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Safety Commission**

**Commission canadienne de  
sûreté nucléaire**

**Public hearing**

**Audience publique**

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**Le 26 septembre 2019**

**Public Hearing Room  
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280 Slater Street  
Ottawa, Ontario**

**Salle des audiences publiques  
14<sup>e</sup> étage  
280, rue Slater  
Ottawa (Ontario)**

**Commission Members present**

**Commissaires présents**

**Ms Rumina Velshi**

**M<sup>me</sup> Rumina Velshi**

**Assistant Secretary:**

**Secrétaire-adjointe:**

**Mr. Marc Leblanc**

**M<sup>e</sup> Marc Leblanc**

**Senior General Counsel:**

**Avocate-générale principale :**

**Ms. Lisa Thiele**

**M<sup>e</sup> Lisa Thiele**

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Ottawa, Ontario / Ottawa (Ontario)

--- Upon commencing on Thursday, September 26, 2019  
at 1:01 p.m. / L'audience débute le jeudi  
26 septembre 2019 à 13 h 01

### **Opening Remarks**

**THE PRESIDENT:** Good afternoon and welcome to the public hearing of the Canadian Nuclear Safety Commission.

My name is Rumina Velshi and I am the President of the Canadian Nuclear Safety Commission.

With respect to today's hearing, as provided for in the *Nuclear Safety and Control Act* and the *CNSC Rules of Procedure*, I will be sitting as the Panel for the Commission.

I would like to begin by recognizing that we are holding this hearing in the Algonquin Traditional Territory.

Welcome to all those joining us by electronic means.

Ms Lisa Thiele, Senior General Counsel to the Commission, and Mr. Marc Leblanc, Secretary of the Commission, are also joining me on the podium today.

I would like to start today's hearing with a safety moment. Today's safety moment is on hotel safety.

Over the summer I have been travelling quite a bit and I'm sure those of you here today and those joining us via Webex or other means also do a fair bit of travelling and staying in hotels and I wanted to share a couple of stories with you.

I was in Sweden and Finland over the summer and both those countries have gone through a country safety culture assessment that the Nuclear Energy Association conducts and one of the findings for both those countries was that they tend to be very trusting and so, you know, if you think of trust but verify, they don't do but the verify bit, and for folks in the nuclear industry that is a cause of concern because a fundamental aspect of a strong safety culture is a questioning attitude and it is one that both countries have identified as one that they need to work on. So I was aware of that and so now I come to the hotel safety part.

I was in Helsinki and I got to my hotel and my key wouldn't work in the elevator. So I go to the reception and I had my sleeve and I said, "The key is not working. Can I get another key for room..." whatever it was. And she gives me a key. And I got to the room and

there is someone in the room and I went "Oh-oh". So I come down and I said, "You know, there is someone in the room." So she looks in the registry and she says, "You are not registered at this hotel. It's our sister hotel a block away." So I had come to the wrong hotel, they had given me a key to a room without asking for ID, which is standard practice in hotels everywhere, but again, it just -- to me just confirmed how trusting they are.

So the safety moment in all of this, when you stay in hotels, to prevent strangers from intruding into your room, use the safety latch or the safety chain. So I thought I would leave that with you.

I will turn the floor now to Mr. Leblanc for some opening remarks.

Marc...?

**MR. LEBLANC:** Thank you.

Bonjour, Mesdames et Messieurs.

The Canadian Nuclear Safety Commission is about to start the public hearing on the application by the Saskatchewan Research Council, or SRC, to authorize the decommissioning of the SLOWPOKE-2 reactor.

The hearing is conducted by electronic means, as a pilot. Thank you to those who are participating for your collaboration and understanding, as

we are experimenting with Webex and other means.

The hearing is recorded and the transcript will be available on the Commission's website in approximately one week.

To make the transcripts as meaningful as possible, we would ask everyone to identify themselves before speaking.

I would also like to note that this proceeding is being audio-webcast live and that the proceeding is also archived on our website for a three-month period after the close of the hearing.

Also, there is no simultaneous interpretation for today's proceeding due to technical challenges that we are working to address with respect to future proceedings.

As a courtesy to others, please silence your cell phones and other electronic devices, as well as using the mute function when not speaking for those participating via electronic means.

This is a one-part public hearing. A Notice of Hearing in writing had been posted on the CNSC website on June 12th, 2019, with the submissions from the Saskatchewan Research Council and CNSC staff.

Following a request made on June 20th by

the Canadian Environmental Law Association, or (CELA), on its own behalf and that of Northwatch, the Inter-Church Uranium Committee Educational Cooperative and the Concerned Citizens of Renfrew County and Area, the Commission agreed to modify the format of the hearing and invite the public to make oral presentations on SRC's application. A revised Notice of Public Hearing was posted on June 27th, also extending the deadline to file submissions.

Participant funding was made available to intervenors to prepare for and participate in this public hearing. Two groups are receiving funding. The funding decision is available on the CNSC website.

The public was invited to participate either by oral presentation or written submission. August 26th was the deadline for filing by intervenors. The Commission received and permitted seven requests for intervention.

September 18th was the deadline for filing of supplementary information and I note that presentations have been filed by the SRC, CNSC staff, as well as intervenors.

SRC representatives are in attendance and also have representatives from Candu Energy available via Webex. One intervenor is in attendance in Ottawa and the

others are joining us by Webex or teleconference.

We will begin with the presentations by SRC and CNSC staff, followed by the presentations from intervenors. President Velshi will have the opportunity to ask questions after each intervention.

After the oral interventions, we will proceed with the three written submissions filed by intervenors and end with final questions.

Ms Velshi, President and Chief Executive Officer of the CNSC, will chair today's public hearing.

Ms Velshi...?

**THE PRESIDENT:** Thank you, Marc.

I would like to start the hearing by calling on the presentation from Saskatchewan Research Council, as outlined in Commission Member Documents 19-H100.1 and 19-H100.1A.

I will turn the floor to the President and CEO of SRC, Mr. Mike Crabtree.

Over to you, Mr. Crabtree.

**CMD 19-H100.1/19-H100.1A**

**Oral presentation by the Saskatchewan Research Council**

**MR. CRABTREE:** Madam President,



Mr. Secretary, ladies and gentlemen, thank you very much for the opportunity to speak and present at this hearing.

I have a short presentation which I will start with now if this is brought up on the screen.

Okay. So this is SLOWPOKE-2 Research Reactor, our submission from Saskatchewan Research Council, which I will refer to as SRC throughout this presentation.

First, I would like to cover the decommissioning decision.

So SRC has evaluated all options after 37 years of service and the most business practical, cost-effective solution is to decommission the reactor.

The services the reactor previously provided have been replaced with alternative and effective technologies through SRC's Environmental Analytical Laboratories.

The operating licence requires SRC to hold funds in trust for decommissioning. For more than a decade, SRC has been building the funds in this trust.

Once that decision had been made, we created a strategy for the decommissioning approach where the overwhelming focus is on safety and to follow the appropriate regulations. Understanding that we are not experts in reactor decommissioning, it was to go forth and

hire industry experts to assist in the process and communicate openly with all of our stakeholders and the public as appropriate.

I would reiterate that safety is an overriding priority for SRC and the SLOWPOKE-2 reactor has operated trouble-free since its commissioning in 1981.

I want to --

**THE PRESIDENT:** I'm sorry, can someone just change the slides along with you?

**MR. CRABTREE:** Oh, yes.

Apologies.

--- Pause

**MR. CRABTREE:** Okay.

I wanted to spend one slide of our presentation talking about the impacts of the SLOWPOKE-2 reactor over its 37 years of operation.

In terms of research, over 242,000 tests were performed for a wide variety of clients, both in Saskatchewan, Canada and internationally. It has been an extremely useful teaching and collaboration tool with faculty and students from the University of Saskatchewan and other academic institutions. And from an environmental standpoint we have received samples from industries across Canada and around the world. So the reactor has had a

significant research and practical impact.

In terms of public information, SRC has held a mandated public meeting on December 5th, 2018, in Saskatoon and invited stakeholders, including municipal, provincial and federal governments, indigenous groups, the University of Saskatchewan and representatives from community associations.

Extensive information is available on our website, including frequently asked questions, milestones, a blog post and video about the reactor.

In terms of the team that is working forward for decommissioning, SRC has contracted Candu Energy to decommission the SLOWPOKE-2.

Candu has successfully decommissioned two other Canadian reactors at Dalhousie University and obviously the University of Alberta as well. This has been, we believe, a continuing successful partnership between SRC, Candu and the Canadian Nuclear Safety Commission.

With that, I would complete our short presentation. Thank you.

**THE PRESIDENT:** Thank you very much.

I would now like to move to the presentation from CNSC staff, as outlined in CMD 19-H100

and 19-H100.A.

I will turn the floor to Ms Haidy Tadros for the presentation.

**CMD 19-H100/19-H100.A**

**Oral presentation by CNSC staff**

**MS TADROS:** Thank you and good afternoon, President Velshi.

For the record, my name is Haidy Tadros, I am the Director General of the Directorate of Nuclear Cycle and Facilities Regulation.

With me are my colleagues, Dr. Caroline Ducros, Director of the Nuclear Processing Facilities Division, and Mr. Pierre Tanguay and Mr. Ismail Erdebil, Senior Project Officers who are responsible for the licensing and compliance of research reactors.

Also present in the room are a number of specialists from various areas of expertise at the CNSC who have been involved with the SRC's SLOWPOKE reactor operation and decommissioning and who are available to answer any questions the Commission may have.

In this presentation, CNSC staff will provide an overview of SRC's application to amend its

non-power reactor operating licence to include decommissioning activities. We will also provide the conclusions drawn by CNSC staff's review of SRC's safety performance and the current status of the facility.

We also want to take the time to acknowledge the interventions received from members of the public and non-government organizations. The presentation will identify the key themes emerging from these interventions and we will present CNSC staff's responses to the concerns.

A comprehensive table dispositioned of the interventions can be found in the annex to this presentation. We will then provide CNSC staff's conclusions and recommendations on this file.

I will now pass the presentation over to Dr. Ducros to present the highlights and the important considerations in this application.

**DR. DUCROS:** Good afternoon, President Velshi. My name is Dr. Caroline Ducros and I am the Director of the Nuclear Processing Facilities Division.

On December 14th, 2018, Saskatchewan Research Council applied for an amendment to its non-power reactor operating licence to include decommissioning. The reactor had ceased operating at the end of April 2019. SRC

submitted a detailed decommissioning plan and a suite of documents that describe the processes, the controls and the programs to support the decommissioning project.

I would like to point out that although defuelling of the reactor is discussed in the decommissioning plan, the current operating licence allows for this activity to occur.

Under the proposed decommissioning project, the reactor and all support systems will be dismantled. The waste will be segregated according to its level of contamination. Non-radioactive waste will be managed as general waste and any radioactive waste will be transported to a licensed nuclear waste management facility.

The pool water will be purified by an ion-exchange column and once the water has achieved unconditional clearance levels, it will be released to the City of Saskatoon's sewer system.

In addition, once SRC demonstrates to the CNSC that the concrete pool has been decontaminated to unconditional clearance levels, it will be filled with concrete.

The end-state objective after decommissioning is completed is to return the facility to a

state of unrestricted use and therefore free of regulatory control by the CNSC. The CNSC will continue to regulate and oversee the facility until it is satisfied that the end-state objectives have been demonstrated. This approach is consistent with previous SLOWPOKE decommissioning projects.

This table clarifies some of the important distinctions between the activities that are normally conducted during the operating and decommissioning phases.

Operating and refuelling of the reactor are carried out only under the operating phase, whereas dismantling and disposal of reactor components are specific activities under decommissioning. Defuelling can be carried out under either the operating or the decommissioning phases.

It is important to note that the transportation of spent fuel is subject to a transport licence which is issued by a Designated Officer. The licence to transport spent fuel is subject to an acceptable transport plan which includes security measures and an emergency response plan. Since the fuel is subject to a repatriation agreement between Canada and the United States, the transport package must also be certified for the specific contents in both Canada and the United States.

Transportation of the fuel is also subject to a non-proliferation and export permit and it is subject to inspection and control by the International Atomic Energy Agency, IAEA.

The Saskatchewan Research Council has a history of satisfactory performance in all 14 safety and control areas as it has been shown in the past CNSC Regulatory Oversight Reports, CMD 18-M32 presented in August 2018 and CMD 16-M43 presented in November 2016.

CNSC staff assessed SRC's application for the licence amendment, which included a detailed decommissioning plan, the training program, the radiation protection and environmental protection programs, and other programs and processes that ensure the workers, the public and the environment are protected.

The SLOWPOKE reactors are low-risk facilities. Their design is simple and the components are relatively few. The entire fuel core is approximately the size of a small pail. Radiation fields around a SLOWPOKE reactor are similar to background levels and operating staff at SRC do not require to be designated as nuclear energy workers.

SRC hired Candu Energy as the contractor responsible for carrying out the proposed decommissioning



activities. Candu Energy successfully conducted the previous University of Alberta and Dalhousie University SLOWPOKE decommissioning projects and lessons learned from these projects were incorporated into the work plans and in specific training developed for the project.

I will now discuss the current status of the SRC SLOWPOKE reactor.

The reactor was last operated on April 30th, 2019, and has remained shut down since then. The reactor was defuelled on August 15th, 2019. CNSC staff conducted an inspection of the defuelling operation and packaging of the fuel core and inspectors from the IAEA were also present. The CNSC inspection identified no regulatory non-compliances and the operation was conducted without any incident.

The IAEA inspectors applied a seal on the transport package to ensure that the fuel is safeguarded and that it cannot be redirected during its transportation to Savannah River in South Carolina.

The fuel was received at Savannah River on September 9th, 2019, without any incidents. Repatriation of the highly enriched uranium fuel core to its country of origin is done under the Canada-U.S. Agreement on Minimization of Highly Enriched Uranium Inventories.

All other components of the reactor will remain on site pending the decision of the Commission on this application to decommission the facility.

If the Commission decides to grant this licence amendment, SRC will proceed with the decommissioning work, including dismantling the reactor and systems, disposal of reactor components at a licensed waste management facility, and disposal of the reactor water once it is purified and meets the acceptance criteria.

The entire facility will be surveyed for any contamination. CNSC staff will conduct an inspection once this work is completed.

If the pool is determined to be clear of contamination, and subject to CNSC staff's inspection, it will be filled with concrete. SRC will then issue an End-State Decommissioning Report, which will contain all the survey results, the waste characterization, the radiological dose incurred by workers and any lessons learned from the project.

