**Canadian Nuclear Safety Commission**

**Commission canadienne de sûreté nucléaire**

**Public hearing**

**Audience publique**

**May 31st, 2022**

Best Western Pembroke Inn & Conference Centre
1 International Drive
Pembroke, Ontario

*also via videoconference*

**Le 31 mai 2022**

Best Western Pembroke Inn & Conference Centre
1, rue International
Pembroke (Ontario)

*aussi par vidéoconférence*

**Commission Members present**

Ms. Rumina Velshi
Dr. Marcel Lacroix
Ms. Indra Maharaj

**Commissaires présents**

Mme Rumina Velshi
Dr Marcel Lacroix
Mme Indra Maharaj

**Registrar:**

Mr. Denis Saumure

**Greffier:**

Me Denis Saumure

**Senior General Counsel:**

Ms. Lisa Thiele

**Avocate-générale principale :**

Me Lisa Thiele

**TABLE OF CONTENTS**

**TABLE OF CONTENTS**

Pembroke, Ontario / Pembroke (Ontario)

--- Upon resuming on Tuesday, May 31, 2022 at 9:00 a.m. / L'audience reprend le mardi 31 mai 2022 à 9 h 00

**Opening Remarks**

**THE PRESIDENT:** Good morning and welcome to the continuation of the public hearing of the Canadian Nuclear Safety Commission. Welcome also to those joining us remotely.

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

For those who were not here yesterday, I will begin by introducing the Members of the Commission who are with us for this public hearing.

I will preside over the hearing, and I have with me on the Panel, to my left, Dr. Marcel Lacroix and Ms. Indra Maharaj.

To my extreme right are Ms. Lisa Thiele, Senior General Counsel to the Commission, and Mr. Denis Saumure, Commission Registrar.

I will now turn the floor to Mr. Saumure for a few opening remarks.

Denis...?

**MR. SAUMURE:** Thank you, President Velshi.

Bonjour, Mesdames et Messieurs. Welcome to the continuation of the public hearing on the application by the Canadian Nuclear Laboratories (CNL) to amend its Chalk River licence to authorize the construction of a Near Surface Disposal Facility.

During today's proceeding we have simultaneous interpretation. The English version is on channel 1; la version française est au poste 2. Please keep the pace of your speech relatively slow so that the interpreters have a chance to keep up.

L'audience est enregistrée et transcrite textuellement. Les transcriptions se font dans l'une ou l'autre des langues officielles, compte tenu de la langue utilisée par le participant à l'audience publique.

The transcript of the hearing will be available on the CNSC website in about two weeks. 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 hearing is being video webcast live and that the hearing is also archived on our website for a three-month period after the closure of the hearing.

Ms. Velshi will preside over the proceedings and will be coordinating the question period.

For the participants joining us on Zoom, to avoid having two people talking at the same time, please use the "Raise Hand" function if you wish to provide an answer or add a comment.

As a courtesy to others in the room, please silence your cell phones and other electronic devices.

Please note that there are three emergency exits located to the left and one on the right.

We have in place for our hearing public health measures that align with the federal public health and safety recommendations on COVID-19 requirements. We urge participants to practise physical distancing. Masks are available at the entrance of the hearing room for those who prefer to wear one. Thank you for your cooperation.

Yesterday the focus of the presentations was Environmental Assessment and Environmental Protection. For today's presentations the focus is Long-Term Safety Case.

For this hearing, the Commission has revised its procedural guidance, as indicated in the Revised Notice of Public Hearing including Procedural Guidance for Questions and Written Final Submissions.

Registered intervenors will have the opportunity to ask questions in two ways: as part of the oral presentation, or in writing by submitting your question to the Registry staff at the back of the room or by sending an email to our interventions account.

The President will determine whether, how and the most appropriate time for questions to be addressed. Questions may be limited or excluded if they fall outside the scope of the hearing, are repetitive or have already been addressed to the Commission's satisfaction.

Intervenors who have registered for oral presentations have the opportunity to submit written final submissions following Part 2 of the public hearing. The provision of written final submissions is optional. New information may not be presented in final submissions and submissions are limited to a maximum of 5,000 words for registered intervenors and 30,000 words for CNL.

For further information on the public Commission hearing process for this proceeding, you can ask our Tribunal Officers in the back or refer to the Notice that was published.

The break for lunch will be at noon and the dinner break at approximately 5:30. There will be health breaks in the morning and in the afternoon.

Madame Velshi, présidente et première dirigeante de la CCSN, présidera cette audience.

President Velshi...?