Other than the End-State Report, the current application contains all the information required by the *General Nuclear Safety and Control Regulations* and *Class I Regulations* to authorize the abandonment of the facility. The authorization to abandon will be conditional

on an acceptable End-State Report, which would need to clearly demonstrate that there are no longer any radiological hazards at the facility. An inspection by CNSC staff will verify the results of the End-State Report.

If a licence to abandon is granted, the facility will be removed from CNSC's oversight and from any requirement under the *Nuclear Liability and Compensation Regulations*.

The public was invited to comment on SRC's application by way of written submissions and oral presentation.

Participant Funding was offered in the amount of \$15,000.

Nuclear Waste Watch was awarded \$10,796 and Northwatch was awarded \$1,918.

A total of seven interventions were submitted in writing. Details of the interventions are provided in the annex of this presentation, with CNSC staff's response to each concern.

The interventions expressed many similar concerns on a number of topics. These are summarized in this slide. Detailed responses to each comment and concern are provided in the table in the annex.

One of the concerns expressed is that

radioactive water will be discharged to the municipal sewer system. CNSC staff would like to clarify that no radioactive water is to be released to the environment. The pool water is discharged only after it is purified through an ion-exchange column and only if it meets stringent requirements listed under Appendix R of the Regulatory Document REGDOC-1.6.1 Licence Application Guide: Nuclear Substances and Radiation Devices. There are no harmful effects to health or the environment at these levels. The entire pool volume is approximately 28,000 litres, or the equivalent of a small above-ground pool.

Another concern expressed is that radioactive waste will end up in municipal landfills. This will not happen. All the waste from decommissioning of the SRC facility will be segregated and characterized. No radioactive waste is to be sent to municipal landfill. Waste will be sent to municipal landfill only if it meets stringent release levels listed in the *Nuclear Substances and Radiation Devices Regulations*. There are no radiological risks at these levels.

Intervenors also expressed concerns related to the abandonment of the pool. CNSC staff would like to clarify that the pool structure can be abandoned only if it meets the unconditional clearance levels from

the *Nuclear Substances and Radiological Devices Regulations*. Once again, there are no radiological risks at these levels.

Another main concern expressed was related to the transportation of radioactive waste. CNSC staff would like to note that the transportation of radioactive waste is a highly controlled activity. Transportation of waste is governed by the *Packaging and Transport of Nuclear Substances Regulations, 2015*, and also by Transport Canada. Transportation of low-level radioactive waste across Canada is conducted every day and safely.

With regard to Canada's long-term strategy for the management of low-level and intermediate waste, Natural Resources Canada's Policy Framework for Radioactive Waste specifies that waste owners are responsible, in accordance with the "polluter pays" principle, for the funding, organization, management and operation of the facilities required to safely manage their waste over the short and long terms. Licensees are obligated to adhere to the terms and conditions of a licence, including references to standards, decommissioning planning and financial guarantee requirements. The financial guarantees ensure the costs of decommissioning, including management of the waste, are covered by the licensees. SRC pays a fee to CNL

for the transfer of the waste, which includes management of the waste.

I will now pass the presentation to Ms Tadros for the final remarks and recommendations to the Commission.

**MS TADROS:** Thank you.

For the record, this is Haidy Tadros.

With these considerations, CNSC staff recommend that the Commission amend the SRC SLOWPOKE-2 licence to authorize decommissioning activities.

The proposed draft licence is attached to CMD 19-H100.

In conclusion, CNSC staff are satisfied that SRC's application to amend its operating licence to include decommissioning meets the requirements of the *Class I Nuclear Facilities Regulations* and all applicable regulations, and that SRC is qualified to carry on the activity that the licence will authorize, and in carrying on the decommissioning activities, the SRC's SLOWPOKE-2 reactor and SRC will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security, and measures required to implement international obligations to which Canada has agreed.

Therefore, CNSC staff recommend that the Commission amend the licence to authorize these activities.

Thank you.

**THE PRESIDENT:** Thank you, Ms Tadros and Dr. Ducros.

We will now move to the interventions.

Before we start, I would like to remind intervenors that we have allocated 10 minutes for each oral presentation and I would appreciate your assistance in helping us to maintain that schedule. Your more detailed written submission has already been read and will be duly considered. There will be time for questions from me after each presentation and no time limit has been ascribed for the question period.

The first presentation is by the Concerned Citizens of Renfrew County and Area, as outlined in CMD 19-H100.5 and 19-H100.5A.

Dr. Hendrickson, the floor is yours.

**CMD 19-H100.5/19-H100.5A**

**Oral presentation by the**

**Concerned Citizens of Renfrew County and Area**

**DR. HENDRICKSON:** Thank you, Madam

President, for this opportunity. I do have a very short presentation.

I am Ole Hendrickson, Researcher with Concerned Citizens of Renfrew County and Area. We are located in the Upper Ottawa Valley and one of our main concerns has been management of waste and prevention of pollution at the Chalk River Laboratories.

So why would our group care about a small SLOWPOKE reactor in Saskatoon thousands of kilometres away? Most of the waste from that reactor from the decommissioning would be sent -- will be probably sent to the Chalk River Laboratories, so the long-term management considerations will fall to the managers of that facility.

Also, reactor decommissioning is becoming a very important matter in Canada. The federal government alone has six medium-sized, I would say, shutdown nuclear reactors awaiting decommissioning, two of which are at Chalk River. So how decommissioning proceeds, how the CNSC manages decommissioning is becoming a priority.

I am a bit concerned that we are hearing from the Licensing and Compliance of Reactor Division and one wonders why CNSC doesn't have a decommissioning and waste specialist here today to talk about reactor decommissioning.



So, as we heard already in part, the fate of the waste from the Saskatoon SRC would be the SLOWPOKE. Most of the radioactivity would be contained in the nuclear fuel and would be shipped to the Savannah River site -- has been already apparently. The beryllium reflector assembly would go to Chalk River; that has the second most highest level of radiation. And then there are some other. There is a lower reactor container and upper reactor container and, as we just heard, there is the concrete reactor pool which has some radiation in it and that would be buried on site if it presumably passes the clearance levels. And also, we discussed the discharge of the reactor pool water to the municipal sewer in Saskatoon.

This is probably familiar to some, but, just very briefly, Radioactive Waste 101. The splitting of U-235 and also Plutonium-239 releases neutrons and alpha particles and so you get new actinides in the fuel: isotopes of neptunium, americium, plutonium and so forth. But the main -- the largest number of waste radionuclides comes from the fission of U-235 and Plutonium-239. The SLOWPOKE decommissioning waste management plan lists fully 191 fission products and some of the major ones are Cesium-137, Strontium-90, Yttrium-90, Barium-137m.

And one of our concerns that maybe hasn't

been fully taken on board is the activation products that come from the release of neutrons from U-235 and Plutonium-239, which cause normally non-radioactive isotopes such as Cobalt-59, Iron-54, Nickel-62, which are components of metal, and some of the things in the concrete to become radioactive and some of those actually are fairly long-lived.

Some of the problematic ones that would likely be found in the concrete reactor pool, and certainly there is a lot of research in other countries that show this, such as Denmark, where I think they take reactor decommissioning very seriously and they have a very active research program in the university there, which we seem to be lacking in Canada. Tritium of course is a major activation product with its 12.3 year half-life and Carbon-14 with its 5,700 year half-life, Chlorine-36 with a 300,000 year half-life, Calcium-41 with a roughly 100,000 year half-life.

And another major activation product which just came to my attention today actually -- I was looking again through the decommissioning and waste management plans -- is Nickel-59. Nickel-58 is the most abundant isotope of nickel and nickel is used to make stainless steel. There are even forms of rebar that contain

stainless steel. I don't know what kind of rebar was used in the concrete pool at the SRC reactor, probably not stainless steel rebar, probably just ordinary carbon steel rebar, but certainly there are stainless steel components of the SRC SLOWPOKE that would have large amounts of Nickel-58 which would be activated to Nickel-59, which has a 75,000 year half-life.

So these are problematic isotopes. These are mobile. These are isotopes that -- these are all essential elements, with the potential exception of chlorine, but certainly hydrogen, carbon, calcium and nickel. So you don't want to leave them on site. You don't want to entomb them in concrete.

And you -- I know that I read the dispositioning in my comments about this and the dispositioning document says that these are not being ignored, but instead a matrix is being used to determine the amounts and they have been assessed via calculation methods.

I would suggest that assessing long-lived radionuclides by calculation methods is unacceptable. Either SRC and/or SNC-Lavalin or Candu Energy should make actual measurements of these long-lived radionuclides to ensure that whatever is left behind in that concrete pool

is below clearance levels.

And I know that the dispositioning in my documents also talks about the measurement of the radionuclides in the materials that will be shipped to Chalk River. And again, if we don't have transparent and well-documented assessments of not just what is estimated to be in the waste that would be shipped to Chalk River but actual documented measurements, then I think we may be doing future generations a disservice by leaving them with wastes for which we simply don't know what's in them and we certainly at this point only have licensed storage facilities at Chalk River and no final disposal plan.

So my concern is that we are moving into quite a number of decommissioning projects that are going to be larger than the SLOWPOKES, such as Douglas Point, Gentilly-1, the Rolphton reactor, the two -- the NRX and NRU at Chalk River, and we don't have a robust regulatory system to determine what kind of wastes are in these decommissioned reactors, in the metal, the concrete, and how to manage these properly over the long term. We are tearing them down and we are shipping them, but we don't know what we are going to do in future with them.

When I read the decommissioning -- detailed decommissioning plan, the focus is very much on

the gamma emissions from the waste transport containers. Now, that is of course important for the public, it is important for the workers that are transporting the waste, the workers that are putting the waste into containers, but in terms of the long-term fate of these wastes we need to know more.

We need to know about the alpha emitters, we need to know how much of the actinides are in there, we need to know about the long-lived beta emitters. And some of these things, like Calcium-41 and Nickel-59, they don't even have -- they're not really -- they're not emitting beta particles, they're decaying by electron capture and then they may be emitting weak X-rays, or in the case of Nickel-59 it can actually emit some gamma on a rare basis. So if we don't have good evidence that these radionuclides that are very long-lived have been properly measured and we are not studying their potential mobility in the environment, their toxicity to humans, we are doing future generations a disservice.

So when I see that this is a Saskatchewan Research Council reactor, it has been operating well for quite a number of years, they have done a lot of even environmental work, I think the Research Council has a bit of a responsibility to look after the waste.

So who is the waste owner? We hear that the waste owner under the federal radiation -- what's it called -- the Radioactive Waste Policy Framework. Under that framework the waste owner is responsible for decommissioning and waste management. So Saskatchewan Research Council pays Canadian Nuclear Laboratories a fee for waste management, yes, that is true. So the waste gets shipped to CRL and CNL gets a fee, but then who becomes the waste owner? Who is the waste owner once the waste arrives at Chalk River? This is unclear to me, but the likelihood is, since CNL is only a contractor working for Atomic Energy of Canada Limited, that the waste owner de facto is going to become the people of Canada.

So we are accumulating wastes from small reactors like the SRC SLOWPOKE, but potentially in future from much larger reactors, including reactors owned by the federal government, owned by AECL, and we do not have a long-term plan, acceptable plan for the management of the wastes arising, and this is imposing an unacceptable burden on future generations.

This is why in our recommendations we say, slow down, let's have a better look at this and perhaps defer decommissioning of this reactor until we have a better handle on the wastes arising. Thank you.

**THE PRESIDENT:** Thank you very much.

So let me start off with maybe an easier question to staff.

So who is the owner of the waste once it has arrived at CNL?

**MS TADROS:** Haidy Tadros, for the record.

We do have our Specialists in Decommissioning and Waste Management here to support staff in answering the detailed questions and I would like to pass this one over to Ms Nancy Greencorn.

**MS OUE:** For the record, Shirley Oue with the Waste and Decommissioning Division.

The waste that -- the decommissioning waste that would be transferred to the Canadian -- sorry, Chalk River Laboratories becomes the owner -- Chalk River Laboratories becomes the owner of that waste.

**THE PRESIDENT:** Thank you.

So, Dr. Hendrickson, that was -- your first question is answered, we do --

**DR. HENDRICKSON:** Well, that begs the question who owns Chalk River Laboratories?

**THE PRESIDENT:** We will get into that. So we do have decommissioning and waste specialists here. The title of the waste goes to Chalk River Laboratories.

So the other question -- and you have raised this a number of times -- is around the potential inadequate characterization of the waste as well as what may be left behind. And I would like maybe staff to start off with the different radionuclides that Dr. Hendrickson mentions that are hard to -- probably hard to measure, but they are long-lived, they are mobile, hazardous. What is your comment on that and how can we get reassured that the waste is indeed adequately characterized?

**DR. DUCROS:** Dr. Caroline Ducros, for the record.

Before I pass it back to our specialists in this area, I would just like to clarify that in a decommissioning plan part of what SRC are going to be doing -- and they can speak to this in more detail -- is when they take samples of the concrete in the most contaminated areas and moving out in a circular way, that concrete will actually be removed to the impermeable seal level so it won't be in the pool and grouted over.

So for a more precise answer in terms of the radionuclides, I will pass it back to the specialists.

**MR. TANGUAY:** Maybe I will make some comments on this.

So while, as far as we know, it is true



that some of the radionuclides are assessed in a matrix and they are really the result of a calculation, once the waste is actually shipped it is characterized, and perhaps SRC may want to comment on that. But if we look at -- we will take for example the U of A decommissioning project, the end-state report lists the -- has the record of all the waste shipped and characterization. And perhaps on that I will let SRC --

**THE PRESIDENT:** Okay. SRC can elaborate on how the waste will be characterized.

**MR. CRABTREE:** Thank you. I'm going to pass elements of this question across to Candu Energy, our subcontractor who will be performing the decommissioning.

I think it is important to note and just reiterate that those components of the concrete wall and bottom of the pool, as we said before, will be actually removed, leaving only residual concrete in the pool that is below the regulatory limits. So there will be nothing that is buried within that cement that is above the regulatory limits.

What I will do with regards to the characterization of the material that will be transported to Chalk River, I will pass that across to our colleagues at Candu Energy.

**MR. ALIM:** This is Candu Energy. My name is Shahzad Alim. I will pass this question to our Radiation Physics Specialist, Imelda.

**MR. LEBLANC:** Excuse me, can you speak louder or a bit closer to the speakers because we can barely hear you. Thank you.

**MR. ALIM:** Okay. This is Shahzad Alim from Candu Energy and I will pass this question to Imelda. She is our Radiation Physics Specialist.