**THE PRESIDENT:** Thank you.

Let's begin with the presentation from CNL on Long-Term Safety Case, as outlined in Commission Member Document CMD 22-H7.1D.

I will turn the floor to Ms. Vickerd for this presentation.

Please proceed.

**CMD 22-H7.1D**

**Oral presentation by the**

**Canadian Nuclear Laboratories**

**MS. VICKERD:** Good morning, President Velshi and Members of the Commission.

For the record, my name is Meggan Vickerd and I am the General Manager of Waste Services at Canadian Nuclear Laboratories.

Thank you for this opportunity for CNL to provide some opening reflections on the written submissions.

With me today are a team of CNL representatives and subject matter experts who work specifically on the long-term safety case.

I would also like to take this moment to acknowledge that our operations in Chalk River are situated on the unceded and unsurrendered traditional territories of the Algonquin people.  At CNL we recognize the important role that Indigenous people perform in Canada and we appreciate the responsibility they have as stewards of the environment.

Today and tomorrow we will be hearing directly from intervenors on their concerns specifically related to the long-term safety of this proposal.

We recognize that there has been significant interest in the project from both the public and Indigenous communities, likely because if approved the Near Surface Disposal Facility will be the first Class 1 disposal facility for radioactive waste in Canada.

CNL recognizes the significance and we take this project very seriously.  We are also proud to be demonstrating that the Canadian nuclear industry has appropriate solutions for the perceived issue of nuclear waste as a problem.

All along the way we have appreciated the opportunity to engage with the public and Indigenous communities with respect to their concerns.  There is an underlying common interest to protect the environment and the Ottawa River not only now but for future generations.

CNL is of the opinion NSDF represents an improvement over the current conditions and is needed to meet modern standards of waste management. These engagements have been meaningful to CNL and in fact we believe the feedback received has resulted in a more robust and transparent safety case.

Through analysis of the written interventions, CNL was able to identify the key concerns for the theme of long-term safety. These themes have been consistent through the process and include waste inventory, design engineering and alignment with international practices, environmental events and, in particular, seismic events.

Now I will spend a few moments addressing what we have heard with respect to each of these key concerns and how CNL has addressed them.

Since the initial submission and public review of the NSDF Project description, CNL has clearly heard concerns with respect to the waste inventory. We believe some of the confusion in interventions may reside in the fact that CNL initially proposed a small amount of intermediate-level waste for disposal in the facility. However, we promptly removed this waste stream in response to public concerns. Now, the public requires transparency from CNL in our waste characterization and inventory reporting in order to have confidence that CNL is adhering to the commitment that only low-level waste will be placed into the NSDF.

To complicate the matter further, low-level waste can include long-lived radionuclides. CNL's threshold for the amount of long-lived radionuclides is aligned with Canadian and international standards. However, there appears to be a misperception about the hazardous nature of these radionuclides.

As CNL clarified in Part 1, just because a radionuclide is long-lived does not mean it represents a hazard or a risk to the public. CNL has supported this assertion by performing dose calculations incorporating scenarios of public and Indigenous interest into our calculations in order to demonstrate these radionuclides that will remain after the facility's design life do not result in significant adverse effects to any member of the public. For this reason, low-level waste is suitable for disposal in an engineered near surface facility.

We have also heard the concerns about the importation of waste from other countries and placement of highly radioactive disused sources into NSDF. The waste forecasted for disposal in the facility is from Canadian sources, generated from products that have benefited the health and safety of Canadians. Furthermore, the vast majority of the waste stream destined for NSDF primarily includes large volumes of contaminated soil and building debris. The use of an engineered containment mound for large volumes of bulk low-level waste is consistent with international practices.

CNL acknowledges and agrees that disused sources of strong source strength are more suitable for geologic disposal. The characteristics of disused sources CNL may consider for acceptance into NSDF should they meet the waste acceptance criteria are those of short, half-life and weak source strength, the intent being these disused sources would meet regulatory exemption criteria 100 years after closure of the facility.

As a Near Surface Disposal Facility, the design is heavily reliant on the passive engineered barriers. As such, it becomes critical to have strict waste exceptions criteria to control the inventory and ensure it is not hazardous after the design life. This is true for both the radiological and non-radiological inventory.

With respect to the radiological inventory, I have already mentioned the threshold for long-lived radionuclides is consistent with both national and international guidance. For the non-radiological inventory, hazardous waste will not be permitted for disposal in the NSDF unless treated. This is consistent with provincial regulations for waste management.

As recognized in Part 1, CNL has been working to evolve our waste management practices to ensure that they are reflective of modern standards. This means that all waste, including legacy waste, is characterized according to modern waste characterization practices and standards.

Although only recently issued, CNL is already aligned to the latest CSA standard on waste characterization. This is because CNL has been leading the Canadian nuclear industry in this field with our experience gained in decommissioning activities and cleanup of sites in Port Hope and Chalk River.

While the public has raised concerns in CNL's ability to segregate intermediate-level and low-level waste in our legacy waste streams, we have already been effectively demonstrating this capability within our existing waste management facilities under our current licence. It is CNL's commitment that all waste shall comply with all criteria in the NSDF waste acceptance criteria document in order for it to be considered acceptable for disposal in NSDF.

At CNL we believe that transparency is important to building public confidence in our ability to characterize and segregate legacy waste. For this reason, CNL has provided information about our waste characterization and segregation activities in a virtual tour which is already available to the public on our website.

Many intervenors are concerned with the alignment of the facility design to international guidance and standards. The suitability of the disposal system is made in the safety case where CNL has demonstrated that the facility meets not only that Canadian regulatory framework but also the International Atomic Energy Agency's safety requirements for disposal of radioactive waste.

CNL is of the opinion that we have submitted an application that meets or exceeds Canadian regulatory requirements and is also aligned with Canadian nuclear industry standards and CNSC regulatory guidance. This includes a facility design that is commensurate with the hazard of the waste, ensuring that we have assessed the future impacts to members of the public and the environment. This includes the time when maximum impact is predicted to occur and confirmation that the predicted impact is not greater than the current regulatory limits.

The proposed project is also aligned to international standards and guidance. Specifically, the key features of the project have been addressed in the IAEA design principles for radioactive waste disposal, including the engineered containment mound is designed with a number of engineered barriers to provide multiple layers of safety to support the long-term containment and isolation requirements. Once the final cover system is installed, the waste inventory is expected to remain contained for at least 550 years, but likely much longer as demonstrated by the geomembrane testing.

The engineered containment mound is designed specifically for the conditions of the selected site, with special considerations for seismic events. The design incorporates passive safety features which perform their function without intervention. Basic monitoring and inspections of the site will occur to confirm the facility is performing as expected.

CNL acknowledges the public's concerns about the effect of a seismic event. While it is true the preferred site is in a region of seismic activity, it is a stable region, with no fault lines running below the facility. The region is recognized by the Geologic Survey of Canada as an area of low to moderate seismic activity. And I might add in a wider context, there are no regions in Canada where zero seismic activity exists.

The risk of an earthquake has been studied and NSDF is designed to withstand a significant seismic event, both during operations and the long term. The magnitude and frequency have been determined by a site-specific seismic hazard assessment in accordance with Canadian standards for nuclear power plants. The selected design basis earthquake is a one-in-10,000-year ground motion event, which is only a 5.4 chance of exceedance during the 550-year design life and a peak ground acceleration of 0.55 g.

For context, the largest earthquake seen in Eastern Canada was the 1663 Charlevoix earthquake which occurred 600 kilometres east of Chalk River, with an estimated magnitude of 7.0. The peak ground acceleration experienced from this earthquake was 0.0054 g. This is two orders of magnitude below the one-in-10,000-year design life selected for the NSDF. Put another way, the NSDF design basis earthquake is 100 times larger than any earthquake seen in this region over the last 350 years.

Through seismic modelling industry recognized analysis, it has been demonstrated that the engineered containment mound can withstand design basis earthquake while maintaining containment of waste.

In summary, CNL has taken deliberate care to ensure the proposed facility is designed and will be constructed to ensure the engineered containment mound will withstand a significant seismic event.

CNL would like to take this opportunity to note an *errata* in Our Commission Member Document CMD 22-H7.1.

Figure 18 of the CMD includes a reference to Ontario Geologic Survey Report which is incorrect. The correct reference is provided on the slide. However, the data used in the figure is accurate and comes from the corrected reference. Furthermore, the correct reference is cited in the NSDF safety case document, including an expanded discussion of this figure. The safety case is available to the public in both official languages on CNL's website.

I would like to conclude my remarks by acknowledging the numerous positive interventions received as part of this process. Support for this process has been expressed by a wide variety of stakeholders and we believe this not only demonstrates broad public confidence in CNL as a steward of the environment but it is also reflective of our significant efforts to engage and educate the public about NSDF. Thank you.

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

I would now like to move to the presentation from CNSC staff, as outlined in CMD 22-H7.C.