**MS ARIANI:** Thank you, Shahzad.

This is Imelda Ariani from Candu Energy.

So it is true that a lot of radionuclides that are potentially present in for example the concrete pool and components in there, most of them we estimated using the state of the industry standard to computational code and we did confirm or we did perform measurements to confirm the validity of the estimate using several of the nuclides. They are not complete, it is understood. However, the ones that have been measured contributed more than 99 percent of the cushion with respect to the unconditional release limit. So nuclides that were mentioned such as Nickel-59 and tritium, Calcium-41, those also were estimated, but the estimated concentration is very, very low and we are confident that even if -- we are

confident that our assumption in the estimations are valid and based on the measurements that were done through other nuclides and the two sets that we used to perform the estimation, the cross-section that we used to estimate the production, et cetera. So since the level is very, very low versus the unconditional release limit, then there is no chance for that nuclide to exit the limit that has been imposed on that specific nuclide.

**THE PRESIDENT:** Thank you.

I will turn to staff again to provide clarification.

So these radionuclides that have been mentioned are never really measured? Actually it is always based on estimation and then some modelling to confirm that the levels are low?

**MS ARIANI:** Correct. These are not diameter, these are very difficult to measure nuclides.

**THE PRESIDENT:** So how does one get confidence on exactly what the levels are?

I will ask CNSC staff to comment on that.

**MS TADROS:** Haidy Tadros, for the record.

So yes, I believe your question has always been in terms of characterization of waste, how do we ensure the radionuclides that are in question are verified

and looked at. So I believe our specialists who do look at the requirements around waste characterization can take this answer.

With regards to the *Nuclear Substance and Radiation Device Regulations*, the schedule that staff do quote for the purposes of the Act and for the purposes of determining what is risk-significant and what is not, those amounts are used and when the specific radionuclide is not found there, as per CNSC staff's disposition, they are grouped in terms of their characterization and their characteristics to ensure that those levels remain below what is in regulations.

So I just wanted to underline and underscore what the importance of that schedule in our regulations represents.

So for waste characterization and what is looked at, I will pass it back to our specialists in waste management and decommissioning.

**MS OUE:** Shirley Oue with the Waste and Decommissioning Division.

SRC's decommissioning waste will be characterized in accordance with the waste receivers acceptance criteria, so in this case it would be Chalk River Laboratories. The Chalk River Laboratories waste

characterization is prepared in accordance with CSA N292.0, which is on the management of radioactive waste and spent fuel. CNSC has reviewed Chalk River's waste characterization documentation. As we know, Chalk River has a licence to possess, manage and store radioactive waste and CNSC staff have found the waste characterization program and documents to be acceptable.

**THE PRESIDENT:** SRC, you said you looked at a number of decommissioning options. Did you look at removing the pool totally?

**MR. CRABTREE:** Mike Crabtree, SRC.

Again, that would be Candu Energy. I will pass that across.

**MR. ALIM:** Yes. This is Shahzad Alim from Candu Energy.

Removing the pool is -- it's not very clear what the question is. The pool is not like above ground, it is sitting inside, below ground, and removing the whole pool, what that would mean?

**THE PRESIDENT:** So you will have read -- a number of intervenors have raised concerns about partial decommissioning. I think the current intervenor, Dr. Hendrickson, also I think uses the term "partial decommissioning", others have used "entombment", because

there is a part of the old reactor, the pool's concrete structure, that is expected to be left behind. I know you are saying that whatever is contaminated will be taken out and only what is clean will be left behind. I'm just asking, was the option of removing, even though it's underground, removing it in its entirety considered?

**MR. ALIM:** Yes, it is considered. What the general practice in decommissioning is when we are doing final surveys, we survey every square inch of the reactor facility. Wherever there is contamination beyond the clearance -- unconditional clearance levels, it is selectively removed and the same principle is applied to the reactor pool as well. Removing concrete unnecessarily just because it is part of the reactor building and thinking that it is contaminated is not the practice which is -- which can be done. So it's measured, it's assessed and then -- only then we remove what is beyond the unconditional limits. Thank you.

**THE PRESIDENT:** Okay, thank you.

Getting back to the question around title of the waste -- and I guess the underlying issue here is if CNL's final disposition or disposal costs skyrocket, what is SRC's liability once the title of the waste has been transferred to them? Any long-term liability that SRC

would still hold?

--- Pause

**THE PRESIDENT:** You look a bit puzzled. Should I -- is it because you don't understand the question? I could try again.

**MR. CRABTREE:** No in the sense that we understand our long-term liability -- our medium long-term liability under the current policy and regulations and we have provision of funds to manage that. Should there be a change in that, that would be a regulatory and policy change, of which we don't have any control over.

**THE PRESIDENT:** The intervenor's comment was, well, why not have deferred decommissioning until CNL has a long-term waste solution in place, and what I read implicit in that is are you transferring your waste before CNL has this long-term solution? There isn't full certainty as to what the costs will be for the long-term disposal of this waste and as a result -- I know you have your decommissioning funds and a financial guarantee, but once the waste has been transferred from SRC to CNL and the title has transferred for the waste, do you still hold any long-term liability for that waste?

**MR. CRABTREE:** Mike Crabtree.

No. The answer to that is once they have

taken title, we have no further long-term liability. Thank you.

**THE PRESIDENT:** Mr. Hendrickson, any comments on what you have heard?

**DR. HENDRICKSON:** Thank you, Madam.

The surveys that would have been done for the University of Alberta SLOWPOKE after the decommissioning would have been gamma surveys, so they would not detect non-gamma emitters and some of the long-lived radionuclides that might still be present in the concrete. So that sort of procedure would seem unacceptable in terms of long-term public health.

And I certainly also want to emphasize the fact that Nickel-59 would not be just a trace waste component, it would be probably a major component of the metal that would be shipped to Chalk River, and again, it's one that you cannot measure with a gamma survey. So unless that is being properly characterized, then we are going to be stuck with a 75,000 year half-life element that is part of a lot of enzymes in our bodies, that is soluble to some extent in water. So I would emphasize that Nickel-59 is one of those isotopes that -- it's not the concrete I'm worried about, it's the waste that is shipped to Chalk River and its long-term fate.



**THE PRESIDENT:** Okay. Thank you very much.

We will move to the next intervenor then. Thank you.

The next presentation is by the National Council of Women of Canada, as outlined in CMD 19-H100.2.

I understand that Ms Gracia Janes will make this presentation by teleconference.

Ms Janes, are you on the phone?

**CMD 19-H100.2**

**Oral presentation by the  
National Council of Women of Canada**

**MS JANES:** I hope I am. Am I on?

**THE PRESIDENT:** Yes, you are on. Over to you.

**MS JANES:** Oh, good. I didn't trust it at the last minute. I'm away from all noise.

Anyway, good afternoon. I am with the National Council of Women of Canada, I am their Environment Vice President.

We have significant interest in and we have strong precautionary policies regarding the lifecycle

and the activities of nuclear power such as the decommissioning and waste management, particularly their potential to harm the public and worker health and safety and the environment.

In this regard, our policy advocates for strong regulatory oversight as well as independent expert input and public participation in related hearings. Therefore, we commend the Canadian Nuclear Safety Commission for responding favourably to requests by public sector groups such as Canadian Environmental Law and the Concerned Citizens of Renfrew County and Northwatch for a public hearing on this application.

Our immediate concerns with the decommissioning application are -- and this has been discussed quite well now by the Citizens of Renfrew County person:

- the planned in situ burial and abandonment of a portion of the residual concrete in the pool, given that in 2018 CNSC allowed the University of Alberta SLOWPOKE reactor to be filled with concrete and abandoned, although portions of the reactor were still radioactive;

- any acceptance that "cores from the reactor pool floor have met clearance levels" when these

will not include the measurements of long-lived, hard-to-measure radioactive substances, and that has been discussed as well and we agree with the previous comments that were made;

- the planned in situ abandonment of the reactor pool "with no institutional control required", despite the above-noted concerns;

- the chemical and radiological dangers to workers from beryllium oxide dust as the reactor is decommissioned -- for example, the decommissioning of both the University of Dalhousie and the University of Toronto reported there were events where decommissioning staff received excessive doses of radiation during the removal of beryllium reflectors; no matter to us that these have been removed, these beryllium reflectors, but these kinds of things do happen and we always have to look, we feel, to the worst-case scenario;

- the collective radiation dose for this application is higher than that allowed for the Alberta SLOWPOKE;

- the plans for "unconditional release" into municipal landfills of "as much waste as possible" and the "processing" of radioactive waste from the reactor pool and its release into the municipal sewage system, given the

difficulties municipalities are having with their waste management, including sewage systems. I realize that they are supposed to be purified, but I'm not quite sure what that purified -- how that works and how effective it is.

Finally, while it is commendable that this SLOWPOKE reactor is being decommissioned, it is essential that no part of the core be abandoned. Its radioactive waste should not be placed in any municipal landfills or released into the municipal sewage system. Rather, using good stewardship, it should be safely stored and retrievable -- well away from waterways, sensitive natural systems and populated areas -- and be under human control.

To conclude, we are not against decommissioning but feel it must be carried out safely using precautionary principles to strictly protect workers, communities and the environment.

And in partial response to CNSC staff comments on our submission, we reiterate that our concerns were also raised by several other groups and we also bring to the Commission's attention the following issues.

With the entombment of even a portion of this reactor pool, there is a potential for ongoing excess radiation in adjoining buildings as found in the U of T 2000 decommissioning. Alpha radiation is hard to detect

and can lead to very dangerous internal exposure for workers. This happened at the Bruce nuclear site when they were working on the nuclear steam generators.

We draw your -- oh, and in case the purification doesn't work for the sewage system as such, we note that sewer systems across Canada have recently been shown to be seriously inadequate and releasing pollutants regularly and we doubt that it could handle radioactive materials.

We draw your attention to the recent CNSC regulation and transportation of liquid high level nuclear waste containing highly enriched uranium from Chalk River through my area of Niagara and into the United States using the same regulatory standards and cautions as solid nuclear waste. In other words, liquid is not the same as solid, we all know that. It goes into the groundwater, it burns at a higher temperature. It is quite different and yet it was treated by all the CNSC staff, by the government itself, as being solid waste and so it was not a problem.

So we feel strongly that there is no harm and much to be gained from previous mistakes in SLOWPOKE nuclear reactor decommissioning and much can be learned from the gaps, inaccuracies and recommendations for improvements presented in the public interest by commenting

agencies.

Therefore, we urge the Commission to ensure these are filled and corrected before a licence to decommission is granted. Thank you.

**THE PRESIDENT:** Thank you very much, Ms Janes.

There are a number of concerns and comments that have been raised and maybe I will start off with staff with the first question -- and Ms Janes isn't the only intervenor who has raised this -- that when it came to the University of Alberta SLOWPOKE reactor, that it had been abandoned with portions of the reactor still radioactive. Can you comment on that, please?

**DR. DUCROS:** Dr. Caroline Ducros, for the record.

I will pass this to the Project Officer in a moment.

I just wanted to clarify that it is a requirement in the end-state report that lessons learned are documented and this has to be done in accordance with CSA N294 for decommissioning of nuclear reactors and also in REGDOC-2.11.2 for decommissioning. Those -- any lessons learned were taken by the contractor and they can speak a little bit more about how they incorporated that into their

plan, but --

**THE PRESIDENT:** So my question wasn't around lessons learned. I will get to that in a moment.

**DR. DUCROS:** Okay.

**THE PRESIDENT:** The question was very much around the Alberta SLOWPOKE reactor and was that abandoned with the reactor still radioactive?

**MR. TANGUAY:** Pierre Tanguay, for the record.

I believe the concern may arise from statements that were in past documents and one of the CMDs that we submitted, CNSC staff submitted for the abandonment, which stated that some portions of the reactor had elevated fields and these were extremely marginal -- marginally elevated, something like 0.54  $\mu\text{Sv}$  compared to the acceptance level of 0.5  $\mu\text{Sv}$ .

And I will point out that this is not a regulatory limit. The regulatory limit when it comes to I will say abandoning or letting go, clearing the concrete pool or the material, takes from the *Nuclear Substances and Radiation Devices Regulations*, Schedule 2, which are levels expressed in terms of Bq/g. And as far as our assessment of the U of A application, the entire pool met those clearance levels.

**MS TADROS:** Haidy Tadros, for the record.

I would just like to bring us back to this notion and this terminology that is used in terms of abandonment and the terminology is not appropriate to be used in this case. That terminology is internationally known and that terminology refers to a whole of reactor being left behind. This is not the case that is happening here for SRC, nor was it the case for what was happening at University of Alberta. These reactors are being decommissioned, these reactors are being decontaminated, these reactors are being surveyed to ensure that the list of radionuclides that are present from activation are below the unconditional clearance levels that are provided for in the regulations. And if they are not below those levels, the grout is not used, the grout does not come into play. The pool is cleaned, the concrete walls of the pool are removed. That is the requirement, because they cannot leave behind material that has contaminated the concrete.

So when we look to some of these interventions, the concerns being raised are around levels and values of surveys that were used by the applicant or by the licensee at the time to do their surveys. There is a margin of error around those values and we need to kind of focus in on there is no risk provided for between a value



of .5 and .54. And those were preliminary values that were submitted that were later then used to determine where the contamination was and removed.

So there is no abandonment, there is no leaving behind or entombment of any radionuclides in the pool that we would accept or that we would allow the licensees to do.

**THE PRESIDENT:** So thank you for that clarification. So let me repeat back to make sure that I have understood you right.

If .5 microcuries per hour -- or is it per hour? What's the --

**MS TADROS:** Haidy Tadros, for the record. It is 0.5  $\mu$ Sv per hour. That is a dose rate.

**THE PRESIDENT:** Right.

If 0.5  $\mu$ Sv per hour is -- what would be acceptable to meet the clearance level requirements if what was measured -- because there are only five measurements that are being taken -- if what is being measured is 0.54, then the expectation is that there will be decontamination or removal of whatever is causing those higher fields so that you get below 0.5  $\mu$ Sv per hour; am I correct?

**MS TADROS:** Haidy Tadros, for the record.

That is correct. In terms of ensuring that the levels that are obtained from a dose rate perspective -- and dose rates are established to ensure protection of the workers and the public -- so once that level is reached, the regulatory level is reached, more cleanup is required to bring it down to that level.