Ms. Murthy, please proceed.

**CMD 22-H7.C**

**Oral presentation by CNSC staff**

**MS. MURTHY:** Good morning, President Velshi and Members of the Commission. For the record, my name is Kavita Murthy and I am the Director General of the Directorate of Nuclear Cycle and Facilities Regulation.

You will see a certain amount of repetitive information in the first couple of slides. We have done this to help situate the context for those persons who may be joining the hearing only on specific theme days.

CNSC staff's presentation today will provide supplemental information to that which was presented at the Part 1 hearing.

With me today in person and remotely are many specialists who are available to answer any questions that the Commission may have.

CNL has applied for an amendment to its CRL operating licence to allow for the construction of the Near Surface Disposal Facility (or NSDF) at the Chalk River Laboratories site. This slide shows where we are in the regulatory review process for the proposed NSDF Project and provides a brief context for today's presentation.

CNSC staff's conclusions and

recommendations related to the proposed NSDF Project were presented to the Commission during Part 1 of this public hearing held in February 2022. A detailed description of the NSDF and CNSC staff's regulatory review, including the Environmental Assessment Report, can be found in CNSC staff's CMD 22-H7.

We are currently in the Part 2 public hearing stage of the regulatory review process, as shown by the box in bold on this slide.

CNSC staff carefully considered each of the 165 interventions submitted to the Commission and identified key topics from the interventions. We have organized the topics under themes as set out for this hearing by the Commission Registrar. CNSC staff's supplemental CMD 22-H7.B addresses each of these themes.

In addition, we were directed by the Commission during Part 1 of the hearing to address concerns raised by intervenors related to inconsistency with international standards. CNSC staff's supplemental CMD provides a table that addresses this request. This part of the hearing deals with long-term safety.

I will now pass the microphone to Kim Campbell, Director of the Canadian Nuclear Laboratories Regulatory Program Division.

**MS. CAMPBELL:** Good morning, President

Velshi and Members of the Commission. For the record, my name is Kim Campbell and I am the Director of the Canadian Nuclear Laboratories Regulatory Program Division.

This slide illustrates the components of the NSDF safety case. The safety case presents scientific, technical, administrative and managerial arguments and evidence that support the safety of the facility throughout its lifecycle.

The NSDF safety case contains two key components: one, the Safety Analysis Report for the construction, operation and closure phases, listed as pre-closure on the diagram; and two, the Post-Closure Safety Assessment that covers the institutional control and post-institutional control phases.

CNSC staff assessed CNL's NSDF safety case and verified that it meets regulatory requirements.

A proponent, CNL in this case, must develop a safety case to demonstrate pre-closure and post-closure safety. There are several fundamental safety requirements that must be met for a disposal facility, as shown on this slide. The overall disposal system and its multiple individual barriers must be robust to contain and isolate the waste during its hazardous life. In addition, evolution and degradation of barrier systems and the impact of disruptive events must be taken into account.

After reviewing the interventions, CNSC staff identified three key topics that were raised by intervenors within the theme Long-Term Safety. These are presented on this slide: the NSDF design, the waste inventory acceptance criteria and characterization, and potential long-term impacts.

We will now speak to each of these key topics.

Robustness of the engineered containment mound and the design life of the liner system were raised by intervenors. The engineered containment mound and its components must be robust to contain and isolate the waste and resist disruptive events such as earthquakes, erosion, climate change and extreme precipitation.

The engineered containment mound, as shown on this slide, would be a multiple barrier system consisting of a multilayer cover system that limits water infiltration into the waste and limits intrusion; a multilayer base liner system that limits water leakage and infiltration into the subsurface; the natural subsurface that slows the movement of contaminants; and a perimeter berm that physically contains the waste.

CNSC staff assessed the design, the longevity and the robustness of the engineered containment mound components from the perspective of both operational and long-term safety and found that the design meets regulatory requirements and international standards and that the mound would meet or exceed its 550-year design life.

The waste acceptance criteria, its role in long-term safety and the importance of waste characterization were raised by many interventions. In particular, CNSC heard concerns around the determination of waste as low-level radioactive waste and the presence of long-lived radionuclides in the waste and their characterization.

The "Waste Acceptance Criteria" document sets the requirements for waste to be accepted for disposal in the NSDF. It requires waste to be characterized, specifies limits on the concentration and activity of key radionuclides, and contains a limiting total inventory at emplacement and at closure for each radionuclide in the waste. It also contains requirements for the activity and identity of radionuclides in the waste that are to be reported and tracked against the referenced inventory.

All of these parameters ensure that limits for significant radionuclides would not be exceeded during the NSDF operations. It is also important to note that long-lived radionuclides constitute a small percentage of the total waste inventory.

CNSC staff reviewed the waste acceptance criteria and the waste inventory extensively throughout the project and determined that the waste acceptance criteria comply with the CNSC requirements and international standards with respect to the definition of low-level radioactive waste, the limits and controls identified, and the development and inclusion of the total inventory.

Intervenors raised concerns regarding the emplacement of hazardous waste in the NSDF. CNSC staff want to be clear that hazardous waste on its own would not be accepted for disposal in the NSDF. However, radioactive waste that contains hazardous materials, also called mixed waste, may be accepted.

Prior to disposing of any mixed waste, CNL would be required to ensure that the waste is treated, processed or stabilized to meet the requirements of *Ontario Regulation 347*, which is titled "General Waste Management". This Ontario Regulation is a component of the "Waste Acceptance Criteria" document and would therefore be a requirement for CNL to comply with during any future NSDF operations.

Another area that intervenors raised concerns with was the potential impacts on the Ottawa River or receptors downstream in the post-closure period. The Post-Closure Safety Assessment provides an evaluation of the potential impact of the disposal facility on people and the environment during the post-closure period.

The expected evolution and degradation of the facility and the impact of human intrusion and other disruptive events, and other worst-case scenarios, were assessed related to the ability of the facility to isolate and contain the waste.  CNSC staff assessed both the methodology used by CNL and the results and found that the results provide assurance that the long-term impacts from the NSDF will comply with the public dose limit of 1 mSv per year.

The NSDF design ensures containment and isolation of the waste in the near- and the long-term.

To meet requirements and guidance, CNL was required to simulate the performance of the NSDF for a variety of scenarios.  This graph shows the calculated annual dose to a receptor for a selection of scenarios which are listed on the left.

For context, the vertical green line to the far right shows the average background radiation dose in Canada of 1.8 mSv per year, the vertical red line near the middle of the graph identifies the CNSC public dose limit of 1 mSv per year, and the vertical blue line on the left shows the more conservative dose acceptance criteria of 0.3 mSv per year.

In addition to the scenario shown, other deliberately unrealistic "what if" scenarios were modelled to illustrate and determine the worst-case impacts. All scenarios resulted in doses below the 1 mSv per year public dose limit.

These results build confidence in the safety case and the long-term performance of the NSDF to assure the public, the environment and the Ottawa River are protected.

This slide provides another graph that shows evidence to support the safety of a 300-year institutional control period and a 550-year design life for the NSDF barriers. It shows the radioactivity concentration of the waste after the NSDF is closed.

The blue line on this figure represents the concentration of radioactivity for waste in the NSDF engineered containment mound. As you can see, the blue line drops off rapidly at 100 years. This is a result of the shorter-lived radionuclides in the NSDF waste, which would decay in the first few decades post-closure.

In addition, the activity concentration of local uranium-enriched rocks shown by the grey horizontal band on the figure near the top and local background shown as the dotted Orange horizontal line at the bottom of the graph demonstrate that the activity of the NSDF waste is trending towards background levels by about 100 years post-closure.

CNSC staff find that the level of the hazard and timeframe used support the 300-year institutional control period and 550-year barrier design life.  The multiple lines of evidence, including the design, the waste and the long-term safety assessment, provide assurance the NSDF will protect people and the environment.

CNSC staff reaffirm our conclusions related to long-term safety, that the NSDF licensing submissions for construction of the NSDF meet regulatory requirements and provide confidence in the long-term impacts from the NSDF.  The NSDF facility design provides for its safe operation, decommissioning and closure, providing adequate protection for workers, Indigenous peoples, the public and the environment over the near- and long-term.

This concludes CNSC staff's presentation on this theme.  We are available to answer any questions the Commission may have.

**THE PRESIDENT:**  Thank you very much, Ms. Murthy and Ms. Campbell, for the presentations.

We will now hear presentations from intervenors and, Denis, over to you for some remarks, please.

**MR. SAUMURE:** Thank you, President Velshi.

Nineteen intervenors are scheduled to present orally today. Ten minutes are allocated for each presentation, with the Commission Members having the opportunity to ask questions after each presentation.

To help you in managing your time, a timer system is being used. The light will turn yellow when there are two minutes left and turn red at the 10-minute mark.

Your more detailed written submission has already been read by the Members and will be duly considered. There will be time for questions from the Commission after each presentation and there is no time limit for the question period.

President Velshi...?