**THE PRESIDENT:** And I can tell you and I can see why the intervenors would be confused, because the material that I have seen in the CMDs and from staff CMDs, that was not as clear as it could be. And even in the earlier responses it wasn't as clear as it is. That was a preliminary measurement that then resulted in decontamination taking place or removal of the concrete so that at no time any material that exceeded the 0.5  $\mu$ Sv per hour was left behind; is that correct?

**MR. TANGUAY:** That is correct.

**THE PRESIDENT:** So, Ms Janes, I will turn to you. Does that give you reassurance as far as addressing your first concern?

**MS JANES:** It does to a degree.

I guess I had another point in there about the measurements themselves and some clarification as some of the radiological dangers are not easy to measure. So if I could be assured that that was the case.

But is there absolutely a need to be leaving anything behind? I realize it's economic and at the other end it's the private sector that is doing the end work, along with AECL's help and I think Ontario Power. You know, if that is going to make them money, I would prefer to just have it all taken out, away, so that we don't have to worry about whether it is .5 or whether -- you know, whether there is something there we missed and then that would be complete. I mean this has done its work there, it has been good work and it's finished, but why bother leaving it so that there can be danger there just because -- and I think this is a just because, I know it is a regulation, too, but that you meet that or below it, but I think that it should be taken away. It is no longer being used for this good purpose, it can be taken somewhere, it can be buried safely. It can be managed safely once we find a proper place to put all of this and hopefully not all up near the Ottawa River. Anyway, that's my answer to that. Thank you, Madam, for the --

**THE PRESIDENT:** Thank you. So we did -- I mean I had asked that question when we had our earlier intervenor and we did get a response from Candu Energy on that.

Another question or concern raised by Ms

Janes is why no institutional control.

So maybe, staff, just for the record, if you can just explain why it's not necessary in this particular case, please.

**MS OUE:** Shirley Oue, for the record, from the Waste and Decommissioning Division.

There is no need for institutional control in this case because the decommissioning strategy that is chosen is immediate decommissioning and it will be completely decommissioned. Therefore, it would be cleaned to the levels for clearance and no CNSC regulatory control is required.

**THE PRESIDENT:** Thank you.

And now, Dr. Ducros, coming to you around lessons learned, but I really will ask Candu Energy on this and it is particularly around beryllium oxide dust and hazards associated with that and events that have happened at previous SLOWPOKE decommissioning projects.

So maybe, Candu Energy, you can explain to us what were the key lessons learned and how have you incorporated them for the SRC reactor.

**MR. ALIM:** Okay. This is, for the record, Shahzad Alim from Candu Energy.

There was the first SLOWPOKE reactor that

was decommissioned in the University of Toronto back in the year 2000. There was an issue of beryllium, but not beryllium oxide. Beryllium oxide is a chemical which is poisonous and if somebody inhales, it is considered toxic. So there has never been any issue of beryllium oxide being ingested or inhaled by anybody during any decommissioning of SLOWPOKE reactors.

In the University of Toronto the company who was -- Candu Energy was not decommissioning that reactor. The company that was doing it, they somehow estimated the activity of the beryllium to be of a lower level, but when they pulled it out and placed it inside a shielding container, the dose rates outside the shielding container were still excessively high. Because of that, they had to keep that shielding container in the facility for a longer period of time and in the meantime they could get some more shielding around the container so that it can be safely shipped. So that was the lesson learned for Candu Energy going in for Dalhousie University decommissioning that happened nine years later.

So the lessons learned are always in use, they are good and good practice to have them and make use of them.

Does that answer the question?

**THE PRESIDENT:** It does.

Were there events at Dalhousie, though, dealing with removing the beryllium?

**MR. ALIM:** Can you be more specific about the question, please?

**THE PRESIDENT:** So I'm looking at the intervenor's concern and it says decommissioning of both the University of Dalhousie and the University of Toronto reported there were events with excessive doses of radiation and there may have been some chemical uptakes, I don't know, with the removal of the beryllium reflectors.

So you have talked about the U of T ones. Were there issues or events with the Dalhousie SLOWPOKE reactor decommissioning?

**MR. ALIM:** For Dalhousie SLOWPOKE decommissioning, the end-state decommissioning report was submitted and there was no excessive radiation dose to any worker.

**THE PRESIDENT:** And these lessons learned reports, are they publicly available?

**MR. ALIM:** Yes, ma'am, that is correct.

**THE PRESIDENT:** Thank you. I think we have some intervenors coming later who have expressed concerns about that, but we will get to those then.

The next issue that Ms Janes has raised is a question for CNSC staff, is around the collective radiation dose allowed in that it's higher for the SRC reactor than it had been for the University of Alberta reactor. Can you comment on that, or at least what the final result was I guess of the University of Alberta reactor?

**MR. ALIM:** Is that a question to Candu Energy?

**THE PRESIDENT:** Well, why don't you start, yes. Tell me why your allowable dose is higher than what the actual was for the University of Alberta decommissioning?

**MR. ALIM:** Okay. For the University of Alberta, the total dose that was received by the crew of six persons was 0.26 mSv for a duration of three months. If we average it over each person, it is below the public -- even for the public allowable dose that was so low.

As far as SRC is concerned, we have removed the fuel and shipped it. We are -- our collective dose is 0.165 mSv at this point. So we are similar to what the University of Alberta dose was at this point.

**THE PRESIDENT:** So what is the most

hazardous activity associated with decommissioning?

**MR. ALIM:** For decommissioning of the SLOWPOKE reactors you mean?

**THE PRESIDENT:** Yes, please.

**MR. ALIM:** The most hazardous as far as radiation is concerned, it is the removal of the beryllium annulus, because it has to be brought out of the water and transferred directly into the shielding container and during that time the personnel who are working around, they get a minimal amount of radiation. So our statistics and data show that the highest that a person got on that day, which was August 16th, 0.5  $\mu$ Sv.

**THE PRESIDENT:** And what's the worst thing that can happen with the decommissioning? What is the worst-case scenario?

**MR. ALIM:** Worst-case scenario from a radiological point of view?

**THE PRESIDENT:** Yes, please.

**MR. ALIM:** That the person can be exposed to radiation beyond the level which is assigned -- or beyond the regulatory level of radiation which is assigned to any worker. And in this case it is 1 mSv.

**THE PRESIDENT:** But I mean is it only under a very severe accident scenario? Like what could



cause that to happen?

**MR. ALIM:** Okay, what could cause? If the person is standing near that beryllium annulus for about four hours and nobody notices, that person would get that kind of dose which will exceed the actual level.

**THE PRESIDENT:** And what kind of controls do you have in place to prevent that from happening?

**MR. ALIM:** We have radiation detectors. We have radiation protection personnel who are detecting radiations all the time whenever the work is going on in the reactor room, and the radiation protection personnel, they make sure that nobody gets any dose which that person should not be getting.

**THE PRESIDENT:** And are any of the six employees, or however large your crew is, have any of them -- did any of them work at the University of Alberta SLOWPOKE reactor decommissioning?

**MR. ALIM:** Yes.

**THE PRESIDENT:** All of them?

**MR. ALIM:** No, not all of them.

**THE PRESIDENT:** Okay. Thank you.

Okay. And then maybe the last concern -- and it is raised by other intervenors, I know we will get into greater detail there -- is around the unconditional

release into the municipal landfills of the waste or into the sewage system for the processed liquid.

So maybe the question I will ask here is -- and I will ask you, SRC, and then you may want to transfer that to Candu Energy -- but if after you have processed the liquid and it is still radioactive, what will you do with the liquid?

**MR. CRABTREE:** The ion exchange system that is in place at the moment has already brought the levels in that 28 metric tonnes of water down below the uncontrolled release levels. However, that doesn't answer actually your question what happens if it didn't, so I am going to pass that to Candu Energy.

**THE PRESIDENT:** Except now it becomes a hypothetical question.

**MR. ALIM:** Yes. This is Shahzad Alim from Candu Energy.

So in our plant we always carry additional ion exchange columns. If the ion exchange column which is in use has been saturated with removing the activity from the water, we replace that ion exchange column with a fresh one and continue processing the water unless we meet the target.

**THE PRESIDENT:** Okay. Thank you very

much.

**MR. ALIM:** After that, we take a sample of the water. It is measured from a radioactive point of view. It is also sent to the lab for chemical analysis. When those results come back, only then we see and we get the clearance to pump the water into the sewer by getting the acceptance from the City of Saskatoon.

**THE PRESIDENT:** We will get into this release of water and waste maybe later.

Ms Janes, any final comments?

**MS JANES:** I just have a -- I have a final question, one tiny final question.

**THE PRESIDENT:** Go for it.

**MS JANES:** Regarding the alpha radiation or, you know, the kind of radiation that is hard to detect. I'm not a scientist, I'm just aware of the problems that they did have at the Bruce and the cutting up of the pipes and then the ingestion and long-term health effects. Undetectable. I was part of a hearing related to the transfer of the nuclear steam generators over to Stuttgart and I asked Sir Duncan Hawthorne, who was the head of the company there, you know, how -- if they can't tell what this radiation -- you know, where it is and how do you find out, and he told me that they cut up the -- you know, would

cut it up in little slices. So that's where my connection with -- that's what happened there. It might be some other accident, but at any rate they did have a serious case of over 100 workers that were affected.

Are there any alpha dangers in this particular -- you know in these SLOWPOKES and in the whole process that they are going to go through?

And my final comment is that I feel that why are -- you know, why do we have to take all of this, you know, and trust, trust either by calculation or formula or rules that are sometimes not agreed to in terms of what the actual results are and what comes from them, that we think maybe the dose should be lower even still or should be zero or whatever. I don't know why we have to deal with this, and deal with it without any -- in the absence of any overall federal policy on this kind of waste management and consistency, et cetera.

I understand that, you know, they learn from the lessons learned and they are trying to do better and better, but when you are doing something like this, I think you really have to almost go to the strongest level of scrutiny in a precautionary way.

So that's my final word, but maybe somebody has an answer to the alpha part.

**THE PRESIDENT:** Okay. Well, I will ask staff if they have anything else to add to the response earlier around waste characterization.

**MS OUE:** Shirley Oue for the Waste and Decommissioning Division, for the record.

In the CSA document N292.0, which is General Principles for the Management of Radioactive Waste and Irradiated Fuel, that is covered under Annex B. It covers the characterization and also it covers the alpha and beta spectrometry.

**THE PRESIDENT:** So maybe a simple question. Are we expecting an alpha hazard here both during the decommissioning and then even with the waste handling later and how would we get confidence that we know how much there is?

**MS TADROS:** Haidy Tadros, for the record.

As we would with any licensed facility that deals with nuclear hazard, there are radiation protection programs that need to be put in place. So the programs are intended to work towards ensuring that the licensee has a handle on the work that needs to happen, the hazards that that work reflects, protection of the workers should a situation occur that these hazards become in front of them and in doing so mitigate those hazards through

these programs. So do events happen? Yes, events do happen. That only requires a tighter perspective from the licensee's side to ensure that their radiation protection program is reviewed and improved with every situation.

From the regulatory perspective, CNSC staff review the radiation protection programs to ensure that these programs meet requirements, but also that they are commensurate with the activities that the licensee is putting forward to protect their workers, their contractors and the personnel in the area when these activities do go on.

**THE PRESIDENT:** So then maybe I will ask you very specifically for the activities envisaged here. Is there an alpha hazard anticipated and does the radiation protection program of SRC address that?

**DR. DUCROS:** Caroline Ducros, for the record.

I just want to stress that there is a high conservatism in the estimates of doses to the public and I will pass it to both the radiation protection experts and also the environmental risk assessment experts to give you an assessment of the detail that we go in just to estimate what potential dose could have occurred -- or could occur should they get this licence.

**MS PURVIS:** Caroline Purvis. I am the Director of the Radiation Protection Division, for the record.

I'm going to complement Ms Tadros' answer in just pointing out in staff's CMD there is detail about the provisions in the radiation safety program to protect workers and to minimize their exposures.

With respect to the reference to the event that happened a number of years ago at Bruce Power, that was due to intakes of airborne contaminants. In this particular activity there are a number of provisions in place that will ensure that workers are protected. There is personal protective equipment, that is, the use of clothing and respiratory protection, to limit any kind of intake. Furthermore, there is real time monitoring, I-cams which detect alpha, beta and gamma radiation. There is also certainly a provision such as contamination monitoring and others that will ensure that workers are protected from the spectrum of hazards that could be presented here.

**THE PRESIDENT:** Thank you very much.

**MS SAUVÉ:** Kiza Sauvé, I am the Director of Health Science and Environmental Compliance Division.

In order to answer the question about public dose, a highly conservative assessment was done for

these types of facilities and the estimate of public dose is below 10  $\mu\text{Sv}$  per year. So the public dose limit is 1,000  $\mu\text{Sv}$  per year, so we don't expect to see anything in any range of concern.

**THE PRESIDENT:** Thank you very much.

Thank you for your intervention, Ms Janes.

We will take a 15-minute break and resume at quarter to 3:00.

Thank you.

--- Upon recessing at 2:32 p.m. /

Suspension à 14 h 32

--- Upon resuming at 2:45 p.m. /

Reprise à 14 h 45

**THE PRESIDENT:** Okay. The next presentation is by Northwatch, as outlined in CMDs 19-H100.6 and 19-H100.6A.

I understand that Ms Brennain Lloyd is joining us for this presentation.

Ms Lloyd...?

**MS LLOYD:** Yes, thank you. I'm here.

**THE PRESIDENT:** Oh, perfect. Thank you. Over to you then.



**CMD 19-H100.6/19-H100.6A**

**Oral presentation by Northwatch**

**MS LLOYD:** Thank you.

So thank you for your decision to hold the public hearing on the SRC decommissioning licence application. My name is Brennain Lloyd and I am associated with Northwatch. We are a regional organization in Northeastern Ontario. And true to form my battery is running low, so I have to slide over and plug in, so excuse me for that.

Next slide, please. Next slide, please.

**THE PRESIDENT:** We are trying.

**MS LLOYD:** Okay. Great, thank you.

So the proposed licence amendment would authorize SRC to decommission the facility. There was some ambiguity in the documents as to whether the removal of the reactor core and its transportation from the facility was part of the operating licence or part of the decommissioning licence. That was certainly clarified today with the news that that reactor core has already been shipped to Savannah River.

The primary documents Northwatch relied

upon in this review were the Commission Member Documents by both the licensee and CNSC staff, staff's environmental protection review, the decommissioning plan prepared by SNC-Lavalin and the decommissioning waste management plan, with some reference to additional documents.

Throughout the documents much of the information was provided in a similar format, sometimes so similar it was repeated wording in several documents, but there were also some important inconsistencies between the documents and we did identify some of those in section 5 of our report.