**THE PRESIDENT:** Thank you.

The first presentation is by the Ottawa River Institute, as outlined in CMD 22-H7.129.

I understand we have Ms. Cheryl Keetch presenting remotely, and Mr. Hendrickson is in attendance in person.

So, Ms. Keetch, over to you, please.

**CMD 22-H7.129**

**Oral presentation by the Ottawa River Institute**

**DR. HENDRICKSON:** Madam Velshi, my understanding is that we attempted to reschedule this for Wednesday so that Ms. Keetch, our Coordinator, could make the presentation. She is unable to do so today, so I will be making the presentation for Ottawa River Institute.

**THE PRESIDENT:** Okay, perfect. Thank you. Please proceed, Dr. Hendrickson.

**DR. HENDRICKSON:** Thank you.

Ole Hendrickson, for the record. I am the President of the Ottawa River Institute.

That is not our slide.

Ottawa River Institute is a non-profit charitable organization established in 2001. Our mission is to foster sustainable communities and ecological integrity in the Ottawa River watershed. We prepared a detailed report in 2006 called "Sustainable Energy for the Ottawa Valley", with support from the Ontario Trillium Foundation, and we met with municipal councils in that process.

We have a working definition of "sustainable energy" and we have a simplified definition which is moving away from non-renewable sources of energy towards renewable sources and sustainable levels of use.

We of course care deeply about long-term sustainable employment for Ottawa Valley residents. We believe Canada can and should build state-of-the-art world-class facilities that will keep radioactive waste from the biosphere for as long as those wastes remain radioactive and hazardous.

Other countries are ahead of Canada. Our written submission has pictures of Finland's rock cavity facility at Olkiluoto for both low- and intermediate-level waste, which has been in operation since 1992. And we also show the Hanford Environmental Restoration Disposal Facility (ERDF), which is located in a flat arid area of the Western U.S.

Our concerns and questions on worker health and safety in the appendix to our submission arise from the October 2020 NSDF Safety Analysis Report and that document, not publicly available at this time, describes various jobs that would be created by the NSDF Project and health and safety issues related.

The benchmarking for the NSDF is the Hanford ERDF. Table 5-3 in the NSDF Safety Case briefly describes the ERDF, which is much larger than the proposed NSDF, with 16.8 million cubic metres of hazardous mixed waste from environmental remediation and decommissioning, which prompts some questions.

Is the Hanford ERDF an inground facility or a mound?

Owing to lack of protection of having waste in the ground, would workers be exposed to more radiation from a mound, the NSDF, than from the Hanford ERDF?

How much would worker dose estimates differ between those two?

Is the Hanford ERDF the right facility for benchmarking the NSDF?

What worker hazards are associated with a mound in a cold, wet climate rather than the climate at the ERDF?

A Safety Analysis Report says ground gamma would by far be the highest annual radiation exposure pathway for workers, 6.36 mSv per year, many times higher than inhalation of alpha and beta particles at 0.01 mSv per year.  So how did the models used to calculate worker radiation doses come to the conclusion that there is such a minimal risk from dust inhalation when at the Hanford ERDF that is one of the main concerns?

When waste is put in the mound, the job with the highest radiological consequence to workers is macro-encapsulation of drummed waste, which has a dose estimate of 10.4 mSv per year, which Dr. Fairlie noted yesterday is quite a high dose, particularly if that is prolonged over a 20-year or so working period.

But what is macro-encapsulation? Where would workers do that? What would they be macro-encapsulating?

The job with the third highest radiological consequences, 6.37 mSv per year, would be for the two heavy equipment operators who would spend eight hours a day, four days a week for eight months a year moving and grading the mound. The estimated dose is essentially the same, 6.37, as the ground gamma, 6.36. The assumption seems to be that there would be no inhalation doses associated with dust from grading and compacting, which seems surprising to us.

The job with the fourth highest radiological consequences, 6.09 mSv per year, is grouting of packaged waste. What type of what packages would be grouted? What would the grouting process involve? What kind of grout would be used?

Table 14-9 in the Safety Analysis Report shows a number of possible accidents, if the mound dropped load, unintended contents, vehicle collision, et cetera. The most severe accident would be dropped load, which results in a waste package being dropped onto another waste package, both being damaged, loss of containment and spread of contamination with radiological consequences to a worker.

Some packages would be moved with a crane, a mobile crane. What type of packages would be moved with a crane? Would these be shielded packages? What would be in them? How often would an accident of this type be expected to occur?

So I think these are important questions for people who might be contemplating working at a facility such as the NSDF.

The proposed 300-year NSDF institutional control period is nearly twice the history of Canada as a nation. If the earth remains habitable for the next 350 years, people will be using renewable energy almost exclusively. There is confusion as to whether AECL or CNL would be the enduring federal entity for the NSDF, but neither CNL nor AECL, both of which focus on use of non-renewable uranium and nuclear power, will likely exist at that time or be capable of exercising institutional control of the NSDF.

And there is confusion regarding abandonment. Mr. McBrearty's presentation yesterday said CNL has no intent to abandon the NSDF or its waste and institutional controls will be maintained for as long as required, but indefinite institutional control means an indefinite and potentially infinite liability. A facility relying on engineered barriers to contain and isolate long-lived nuclear waste is not a disposal facility, it is a storage facility that would impose a perpetual burden on future generations of Canadians.

Perhaps a way to address this dilemma would be to transform Chalk River Laboratories into a national research facility with the human and technical resources to examine all forms of energy in Canada's transition to net zero. CRL's expanded mandate would necessarily include long-term management of waste from all different forms of energy, including the nuclear waste at Chalk River and other AECL properties.

Baby steps have already been taken in this direction. The old name, Chalk River Nuclear Laboratories, was changed to Chalk River Laboratories in the 1980s. Research on hydrogen fuel, which can be made from renewable energy sources, is now being conducted at CRL. At a past Environmental Stewardship Council Meeting, former president Mark Lesinski discussed the need for research on how nuclear and renewable energy can complement each other.

So we believe that CRL, rather than CNL or AECL, could be the enduring federal entity for institutional control either of an NSDF or preferably another different, more secure, permanent disposal or long-term storage facility for nuclear waste.

CRL's expanded mandate would necessarily include accommodation and consent of Ottawa Valley First Nations, given that any long-term storage or disposal facility would be on their unceded territory.

We strongly urge you to discuss the issue of how to create an entity that is capable of exercising institutional control for 300 years before any approval is given for either permanent disposal or long-term waste management in the Ottawa River watershed. Thank you.

**THE PRESIDENT:** Thank you very much, Dr. Hendrickson.

I will open the floor for questions from Panel members, starting with Dr. Lacroix, please.

**MEMBER LACROIX:** Thank you very much, Dr. Hendrickson, for your presentation and submission.

This question is directed to CNL. During the construction of the NSDF, the workers will be exposed to various kinds of risks, physical, chemical, maybe radiological. So could you tell us -- well, could you summarize the kind of risks that they will be exposed to and the measures that will be taken to mitigate these risks?

**MR. BOYLE:** Phil Boyle, for the record.

This construction process is not entirely different from other construction processes that are ongoing at the site and not entirely different than other industrial construction activities around the country. So fundamentally, the conventional occupational and safety control requirements that the labour organization applies, that the government applies would be in place here.

We have a couple of levels, I would say, of overseeing that. One is the contractor themselves have an occupational safety and health program that we specify in our contracts with them, certain requirements for that, and then we oversee their application of that.

We also have at CNL an Occupational Safety and Health Program. It in fact is one the SCAs of our licence, the conventional safety and health program that has to apply across the entire laboratory. So that is another layer.

And then periodically we do have outside third parties come and audit us to see whether or not we are complying with that.

So in terms of the kinds of hazards, as I said, not entirely different than other industrial hazards associated with construction. I think once you get to operation and you start handling radioactive material, then that adds the exposure element to it. But again, we handle those materials currently in our storage area, our waste management areas, so the process we use for radiological controls, the exposure control of our workers, the ALARA principle where we minimize the exposure, again that is one of the SCAs, the radiation protection program that gets reviewed by CNSC and others.

Those are the mechanisms, Dr. Lacroix, we would use.

**MEMBER LACROIX:** Thank you very much.

**MR. McBREARTY:** I would like to add, Dr. Lacroix.

Mr. McBrearty, for the record.

Mr. Boyle mentioned that presently we are handling, storing waste products. We have a very large facilities decommissioning project underway at the site and what is kind of the basis of this is just really good prior planning prior to getting into any job. That would be much like the construction job for the NSDF, but since we are dealing with potentially contaminated materials in the NSDF, the actual emplacement of the waste is not really dissimilar to the types of work we are doing today.

Planning, design, the characterization, the precautions, the personal protective cautions that we put in place for our workforce exist today. We have experience with this, we measure ourselves and look at best practices across the world in other countries that have done this have worked with, you know, soils, demolition waste, et cetera. You can see that in some of the examples that were used yesterday at Piketon or in a bridge and at Hanford.