Next slide, please.

So Northwatch's interest as a regional organization in Northern Ontario is in those -- primarily in those issues which are going to potentially impact on our region and our membership and our area of concern most directly, that being the transport of radioactive waste through Northern Ontario.

We are also very concerned about the continuing practice, continued practice of transferring high level radioactive waste and other radioactive waste across international borders from Canada to the U.S. We do understand the agreement that it is made under. It is still a matter of concern.

We are also very concerned with the setting of precedents in CNSC decision-making and particularly at this juncture in time decommissioning decisions.

Next slide, please.

So with respect to radioactive waste management, there were important information deficiencies throughout the document and some inconsistencies. We are also very concerned with the in situ waste disposal. I believe it was Ms Tadros objected to the language of abandonment. We will certainly be interested to hear her views on in situ disposal, which is what SNC-Lavalin on behalf of SRC is proposing for the reactor pool.

There were a number of difficulties. There is no debate around a decommissioning project generating waste, but there were several areas of contention with this proposal: the quality of information and planning, the robustness of the plan in terms of its exercise of precautionary principle, and the degree to which the plan has optimized protection of health and the environment.

One of the things we found challenging with the contractor SNC-Lavalin's method of presenting information was it rather swung back and forth between,

from our perspective, highly technical to highly generalized and we didn't quite find that middle path where the information was comprehensive, clearly presented and referenced. And in some cases we found that there were just questions around the reliability of the information and we presented in our submission one example of that and that is from the SLOWPOKE decommissioning waste management plan.

If you look to page 24, Table 1, the lower reactor container irradiation tubes are identified as being placed in a shielding container -- identified as low-level waste but to be placed in a shielding container. Generally speaking, low-level waste does not require shielding.

Then if you move on, in Table 1 the shim tray is identified as intermediate-level waste, irradiation tubes are identified as low-level waste, but in Table C-2 of the same document the shim tray is identified as having a lower level of radioactivity than the irradiation tubes.

These to us just read as inconsistencies. They put the reliability of the information in question. We didn't have technical experts assisting us in this review, but certainly those kinds of examples raised questions for us.

The in situ, the proposal for in situ

disposal, we share the concerns identified by other intervenors.

We also take issue with some of the statements made by SNC-Lavalin and CNSC staff today. For example, SNC-Lavalin, Candu Energy made a remark -- I believe it was them -- made the remark to the effect that they would be -- the degree to which they would be measuring, taking measures or monitoring of the facility and they I think used the term "every square inch". As I recall the documents, and specifically with respect to the reactor pool, there were going to be five samples in the pool, four in a row on the floor and one in the wall. That doesn't coincide for me with this claim of measuring every square inch.

I also -- in the discussion around the University of Alberta in situ disposal of the reactor pool, I really was taken aback by, I believe it was Monsieur Tanguay and Ms Tadros, putting to you, Madam President, that there was no associated increased risk between .5 and .54. If there is no difference between .5 and .54, what about between .5 and .6, between .5 and .7? When is a rule a rule?

I also was surprised -- I believe I heard them tell you, in response to your question, that no

contamination was left in place in the University of Alberta, and that is inconsistent with what I read in the record of decision for the University of Alberta.

So I think that -- we have recommended that there be hold points put in this licence decision and I think that is an example of where we really very much would benefit from the Commission having a hold point in this decision.

Radioactive waste transport, if we could have the next slide, please.

So a number of issues were raised for us in radioactive waste transport: lack of -- required information not meeting the licensee requirements, the overall lack of availability of information, some documents available, some documents denied.

The dose estimates. Dose estimates were provided for the facility, but there were no dose estimates that we were able to identify, certainly not in the detailed decommissioning plan, which provided dose estimates for during decommissioning, including removal of the reactor components and auxiliary components, but no dose estimates were provided for transportation activities and those are in fact part of the proposed decommissioning approach.

Next slide, please.

We have a particular concern about the transportation impacts, potential impacts in Northern Ontario with the shipments through Northern Ontario and we included in our submission a summary of some works that we had done with the support of the Ontario Law Foundation in 2017 and 2018.

In a nutshell, what we found was that there was a real gap in training and education for first responders, and our particular interest is in first responders in rural and remote locations. Those are largely local service boards, small municipalities. There was a real gap in their training and there was no training provided specific to radiological events, with the exception of what is included in the Emergency Reference Guide.

The 2018 Emergency Response Guidebook was the go-to resource that many people in our interviews referenced. It is a 400-page guide. They have 11 pages dealing with six different groupings of radioactive material and we were concerned. We found it disconcerting that each of those sections began with the statement, "Radiation presents minimal risk to transport workers, emergency response personnel and the public during

transportation accidents". There was not a similar statement in front of the other sections dealing with other hazardous toxic chemical materials and we found it disconcerting, to say the least, that that is really most of the training and education available to first responders in rural and remote communities in Northern Ontario and we think it is misleading.

That, coupled then with the absence of a radioactive waste transportation plan, the omission of transportation emergencies from the emergency response plan, they present, in our view, the real potential for first responders in rural communities and remote locations during transportation route accidents to be put particularly at risk.

Next slide, please.

So additional issues, and there were many of them, and perhaps in questions we can come back to some of the issues raised around planned release of radiological materials, namely waste to the landfill, liquid to the sewer treatment plant, but I want to focus on one that is particularly important to us and that is around the duty to consult.

Canadian Nuclear Safety Commission staff determined that there was no duty to consult. It's as if



they drew a line around the facility and didn't look beyond it, certainly didn't look at the transportation aspects of this activity, licensed activity. And though transportation has the potential to adversely affect Aboriginal and Treaty rights and Indigenous people along the route, the shipping for the shipments to Savannah River have already taken place, would go through Treaty 6 and Treaty 4 territories. The shipments for the low- and intermediate-level waste that are destined to Chalk River would go through Treaty 4 and Treaty 6, but also through Treaty 3, Treaty 9, and we don't know the route yet, so either Robinson-Huron or Robinson-Superior Treaty areas in Northern Ontario, and we take exception to there having been no duty to consult acknowledged and exercised with respect to Indigenous peoples in Northern Ontario. And certainly Anishinaabe Nation, who represent Robinson-Huron and Robinson-Superior Treaty areas, have gone on record fairly recently with the Commission identifying their concerns and I think that this was a real shortcoming and an unacceptable shortcoming in the conduct of this review.

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So I will just quickly go through our conclusions, which are all stated in terms of requests to the Commission.

So we request that the Commission take a number of actions, the first being to have SRC or their contractor fill the information gaps that have been identified not only by Northwatch but by other intervenors and I believe in the course of today's proceedings by the Commission itself.

The second is to create a hold point through the licence conditions so the Commission itself reviews the radiological survey results for the reactor pool floor and the wall and the decision is made by a multimember panel. I think that the University of Alberta -- pleased to hear -- will have lessons learned included in the end-state report. I think the end-state report should be part of the Commission's considerations at a hold point hearing to really ensure that this in situ disposal is of a reactor pool that is not highly radiologically contaminated, or even minimally radiologically contaminated.

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We request that there be an augmented sampling plan for the reactor pool floor and the walls. We don't think that four in a line on the floor and one in the wall is enough information to support a determination on whether clearance levels have been met or will be met.

We also request that the Commission require SRC to meet the information requirement related to transportation risks prior to giving further consideration to the SRC application. So that could also be in the same hold point hearing.

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And we request that the decision -- in your decision the Commission clarify and confirm decommissioning activities such as removal/shipping of reactor fuel waste are to be undertaken only under a decommissioning licence, not under a reactor operating licence. So this might require looking at other operating licence, something which we haven't undertaken. We were surprised to learn that the fuel core could be removed and transported off-site under the operating licence and we think that is something that the Commission should look to correct in any future circumstances.

We also think that the Commission should clarify and confirm it is stated in the documents that there will be a separate licence for the transport of the spent fuel. We should be -- obviously a lot has come and gone and there was not a separate comment and public hearing opportunity and perhaps in future instances that could be exercised. And in this instance the shipment

issues should be addressed with more information in a hold point hearing.

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And I think this is our last one considering transportation licensing and this could again be in the same hold point hearing. There is a need to have particular engagement with Indigenous communities, First Nations, first responders along the transportation route prior to making a transportation decision.

And finally, future proceedings related to the decommissioning and abandonment of SLOWPOKE reactors should be conducted as a public hearing. As you are doing today, we should have adequate notice, opportunity of both written and oral submissions, which was the end result of this proceeding, but we would request that in future. So that would be for the -- I think there are only two remaining SLOWPOKE reactors, but in those instances they should have full and fair procedures afforded them.

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Thank you. So thank you for your time and I certainly welcome any questions or comments. Thank you.

**THE PRESIDENT:** Thank you, Ms Lloyd, for your presentation.

Maybe I will start off by commenting on

your last point around this hearing being a public hearing.

You, I think, have noted that for the previous SLOWPOKE reactor decommissioning, those were written submissions -- that no submissions were even requested. So we have actually gone a step ahead for this one in inviting the public to submit written interventions if they had any, and then once we heard that there was a level of interest to participate in a public hearing and make oral submissions, we certainly accommodated that, because that is exactly what we want to be able to do.

So let me go through some of the points and concerns that you have raised and those that we haven't already addressed.

So the first one is around inconsistencies that have been identified in the various submissions. I will get both SRC and staff to comment, but perhaps we can start with Table 1 and the low-level waste from the lower reactor container and requiring shielding or that inventories presented in different units.

But maybe, staff, you can start off with your reaction to the various inconsistencies that have been identified.

--- Pause

**DR. DUCROS:** I'm sorry, I'm just trying to

open staff CMD.

**THE PRESIDENT:** No. So this is Northwatch's CMD, page 7. So this is CMD 19-H100.6, page 7, Table 1.

**DR. DUCROS:** Okay.

--- Pause

**DR. DUCROS:** Yes, okay. So the classification of SRC's decommissioning radioactive waste?

**THE PRESIDENT:** That is correct.

**DR. DUCROS:** Thank you.

And if I understand the question correctly, you are asking us to comment on inconsistencies?

**THE PRESIDENT:** So if you look at the preamble to the table -- and I think one of the comments Ms Lloyd is saying is this doesn't lend itself to being understood easily. Radionuclide inventory is presented in curies and the next in grams, et cetera. Then under Table 1, it shows lower reactor container, irradiation tubes, and so on, classified as low-level waste but still requiring shielding containers, et cetera.

**DR. DUCROS:** Okay, thank you.

So I'm going to pass this back to the experts in waste and decommissioning, but I want to -- without reading too far ahead of that table, I just wanted

to put some context around the decommissioning activities in general that I'm not sure came out earlier in the previous presentations.

But one of the things that CNSC staff is expecting, and which is an activity that is proposed as part of the decommissioning, is that core samples are going to be taken, as Ms Lloyd mentioned, and those core samples are going to be taken to confirm the predicted levels of radioactivity. The core samples are going to begin right below where the fuel would have been, so where you would expect the highest contamination to be, and they will radiate out. The results of these characterized samples are going to be in the end-state report. We use mSv in all our documentation, we don't use the curies. So in terms of inconsistencies, CNSC uses that nomenclature.

CNSC staff are expecting those samples to be -- to have very insignificant dose consequences. So if they aren't, if that proves to be different, then the onus would be on the licensee to demonstrate to CNSC staff how they are going to bring those levels to clearance levels.

In terms of this table in itself, I will pass it to my experts in waste and decommissioning to respond.

**MS OUE:** Shirley Oue with the Waste and

Decommissioning Division.

CNSC staff did conduct a sufficiency check of the application, SRC's application, and noted that it was complete. Furthermore, CNSC staff also did a technical assessment of the detailed decommissioning plan as well as the decommissioning waste management plan and found that it met the regulatory requirements.

During its review, staff also noted that there were some overlaps in the application and the DDP and the decommissioning waste management plan. There was reference -- obviously those two plans are referenced in the application, so there was some overlap.

In terms of Table 1, CNSC staff noted there was an inconsistency as well with the beryllium shims, which the question was posed to SRC and they had provided a response to that and made the correction.

**THE PRESIDENT:** Thank you.

So do you want to comment on the low-level waste requiring shielding and that what's classified as intermediate-level waste actually has lower activity than the low-level waste and not require shielding?

**MS OUE:** Shirley Oue with the Waste and Decommissioning Division.

In CSA N292.0, in Annex A there is a



description of low-level waste. So low-level waste does require shielding, but not significant shielding.

**THE PRESIDENT:** And the irradiation tubes, I think it is, have lesser activity than some of the other stuff that has been categorized as low level waste. That is not inconsistent?

--- Pause

**MS OUE:** Excuse me, I'm just looking for Table 1 again.

**THE PRESIDENT:** No. So this is actually Table C-2. If you look in there, and I'm hoping I'm reading this right -- and, Ms Lloyd, you may need to help me here -- but if I look at "Lower reactor container" it has activity of  $1.2 \times 10^9$  Bq and that is classified as low-level waste. And then if I go further down to what was intermediate-level waste, the "Irradiation tubes" and you will see it has, you know,  $10^8$  Bq, but that was intermediate-level waste. So it was just a question of what is low and what is intermediate.

**MS LLOYD:** If I could, I think the question is around the reliability of the information. I didn't do a check to see, to try to find the level of activity for each of these materials identified in Table 1 as low-level waste. I did a simple comparison between

Table 1 and Table C-2. The question is the reliability of the information and I understand CNSC staff checked that the applicant had, you know, provided all the information. Is the information accurate, is it reliable internally and in comparison to what, you know, is known elsewhere, that's the question. And, you know, I don't know, I think that it can only be really remedied by the Commission allowing SRC and SNC-Lavalin to try again.

**MS TADROS:** Haidy Tadros, for the record.

So what I think we are trying to ensure we have established is to address the intervention in such a way that, one, it provides a comprehensive enough response to indicate that from CNSC staff's perspective the waste characterization is a standard that is used across the industry and there are levels and values that are given. It is not a one-for-one. It depends on the radioisotope that is involved. It depends on the decay scheme that is involved. It depends on a series of considerations that are put into a table to allow for the licensee to look at what their waste inventory is and propose to us here is how they have categorized the work that they will be doing and hence the appropriate protection that is needed for that waste.

So in answer to some of the

inconsistencies and discrepancies, I believe the intervenor has done a comprehensive job to identify these specific activities, but it is not a question of comparing it is less here so why is it intermediate, it is more here why is it low. There is a series of considerations that potentially we would need to go through, and we have gone through, to look at the information and ensure that it is accurate and when we do have questions similar to what my colleague Ms Oue indicated, we would go back to the licensees for clarification on why this is considered to be in the bucket of intermediate-level waste or low-level waste.

So I think I would like to hear from them to ensure that it is captured on the record that that systematic approach to how they look at the information and how they compare that information to the standards that are available in the industry and then go back to the licensee with that.

**MS OUE:** Shirley Oue with Waste and Decommissioning Division.

In the assessment of SRC's detailed decommissioning plan, the decommissioning waste management plan and the application, there were a number of regulatory requirements that set the criteria for the review and this

included CNSC regulatory documents, G-219 Decommissioning Planning for Licensed Activities, as well as three CSA documents, two on waste, N292.0 and N292.3, as well as the one on decommissioning, which is 294.

In our assessment the requirements have been met by SRC in their documentation.

**THE PRESIDENT:** Thank you.

Ms Tadros, a quick question for you. Ms Lloyd asked what your thoughts were on the applicant referring to the end-state of the decommissioning as in situ waste disposal.

**MS TADROS:** Haidy Tadros, for the record.

Similar to my response the first time, having the opportunity to work with international peers and international colleagues and putting in place a regulatory framework that speaks to all options of decommissioning, the term "in situ entombment" has a very specific connotation around it, both from an international perspective and from a national perspective as we are updating our CSA standards.

So "entombment" and "in situ" refers to a reactor that is there, that is present, and based on whatever considerations or ideas or plans for it, it gets grouted in place. That is what that terminology is used

for. This is activities that involve decommissioning and decontamination. It is not an entombment of any kind because the reactor, one, is no longer there. There is no accident scenario that would require any sort of proposal to come forward, based on international standards once again, that would look to any sort of plans like this.

So I think the words we use are very important and they set certain ideas and expectations in how we communicate both regulatory requirements and situations to the public, and part of our role, part of our mandate is to disseminate scientific and technical information and ensure that when we refer to certain terms that there is a general understanding of what those terms mean and signify.

So again, my statement previous to that is CNSC staff do not see this as an entombment, that is not what the proposal is that is put on the table, it is decommissioning activities that will involve dismantlement and decontamination of all elements of the reactor that is currently there.

**THE PRESIDENT:** So just to confirm, does the applicant ever refer to this as in situ waste disposal?

**MS TADROS:** I believe the applicant would be in a better position to answer that question, but --

**THE PRESIDENT:** Well, no, but you have reviewed their submission, so I expect you to know as well.

**MS TADROS:** No, that is not what they are referring to.

**THE PRESIDENT:** They don't. Okay.

**DR. DUCROS:** If I could add to the no just to put some context around the pool and the grouting of the pool. The reason why the pool will be filled with cement is to prevent a conventional health and safety issue that there will be a hole there. The grouting and the cement cannot be put in place unless we -- it has been determined that all clearance levels have been met. The purpose of filling it is so that no one falls in it and so that the space can be used for other purposes.

**THE PRESIDENT:** And so on that note, the intervenor made the comment that at the University of Alberta SLOWPOKE there was contamination left behind and I know for this in your opening comments you were quite categorical that there will be no radiological hazard left behind. So is that statement incorrect about the University of Alberta SLOWPOKE reactor?

**MS TADROS:** Haidy Tadros, for the record.

That statement about the end-state of the University of Alberta being at 0.54, during the break we

did have an opportunity to verify and yes, the value, the dose rate value is and was at 0.54.

**DR. DUCROS:** And to put some context around that figure, because the intervenor has asked what is acceptable. The 0.5 is an industry standard, it wasn't a regulatory limit. And I would like my experts in radiation protection to give some context around what a dose of .54 --

**THE PRESIDENT:** I don't want -- I mean, we will get into that. I think you have just confused me because I thought when they measured .54 they actually removed the concrete that was contaminated so there was nothing left behind that was over 0.5  $\mu\text{Sv}$  an hour. And are you telling me that that wasn't the case?

**MS TADROS:** Haidy Tadros, for the record. So what we have done is, in preparation for this proceeding and knowing the interventions and the question that would come, we requested clarification from SRC and Candu Energy, who were the contractors who did the work for University of Alberta to confirm what in their end-state they referred to as the maximum value of 0.54 and the response was such that there was an initial preliminary reading of 0.54 that was then cleaned down to nothing and hence why I responded the way I had.

When we were looking at the information, and without this confirmation in our CMD, we went through the CMD that was presented to the Commission on the University of Alberta and we had not captured that there was any end value beyond the cleanup that had occurred according to the contractor's information.

**THE PRESIDENT:** Okay. So there was no radiological hazard left behind?

**MS TADROS:** Haidy Tadros, for the record. That is correct, there is no radiological hazard left behind at University of Alberta.

**THE PRESIDENT:** Ms Lloyd, you were ready to jump in.

**MS LLOYD:** Yes.

The first thing I heard -- or maybe it wasn't the first, maybe it was the second or third thing I heard -- was it sounded to me like a confirmation that the final reading was .54 and then we heard that that wasn't a regulatory standard, it was an industry standard, et cetera. I did understand that it was the standard by which the project was being assessed for success or failure. So the first response I heard on the .5 versus .54 just now was confirming that it was .54, but then Ms Tadros just said something that maybe was different, but maybe was just



semantically different, saying there was no radiological contamination.

I think this is an important -- it's an important detail and it's an important larger issue. So it shouldn't be this difficult for either public intervenors, certainly not for you the Commission, to get a clear statement on what the end-state reading was.

And it leads us into a bigger, broader conversation about if we are working to .5 and it ends at .54 and there is no risk with that, but then where -- you know, there is some real -- there is some real creep going on there and where does that creep end, if it's .54, .55, et cetera.

I do want to come back also to the remarks by Ms Tadros around in situ entombment, but maybe if I could come back to that in a few minutes.

**THE PRESIDENT:** Okay. I will give you time to do that later.

So on this .5, .54, it was below .5. What you are saying is that the CMD didn't capture what you then -- the confirmation that you got from the contractor and so it's the deficiency in the CMD or the inaccuracy in the CMD that has caused a fair bit of confusion and the responses have not been quite as clear as they should be,

but your last one was very clear. So for this particular reactor, again I want reassurance that what is being suggested is that if it is 0.5  $\mu\text{Sv}$  per hour, that is the limit that has been set up. If there is a measurement -- and we will talk about the adequacy of measurements and the number of measurements -- if there is a measurement above .5 there will be decontamination and nothing above .5 will be left behind. Is that a correct understanding?

**MS TADROS:** Haidy Tadros, for the record.

The industry standard as per the CMD and as per the conversations that we have had is to clean the value to the dose rate of 0.54. With that statement, what I would like to do is for us to step back and think of the context of the risk that we are talking about in terms of radiological risk because of the fact that we need to ensure we have the vision of a risk-informed no unreasonable risk that occurs when these reactors become decommissioned, dismantled and removed. So we can look at the values, the numbers. We have our radiation protection specialists who can come and speak to those values in terms of what they mean.

Just a point of clarification, though. The 0.5 is not a limit, it is an industry standard by which when we do -- when we look at the dose rates there is no

exposure to individuals.

So with that, perhaps I can ask our radiation protection specialists to speak to the radiological risk at the levels that we are discussing here today.

**THE PRESIDENT:** Ms Tadros, I don't know why it's so difficult to give me the reassurance that I'm asking for, which is, if .50 is what we have established as what the criteria is for us to accept that there is no radiological hazard, will we allow this reactor to be left behind with anything above that?

**MS TADROS:** Haidy Tadros, for the record.

And I would very much like to ensure that that reassurance and that confidence is relayed to the Commission. With regards to the value that we have set, just again we need to clarify. The 0.5  $\mu$ Sv per hour is not a regulatory limit that is set by the CNSC. It is an industry standard that we have used, the contractors have used to ensure that the dose rates remain below any risk threshold that exists and does not -- it does not become anywhere near the regulatory dose limit for members of the public.

**THE PRESIDENT:** So what have we established as what would be an acceptable limit for the

decontamination of the pool?

**MS TADROS:** Haidy Tadros, for the record.

That would be what CNSC staff have put forward in our disposition. That is Schedule 2 of our *Nuclear Substance and Radiation Device Regulations* that has a list of all the isotopes in Bq/g, which is an activity concentration of all radionuclides that need to be cleaned up to those activity levels to ensure that for the purposes of the Act and the Regulations under the Act there is no radiological contamination left behind. That is what we refer to as unconditional clearance levels.

**MS LLOYD:** If I could, it was -- a "clearance level" was the language used in the University of Alberta and I'm only looking at an excerpt from the Record of Decision University of Alberta 2018-H101, and it said:

"The post-decommissioning radiological survey found radiation levels in the floor of the reactor pool to be in excess of the clearance level of 0.5  $\mu$ Sv." (As read)

I did not -- until today's several clarifications that it's simply an industry standard that CNSC works to, I thought it actually had some authority.

So if it's a clearance level of .5 that was deviated from for Alberta and it's the clearance level that will limit what gets released to, for example, the landfill, the sewers, are all the clearance levels this flexible? They are just an industry standard and we can deviate from them if CNSC staff deems that it is an acceptable risk? On what basis -- do we have a rule or not?

**THE PRESIDENT:** Ms Tadros...?

**MS TADROS:** Haidy Tadros, for the record.

So specifically to the 0.5  $\mu\text{Sv}$  per hour clearance level that is used in CNSC staff's CMD, our colleagues in Waste Management and Decommissioning can point exactly to where that clearance level is found in the industry standards.

**MS OUE:** Shirley Oue with the Waste and Decommissioning Division.

In SRC's detailed decommissioning plan they indicate that the decommissioning end-state objective is to decommission the SLOWPOKE facility to obtain a licence to abandon which will allow SRC unrestricted use of the building and services remaining in place that is currently occupied by the reactor -- research reactor.

In their DDP they also indicate that -- and I will quote this:

"The reactor pool will remain in place and be filled with concrete after it has been confirmed that the structural materials and inner surface coating satisfy the applicable nuclear substance and radiation devices clearance limits."

(As read)

**THE PRESIDENT:** So no reference to 0.5  $\mu$ Sv per hour?

**MS OUE:** Shirley Oue, for the record. Not in SRC's DDP. It points to the Regulations.

**THE PRESIDENT:** Did the University of Alberta, when they had done their final surveys after whatever decontamination, were all the levels less than what's in the Regs?

--- Pause

**MS TADROS:** Haidy Tadros, for the record. We are looking at the information from the University of Alberta and the readings according to the end-state radiological surveys in the end-state report of the University of Alberta, all of the values were under the 0.5  $\mu$ Sv per hour.

**THE PRESIDENT:** But are those the levels in the Regulations? I mean you just told me that the .5 is an industry standard but what the CNSC uses is what's in the Regs and I just want to know, did we allow anything that exceeded what's in the Regs for the University of Alberta?

**MS TADROS:** Haidy Tadros, for the record.

We will get that information to you, but based on -- and this is the SRC hearing, but based on the information that CNSC staff would have put together, there would not have been any allowance to go above the Regulations if we were putting together a recommendation for the Commission to release the University of Alberta from licensing. That is our regulatory requirement. So just to make sure that we have confirmatory numbers in front of us and definitively speaking we can come back with those values to ensure that the Commission has the confidence it needs both in U of A as well as the Saskatchewan Research Council's decommissioning activities.

**THE PRESIDENT:** Okay. Thank you.

**MS LLOYD:** If you could just be clear if that's release from licensing, the licence -- the decommissioning licence or the licence to abandon, which I don't think University of Alberta has yet applied for. So

just to be clear.

**MS TADROS:** Haidy Tadros, for the record.

The University of Alberta has received a licence to abandon, it provided us with an end-state report, and that is the question that previously we are looking to ensure that the recommendation put by staff, the information on the record and the Record of Decision that the Commission has put forward ensures that those end-state report values are per the regulatory requirement and the values found in the Regulations.

**THE PRESIDENT:** Okay. And before I get back to you, Ms Lloyd, on your other questions around in situ decommissioning, I did want to ask some more questions around what the survey or the measurement requirements are and how do we come to five samples. So maybe you can provide some background on how that has been determined.

Staff or is this for Candu Energy?

**DR. DUCROS:** It's Caroline Ducros, for the record.

Candu Energy can explain to you their methodology and their rationale for the samples and how many they have taken. From a CNSC compliance verification standpoint, if any of those samples are much more elevated than we anticipated, we can request that more samples are



taken.

So I would pass it to Candu Energy to explain their methodology and why they chose that many and the locations of those samples.

**THE PRESIDENT:** Thank you.

Candu Energy...?

**MR. ALIM:** Yes. This is Shahzad Alim from Candu Energy.

I would explain on the methodology and how it is done.

So before we start taking any samples, we have a computer estimation which gives us the activation of the pool floor. So to confirm and validate that result, we take a projection of the reactor core which is closest on the pool floor and take a sample and then radially we go every two -- approximately 200 mm away from the centre and we take samples. These samples are sent for lab analysis to validate that whatever our assumptions were they are correct.

When we get the results back, our computer assessment is just validated. We assess and we know how much concrete has to be removed that is above the clearance levels. We remove all that concrete which is above the contamination level and that concrete is removed and placed

in radioactive transportation packages.

So those samples does not mean that we are taking a sample and leaving the rest of the radioactivity behind. These samples are just taken to assess how much activity has taken place in the concrete and the rebar.

After that, the portion of the concrete which is beyond the clearance level is removed right to the membrane and there is no contamination left behind which is beyond the clearance levels.

And the value of .54 which we have been talking time and again, these measurements were done even before taking any samples. These are done as a radiation survey before we remove any activity. This tells us where the higher contamination level is. After that, we remove all the contaminated parts.

And if you look in our end-state decommissioning report in Appendix Q, after the first page -- the first page talks about what was the dose before removal and after that there are tables and tables showing that every single place which was surveyed after cleanup there was no area left behind which was beyond the clearance levels.

Does that answer the question?

**THE PRESIDENT:** That answers it very

clearly. Thank you very much.

Ms Lloyd, on to you for the in situ waste endpoint.

**MS LLOYD:** Yes. Thank you.

Brennain Lloyd, for the record.

I didn't want it left on the record. I felt that Ms Tadros created an impression that I had been using the language of "entombment". I have not. She seemed to couple "in situ entombment". We have used the term "entombment". I think it's an accurate term. It is the term that CNSC uses for Whiteshell Reactor #1 and for the NPD. Similar to this, the reactor components, the reactors are removed. The language "in situ" means to leave in place, in situation. So just to be clear, we are not calling it entombment, we are calling it in situ. It's not -- you know, it is not an issue we need to belabour, but I did not want it to be left on the record as, you know, having coupled two terms, which I had not.

**THE PRESIDENT:** Okay.

So moving onto the next issue that you had raised, and it's Slide 5 where you, Ms Lloyd, had mentioned that there were some documents that you had requested that you were denied access to. Can you give me specifics of that, please?

**MS LLOYD:** If I can recall that far back, it was related to particularly around the transportation and it was -- I can get you that list. Actually, the Secretariat would have that list as well. So I can't confidently tell you off the top, but there were I think three documents that we requested which were not provided.

And the reasons they were not provided -- it may actually be in my submission. The reasons they were not provided was to the effect of sort of for reasons of competitiveness. It was sort of the language, you know, corporate language. I didn't think that it would disadvantage. But I will get back to you by the end of the day with the outstanding documents.

**THE PRESIDENT:** Thank you.

So then let's move over to your comments around transportation.

Maybe I will ask you, SRC, first. Have you had any shipments, radioactive waste shipments to Chalk River over the operating life of the reactor?

**MR. CRABTREE:** No, not that I'm aware of.

**THE PRESIDENT:** Okay. So this will be the first time.

So staff, comment on the intervenor's concerns around training of first responders in rural and

remote areas.

**MS OWEN-WHITRED:** For the record, my name is Karen Owen-Whitred, Director of the Transport Licensing Division.

So first responders do receive -- all first responders in Canada do receive some basic hazmat training which includes radioactive material emergency management training. The CNSC is also available to provide similar training upon request and has done so in the past.

I would also reiterate that there was a reference in the intervention to the Emergency Response Guidebook that does provide information and guidance to first responders.

There is also a requirement -- there is a transportation requirement to have within the shipping documents themselves a 24/7 emergency number to call where -- you know, for a contact that would be able to provide any necessary information on the specific material being transported in the event of an emergency.

And this isn't -- well, one further piece of information would be that Transport Canada runs a centre called CANUTEC, which is also a 24/7 call centre that is available to provide technical expert information upon request.

And finally, the CNSC of course has a Duty Officer program that is available 24/7 to provide expert technical information.

**THE PRESIDENT:** Thank you.

And how many shipments are anticipated from this decommissioning project?

**MS OWEN-WHITRED:** For that precise -- Karen Owen-Whitred, for the record.

**THE PRESIDENT:** I don't know, it's 8 cubic metres I think of radioactive waste. Are you talking about dozens, more, less?

**MS OWEN-WHITRED:** I would have to turn to the licensee for the specifics on that information.

**THE PRESIDENT:** SRC...?

**MR. CRABTREE:** It will be a single shipment of three Type A containers.

**THE PRESIDENT:** Thank you.

And then there was some question around the duty to consult, especially with Indigenous communities along the transportation route, and there is one single shipment, now that we have heard, that's expected. So can someone -- okay, Mr. Levine, please provide some insight into that.

**MR. LEVINE:** Okay. Adam Levine, for the

record, Team Lead, Indigenous Relations and Participant Funding.

So in this instance we have to look at what the applicant is applying for before the Commission. So they are asking for activities to decommission the SLOWPOKE reactor within an existing building within the university campus in that area. What we have to look at for the duty to consult is whether those activities being applied for could impact potential or established indigenous or Treaty rights, the exercise of those rights. So in this instance when we look at this application, from CNSC staff's perspective we don't see potential impacts on the exercise of rights as it's deemed within an existing building on the site that has been established for a long time and so for the duty to consult to be raised, we don't see those elements there. However, we did offer participant funding, we did have a public announcement about this hearing, but we didn't receive any interest from any Indigenous communities in Saskatoon or surrounding areas.

**THE PRESIDENT:** Yes. I think, though, the concern was more around communities along the transportation route.

**MR. LEVINE:** Adam Levine, for the record.

So in regards to the transportation route, when we look at transportation, again we have to look at what the decision is and what the activities are. As has been discussed, the transportation of radioactive materials is heavily regulated and the safety is inherent in the packaging and certification process. So again, there is no potential impact to Indigenous or treaty rights along the route because of the safety procedures. And again, as Ms Owen-Whitred mentioned, we are open to any communities that want to learn more about safety measures and how you review packages and regulate transport for radioactive materials and about the measures in place to learn more about first responders and responding to emergencies. So any communities along the route, indigenous or non-indigenous, are welcome to contact us for more information on that.

**THE PRESIDENT:** Okay. Thank you very much.

So, Ms Lloyd, I will turn it over to you for any additional comments or questions.

**MS LLOYD:** Thank you, Madam President. Just a few tidy up points, points that were raised by other intervenors I think.

The National Council of Women raised a



question around alpha emitters. I had a similar question, didn't put it in our submission, and my question around that arose when we did comment on there being a very limited discussion around the potential consequences of cutting the reactor. So the reactor container, I believe it is, is going to be cut. I think, as I recall from many years ago, that was where the alpha contamination occurred at Bruce. So that's where I would have focused a question, if we had delved into that area more deeply.

The other area that was outstanding was -- so that's the alpha hazards. There was another issue that was outstanding just around the -- I recall it was the liquid shipments. You had asked about what the contingency was for liquid shipments and I believe the answer from, I think it was SNC-Lavalin, said there would be no liquid shipments. And I would just refer you to the decommissioning -- no, it's CMD 19-H100.1, page 26-27, where they do talk about what the contingency -- contaminated liquids, if any arising, "will be placed in approved containers and transported for storage". So the question would be, storage to where?

So I think those were the only two follow-up items. I do appreciate Mr. Levine's response. I don't think it really added anything to what the CNSC set

out in their Commission Member Document, so I don't think I can add anything to what we said in our submission. So I think I will leave it at that and thank you very much for your time and your interest.

**THE PRESIDENT:** And thank you for your intervention, Ms Lloyd.

Okay. So moving on to our next presentation, and it is by Nuclear Waste Watch and Inter-Church Uranium Committee Educational Cooperative, as outlined in CMDs 19-H100.8 and 19-H100.8A.

I understand that Ms Jessica Karban from CELA will be making this presentation.

Ms Karban, are you with us?

**MS KARBAN:** I am.

**THE PRESIDENT:** Okay. Over to you then.  
Thank you.

**CMD 19-H100.8/19-H100.8A**

**Oral presentation by**

**Nuclear Waste Watch and**

**Inter-Church Uranium Committee Educational Cooperative**

**MS KARBAN:** Okay. Thank you.

Good afternoon, President Velshi. Thank

you for having me today. My name is Jessica Karban and I am counsel with CELA, representing Nuclear Waste Watch and ICUCEC in this intervention today.

Could I please have the next slide?

--- Pause

**MS KARBAN:** Thank you.

Nuclear Waste Watch is a network of organizations concerned about radioactive waste in Canada. Nuclear Waste Watch provides public interest responses to nuclear waste proposals and policies.

Next slide, please.

ICUCEC is an inter-church coalition that educates people about the nuclear industry and aims to stop nuclear development in Saskatchewan.

Next slide, please.

And CELA is a non-profit public interest environmental organization funded by Legal Aid Ontario.

Our review of SRC's licence application had three goals:

- first, we reviewed the sufficiency of Canada's regulatory regime governing decommissioning;
- second, we reviewed past incidences involving decommissioning of SLOWPOKE reactors and highlighted lessons learned; and

- lastly, we reviewed the adequacy of SRC's and CNSC's Commission Member Documents.

Next slide, please.

I will now present the main findings in our report. For a detailed list of our recommendations you can turn to Slide 24.

Next slide, please.

In the first part of our review we found that Canada does not have a comprehensive and sufficiently detailed regulatory framework for decommissioning. In addition, IAEA requirements are not adequately reflected. For example, unlike Canada, the IAEA does not consider in situ confinement as an acceptable decommissioning strategy in the case of a planned permanent shutdown, short of an emergency scenario.

Therefore, we recommend that the Government of Canada develop a principled overall policy framework for decommissioning.

Next slide, please.

I will now move to the second part of our review which reviewed past decommissioning of SLOWPOKE reactors in Canada.

During the decommissioning of a University of Toronto SLOWPOKE reactor in 2000 an incident occurred

involving the management of a beryllium reflector. To summarize, the reflector was found to be more radioactive than initially anticipated and was therefore in excess of the Transport Index. No alternative transportation arrangements had been established and lead shielding was not available onsite during the incident. An intervenor had also raised concerns about the lack of public engagement throughout decommissioning.

In the record of proceedings for the U of T licence to abandon, the Commission directed CNSC staff to report back to the Commission on lessons learned. CELA submitted an information request to the CNSC but never received this report or an acknowledgement of its existence.

Next slide, please.

Based on this incident, we highlight the following lessons learned:

- first, the CNSC should review the feasibility and efficacy of a licensee's contingency plan;
- second, because of the potential for human error, the CNSC must ensure there are sufficient precautions to protect human health and safety during decommissioning, such as worst-case exposure scenarios and ongoing engagement with all relevant stakeholders; and

- third, CNSC staff, not just the proponent, should produce publicly available lessons learned reports.

Next slide, please.

During the decommissioning of the University of Dalhousie's SLOWPOKE reactor, the reactor control rod was inadvertently extracted as a result of a mechanical failure. This resulted in increased radiation doses to workers.

Next slide.

Based on this incident, we highlight the following lessons learned:

= the CNSC must ensure the reliability and effectiveness of all systems and equipment; and

- second, as previously stated, the need for CNSC staff to prepare publicly available lessons learned reports.

Next slide.

--- Pause

**MS KARPAN:** Both incidents demonstrate that the risk of unplanned events is real and must be taken seriously. The precautionary principle should therefore be applied to all decommissioning activities.

I will now turn to the third part of our

review.

Our first concern is that the proposed decommissioning, unlike in the case of U of T and U of D, is not subject to a federal environmental assessment. We submit that the EA conducted under the *Nuclear Safety Control Act* is not an adequate nor equal substitute, one critical reason being that the NSCA review primarily relies on licensing information and not studies from independent experts of site local and regional impacts.

Next slide, please. I think we need to skip two more slides. One more. Thank you.

Our second concern relates to the limited scope of CNSC staff review. CNSC staff's CMD only reviews four relevant safety and control areas. With respect to the other 10, the CNSC states that compliance is assured through the baseline compliance program.

In the interest of transparency, we recommend that the CNSC's CMD include greater detail and provide a comprehensive review and assessment of the proponent's licensing application.

Our next concern relates to the *Licence Conditions Handbook*.

The CNSC's CMD does not include a draft *Licence Conditions Handbook* specific to decommissioning.

The current LCH only addresses operational matters and the defuelling of the reactor. In comparison, CNSC staff's CMD for the decommissioning of University of Dalhousie's SLOWPOKE reactor included a proposed LCH specific to decommissioning. We also request that the CNSC explain how it will ensure that the SRC's LCH will comply with the requirements of the new decommissioning REGDOC which is currently being consulted on.

Next slide, please.

We also request that the CNSC clarify the amount of SRC's financial guarantee, whether it is \$5.76 million or \$7.5 million, and ensure that it is sufficient to cover the estimated cost of decommissioning, \$6.6 million.

Next slide, please.

While SRC and CNSC staff describe the proposed decommissioning strategy as prompt dismantlement, we submit that it is more akin to in situ confinement. Although SRC states that the proposed reactor pool will only be filled with concrete once compliance of clearance level is confirmed, we are nevertheless concerned that radioactive contamination will remain in the filled structure. Samples which are to be taken from the reactor pool floor do not take full inventory of potential



hard-to-measure, long-lived radioisotopes such as tritium, Carbon-14, Chlorine-36 and Calcium-41.

As stated in the end-state report, the University of Alberta's SLOWPOKE reactor was abandoned despite the presence of radionuclides above the release limits in the concrete floor and sludge.

Next slide, please.

We therefore recommend that the CNSC require a full inventory of radionuclides and the total dismantlement and cleanup of the reactor pool structure.

Next slide.

We also submit that radioactive waste generated from decommissioning should not be subject to clearance levels and approved for general release or recycling. Although it is proposed that the waste is to meet clearance levels, this does not mean that it is not radioactive or there is no potential for cumulative additive risk, given the potential presence of long-lived, hard-to-measure radioisotopes which the CNSC and SRC have not taken a full inventory of. Moreover, we are unaware of any studies undertaken by SRC or CNSC staff to determine whether there is any potential for leachate of radioactive material into the South Saskatchewan River so the waste will be disposed into the Saskatoon landfill.

Next slide, please.

With respect to liquid waste, we submit that the Commission should not allow the release of 28,000 litres of treated radioactive water into the public sewer system without a careful assessment of the cumulative or additive effects of the release.

Next slide, please.

And lastly, it is our recommendation that the Commission should require ongoing monitoring post-abandonment of the SLOWPOKE-2 reactor, given that the potential presence of long-lived, hard-to-measure radioisotopes which the CNSC has not taken a full inventory of.

Next slide, please. One more, please.

Thank you.

And our conclusion.

In conclusion, until the described deficiencies have been remedied, Nuclear Waste Watch and ICUCEC respectfully request the Canadian Nuclear Safety Commission not approve the decommissioning of SRC's SLOWPOKE-2 reactor as currently proposed. Thank you.

**THE PRESIDENT:** Thank you very much for your presentation.

There are a number of concerns and issues

that the intervenor has raised that we haven't discussed before, so let me go through some of those.

The first one is around financial guarantees. There were different numbers thrown around, what the detailed decommissioning plan has, what has been approved by the budget, and there may be a different number in the CMD.

So maybe I will ask SRC. Can you provide some clarity on exactly what is the quantum of the financial guarantee?

**MR. CRABTREE:** Thank you. Mike Crabtree.

So SRC has fulfilled and adhered to all of the terms of the CNSC operating licence, part of which is to make financial provision in the form of a trust fund for the decommissioning of the reactor. The terms and size of the fund have been approved by CNSC under the terms of our licence. SRC, as I mentioned in the presentation, has been building this fund for the last 10 years from our operating revenues.

The SRC Board authorized the company expenditure of up to \$7.5 million for the defuelling and decommissioning process. This figure is distinct from the decommissioning trust fund because it includes other costs not directly related to the actual decommissioning, such as

modifications of the building to allow more efficient decommissioning, cost of security, cost of materials transport. It also includes a very considerable contingency for delays or unexpected cost overruns. This is normal and prudent practice for this type of project management.

SRC has sufficient -- I'm sorry, I beg your pardon.

The original estimate of \$7.5 million at Board level was based on a 2025 decommissioning, not a 2019-2020 decommissioning, so substantial inflation into that \$7.5 million figure was built in. SRC has to date funded approximately \$4 million in the process, with a budget estimate of a further \$1.7 million to a completion of the decommissioning, subject of course to a licence from CNSC. This has been funded out of SRC's operating budget without recourse to the trust fund, which will only be released to SRC once we have final signoff by CNSC upon completion.

SRC has sufficient cash resources on hand to complete the decommissioning in accordance with the regulations and requirements of the CNSC. CNSC, under the terms of our licence, is -- assuming of course CNSC under the terms of our licence is satisfied with SRC's financial

provisions.

**THE PRESIDENT:** Thank you.

Staff, do you have anything to add?

**MS OUE:** Shirley Oue with the Waste and Decommissioning Division.

The letter of commitment submitted by SRC has been -- is an acceptable financial guarantee instrument and the amount of \$7.5 million is sufficient to cover the decommissioning costs, including the waste management.

**THE PRESIDENT:** I'm sorry, where does the \$5.76 million come from then?

**MR. CRABTREE:** That is actually the contract value with Candu Energy.

**THE PRESIDENT:** Okay. Because I understand what the Board has approved, but I didn't know what the value of the financial guarantee that the CNSC has approved is. Is it also \$7.5 million?

**MS OUE:** Shirley Oue, for the record.

Yes, the amount is \$7.5 million.

**THE PRESIDENT:** Thank you.

Another concern raised is around the *Licence Conditions Handbook*, and a draft that includes decommissioning and the requirements for that has not been provided.

Again, staff, any comments?

**DR. DUCROS:** Caroline Ducros, for the record.

If the Commission grants a licence for the decommissioning activities, a *Licence Conditions Handbook* with the detailed decommissioning plan parameters will be updated. We didn't submit it as part of the -- we don't always submit it either as part of the materials for review.

**THE PRESIDENT:** Because I do recall for other licence applications in front of the Commission the draft LCH is also part of the CMD.

**MS TADROS:** Haidy Tadros, for the record.

We want to confirm that there is an LCH that is currently in place for the operating licence and, as Dr. Ducros said, given the format of this hearing we did not include it in our package, but we can definitely make that LCH available.

**THE PRESIDENT:** No, that's not -- yes. So I mean I know that you have one for the current operations, it's what is being proposed. What you are saying is it's not standard practice to provide the proposed draft LCH to the Commission with the CMD?

**DR. DUCROS:** Caroline Ducros, for the

record.

In this instance they have an operating licence and this is an amendment to that licence just to include the decommissioning activities, it is not a decommissioning licence, and so the amendments to the *Licence Conditions Handbook* would be to include the words that they can decommission and elements of the decommissioning, the detailed decommissioning plan which was part of the package. So we didn't submit it, but it can be submitted.

**THE PRESIDENT:** Yes. Especially when there is, you know, some confusion around clearance levels and end-state, and so on. But I understand that it is just an amendment to the licence.

Making lessons learned reports available.  
Staff, comment on that?

**DR. DUCROS:** Caroline Ducros, for the record.

The lessons learned is an element of the end-state report. So we don't have a separate document for lessons learned, but it is a requirement and it is a requirement that the end-state report includes lessons learned.

**THE PRESIDENT:** But I meant for previous

decommissioning projects of SLOWPOKE reactors. Does the CNSC have it for the other three and how does the public access those?

**MS OUE:** Shirley Oue with the Waste and Decommissioning Division.

The lessons learned will be documented with the end-state reports from the licensee.

**THE PRESIDENT:** So my question was, for the previous three SLOWPOKE reactor decommissioning projects, does the CNSC have their lessons learned reports and can the public access them from the CNSC?

**MR. TANGUAY:** Pierre Tanguay, for the record.

So clearly, for Dalhousie and U of A we have end-state reports that do identify the lessons learned. I don't believe we were successful finding the same material for U of T. However, this being said, we do have records of the event that were referenced as far as U of T and so we have a clear understanding that the decommissioning plans that were applied for Dalhousie and certainly for U of A, and in this case for SRC, do incorporate the lessons learned. For instance, the shielding for the beryllium package were increased in light of the lessons learned from U of T.



**THE PRESIDENT:** So if a member of the public -- and I don't know if you have received any requests -- asked for copies of those reports, those would be made available?

**DR. DUCROS:** Caroline Ducros, for the record.

Those are licensee documents and as per the requirements we would go to the licensee and ask that they release those and it would be up to the licensee to determine whether or not they would release them.

**THE PRESIDENT:** So we have not received any requests for those lessons learned reports?

**MR. ISLAM:** For the record, my name is Wasif Islam. I was the Project Officer responsible for the decommissioning of the University of Alberta. I just wanted to add a couple of points.

Prior to the beginning and during decommissioning we have incorporated the lessons learned from University of Dalhousie. We have indicated to the licensee that they should and we as well provided a lessons learned report from the U of A and we have incorporated those lessons learned for activities that are going to be happening at -- and that has happened at SRC.

To answer your question whether they are

going to be available to the general public, I would have to say if requested we would be more than happy to share those lessons learned. However, in the case of U of A there were no requests from the general public that lessons learned from Dalhousie be shared.

**THE PRESIDENT:** Okay. Thank you.

And then again to staff, if you have a comment on Slide 7, on the finding around lack of adequate framework for decommissioning. Any comments on that?

**MS GREENCORN:** Nancy Greencorn, for the record, Waste and Decommissioning Division.

Regarding the framework for decommissioning, the policy for waste management and decommissioning is set out in NRCan's Radioactive Waste Policy Framework. In addition to that, CNSC staff have Regulatory Document 211 that sets out our framework for both waste management and decommissioning. We have, further to that, a Regulatory Guide G-219 on decommissioning, and we are in the process currently of developing several regulatory documents that are out for public consultation for both waste management and decommissioning. These are in addition to the requirements that are sent out in Regulations. So for a Class I nuclear facility, for a licence to decommission, their requirements

are set out in those Regs.

**THE PRESIDENT:** Okay. Thank you.

A couple of questions for SRC that have come up from this. One is around public engagement. I know you -- in your presentation you actually used the word "mandated". I just wondered who had mandated that.

But tell me about the level of interest, how many people came and what were the kind of concerns that were raised at your open house.

**MR. CRABTREE:** You would think I would have learned by now. Mike Crabtree.

Yes, it is part of the mandated public information program on that. So it went ahead on December the 5th. We invited city, provincial and federal governments, so City of Saskatoon also. Indigenous groups, University of Saskatchewan and various community groups were invited. The attendance to that, despite the publicity, was relatively small.

The concerns --

**THE PRESIDENT:** How small?

**MR. CRABTREE:** I think in total seven people came to that, representing different groups.

The concerns that were outlined were very similar to the concerns that have been put here in terms of

what would be the indications -- the problems of transport, would there be any 'nuclear waste' disposed of within the province or within Saskatoon, so similar concerns as to what has been outlined here.

**THE PRESIDENT:** Thank you.

And did the municipality, folks from the City of Saskatoon come, and tell me what your consultation with them around the landfill and the sewage system and material being sent there has been.

**MR. CRABTREE:** So that is an ongoing discussion, as you would expect. So they are, quite rightly, engaged with understanding what the regulations are, what the quanta of material would be, what risk that might propose -- present, rather. So, you know, it is an ongoing -- it is an ongoing discussion.

**THE PRESIDENT:** And are there major concerns that they have raised that may require you to change your approach to things?

**MR. CRABTREE:** Not at all, no.

**THE PRESIDENT:** Okay.

And then a last question and it is to staff and it is around the risk to the environment by sending the waste and the liquid. Maybe if you can elaborate on the kind of assessment done on the cumulative

risks associated with that disposal proposal.

**DR. DUCROS:** Caroline Ducros, for the record.

As part of this submission and part of the CMD there was an Environmental Protection Report that speaks to those elements. so I would like to call our experts in that field to comment.

**MS SAUVÉ:** Kiza Sauvé, I am the Director of the Health Science and Environmental Compliance Division.

What we are talking about for this facility is clearance levels, so those are levels with which we can release water into the sewer or send materials to landfill. So our Radiation Protection Specialist Bert Thériault is going to give us some information on how those levels are calculated.

**MR. THÉRIAULT:** Thank you. Bertrand Thériault, for the record.

So the clearance levels for the release of radionuclides to municipal sewer systems are those in this case that are used for nuclear substances licences as well. The numbers are adopted from IAEA-TECDOC-1000, which is entitled "Clearance of materials resulting from the use of radionuclides in medicine, industry and research".

The values were derived to ensure that no one receives an annual dose of more than 0.01 mSv in a year considering two aspects: on the one hand, exposures of the workers at a wastewater treatment plant from the external gamma exposure to radionuclides in the process systems, the sludge in the wastewater treatment plant, as well as to any possible resuspended dust in the air; and on the other hand, ensuring that doses again remain below 0.01 mSv per year to any members of the public due to the discharge of the radionuclides to the water body that receives the water from the wastewater treatment plant. So this includes exposure as a result of radionuclides in water, so to drinking water. It considers the uptake of the radionuclides by fish and ingestion of fish. So these are the basis for these clearance levels.

**THE PRESIDENT:** Thank you.

What is the estimated volume of the non-radioactive hazardous waste that is expected from this project?

**MS SAUVÉ:** I'm going to actually -- I don't think the question is to me, but when you ask about radioactive waste, we have already seen that it is the 8 metres cubed. But I don't think that is your question.

**THE PRESIDENT:** Waste, non-radioactive

hazardous waste.

**MR. CRABTREE:** Negligible. I think three car batteries.

**THE PRESIDENT:** Okay. Yes. Thank you. Ms Sauv , did you have anything to add?

**MS SAUV :** I would add the amount of the water since that is going to be -- is about the same size as a backyard pool, just to put it into perspective.

**THE PRESIDENT:** Thank you.

So, Ms Karban, to you. The groups that you are representing, do you know if any of them went to the public information forum that SRC had hosted in December?

**MS KARBAN:** I'm not too sure. Possibly ICUCEC did since they are located there, but I don't think Nuclear Waste Watch attended.

**THE PRESIDENT:** Okay. Any comments on what you have heard from SRC and staff and others around the concerns and questions you have raised?

**MS KARBAN:** Just one question.

A gentleman just mentioned that there would be about a three-car-battery size of non-radioactive hazardous waste. Is that the waste that would go to the landfill? I'm just a bit confused about which waste he's

referring to.

**MR. CRABTREE:** Mike Crabtree.

No. I was actually referring to three car batteries, actual --

**MS KARBAN:** Batteries?

**THE PRESIDENT:** And it's not going to the landfill site?

**MR. CRABTREE:** No. They will go for recycling, yes.

**THE PRESIDENT:** Right.

**MS KARBAN:** Okay. Okay. Okay.

**THE PRESIDENT:** Any final comments?

**MS KARBAN:** No, no final comments. Thank you.

**THE PRESIDENT:** Okay. Thank you very much for your intervention.

This concludes the oral presentations by the intervenors.

We will now move to the written submissions.



**CMD 19-H100.3**

**Written submission from Elaine Hughes**

**THE PRESIDENT:** The first submission is from Ms Elaine Hughes, as outlined in CMD 19-H100.3.

I will see if I have any questions that we haven't asked as yet.

--- Pause

**THE PRESIDENT:** No, I don't have anything from Ms Hughes' submission.

**CMD 19-H100.4**

**Written submission from Linda Murphy**

**THE PRESIDENT:** The next submission is from Ms Linda Murphy, as outlined in CMD 19-H100.4.

Again, none from there.

**CMD 19-H100.7**

**Written submission from the  
North American Young Generation in Nuclear**

**THE PRESIDENT:** And the last one is from the North American Young Generation in Nuclear, as outlined

in CMD 19-H100.7.

No questions for there either.

I think we have covered everything with all the other interventions, so this concludes the written submissions.

As far as any final questions -- so I visited your facility last year, so I am very glad I did, and met your staff there. So what is going to be happening to the staff who work at the facility?

**MR. CRABTREE:** These staff are very, very highly skilled and very highly valued, so they will be taken into other areas of operations within SRC.

**THE PRESIDENT:** Thank you.

And I know in your opening comments you said that all the applications and all the work done under the reactor is now going to be done elsewhere in the facility. Does that include everything or just most of what the reactor provides right now?

**MR. CRABTREE:** Pretty much everything. It's difficult to point to a sort of test or analysis that we can't cover via other techniques.

**THE PRESIDENT:** Okay. Thank you very much.

So before concluding the hearing, I will

turn to you, Mr. Crabtree, and see if you have any final words you would like to address.

**MR. CRABTREE:** I would just like to thank the committee here for the opportunity to speak and to put our point and to thank Candu Energy and CNSC and all of the participants in this committee hearing. I think it has been very important. We certainly support, as SRC, the ability to interrogate and question our actions very closely. It's something that we appreciate. Thank you.

**THE PRESIDENT:** Thank you.

Ms Tadros...?

**MS TADROS:** Thank you, yes.

I wanted to ensure that we close the thread of the questioning along the lines of the amounts, the radionuclide amounts and the confidence that the Commission had asked for.

So we have as part of CNSC staff's CMD actually referenced the University of Alberta's end-state decommissioning report and in that report there are tables of rooms that were surveyed and all of the surveys in microsieverts per hour as well as activity concentrations came back to:

- one, the surveys are below 0.5  $\mu\text{Sv}$  per hour and confirmation of such; and

- two, all the activity concentrations are below the Schedule 2 that is found in the *Nuclear Substances and Radiation Devices Regulations*, and that is reference number 11 of CMD staff's submission.

**THE PRESIDENT:** Thank you very much for that clarification, Ms Tadros.

Okay. Well, thank you all for your participation. Candu Energy, thank you for being a part of this hearing as well.

And before we end, Marc, over to you for any closing remarks.

### **Closing Remarks**

**MR. LEBLANC:** Thank you very much.

Thank you to all who participated and also for those who participated via Webex and we will have to probably communicate back with you to determine whether that was successful from your end as well.

So this brings to a close the public hearing.

With respect to this matter, it is proposed that the Commission confer with regards to the information that is considered and then determine if

further information is needed or if the Commission is ready to proceed with a decision and we will advise accordingly.

And again, thank you for your participation.

--- Whereupon the hearing concluded at 4:23 p.m. /

L'audience est terminée à 16 h 23