So the experience exists, the procedures, processes exist today. As we look at our basic exposures over the last few years, they continue to go down for our people.

Part of that, as Mr. Boyle mentioned, we take ALARA very seriously. We look at it how can we absolutely reduce the risk to our employees, no matter what job they are in? And much of that goes back to the planning to understand what the characterization, what the specific material folks are working with on a particular day, and how do we protect them. Thank you.

**MEMBER LACROIX:** Thank you.

**THE PRESIDENT:** I will follow up with the question Dr. Lacroix posed around the analysis that may have been done associated with worker health and safety.

The intervenor mentioned that this report, Near Surface Disposal Facility Safety Analysis Report, that is not publicly available. So, I want to get confirmation from you that there is indeed such a report. And if it is on the topic, as the title suggests, then why is it not publicly available?

There were many follow-up questions from that: that it is using the Hanford facility to kind of do some benchmarking and is that an appropriate facility? And also questions around some of the dose estimates and are those correct, are those justifiable?

And as we heard from Dr. Fairlie yesterday as well, over 10 millisieverts a year over 50 years is a high dose.

So, we will start with you and then I would like to get staff's comment around worker health and safety and any analysis and assessment done about that.

So, Mr. Boyle, please.

**MR. BOYLE:** Phil Boyle, for the record.

Before I turn this over to Ms. Vickerd, who is a little more familiar with the details of that report that you referred to, President Velshi, I would comment that the dose assessments are, first of all, conservative. They are an analysis in order to provide us an upward limit of what might happen. But more importantly is the fact that we would not put a single individual in that role day-after-day, year-after-year. The ALARA process causes us to evaluate the dose that our workers are receiving on a regular basis. In fact, for every worker, we have what's called a dose control point. It's a value that we've established. It says we would like this individual to be able to stay at this number or below, and every quarter that's evaluated to determine how they are relative to that value; and if we need to, perhaps change the work environment to reduce the source or change the work assignments in order to avoid any individual getting a particularly elevated dose. We do that.

We have not been at the level of 10 millisievert for an individual for several years, and the overall dose, the workforce gets a person-millisievert number, where you take the number of millisieverts everyone gets, add them up and then divide by the number of people, that's been steadily declining over the year also.

That idea of the planning that Mr. McBrearty described, where we don't operate to whatever the limit allows, let's work up to that limit. We operate on the basis of how low can we go, what's reasonable? And that means applying shielding. That means additional practice, for example, on how to do certain jobs. We do a lot of mock-up work where we create a situation that's similar to the radioactive situation and we let the workers practise there in order to find out how to spend the minimum amount of time and to position them to be as far from the source as possible. And after some practice there, then we go do the job.

So, those kinds of things would result in less exposure than this particular analysis would get if you just extrapolated this analysis over 50 years.

So, Ms. Vickerd?

**MS. VICKERD:** Meggan Vickerd, for the record.

With respect to the safety analysis report, it is what I would call a conventional nuclear safety analysis report, where it looks at the operational period of -- construction, operation and closure of NSDF. It has been prepared in alignment with the CNSC's Regulatory Guidance Document-2.4.1, Deterministic Safety Analysis, and it has been submitted to CNSC staff for review.

The document is a technical document, and summaries of it have been extrapolated and put into the EIS. So, it supports the EIS. And it has also been summarized in the safety case document, both of which are available for the public.

The Safety Analysis Report, as a technical support document, has also been added to the IAEA's registry of documents for this project. So, it is available to the public in its full technical detail, as well as a summary provided in the EIS and safety case.

With respect to Hanford from a benchmark facility, in the planning process for NSDF we identified a number of nuclear facilities internationally which we identified similarities with our design, to pull from them lessons to incorporate into our design. We've done that from existing facilities CNL operates at Port Hope and Port Granby, Hanford, but we've also done Oak Ridge, some European facilities as well. So, we incorporate -- we did a number of benchmarking to incorporate operational experience of things that we want to incorporate into the design and planning of the facility, such as making sure we had sufficient water treatment capacity and storage. So, we are in the process of applying for a licence to construct the EA, to ensure everything is binding. As we prepare our conduct of operations for a licence to operate, we would continue to do benchmarking to ensure we are incorporating lessons learned from those operating facilities to plan operations of NSDF as well. So, we continue benchmarking and lessons learned.

Hanford is a very arid climate, so they are going to have some unique challenges that we would not necessarily have in Chalk River. For example, we would rely on certainly our own experience in operating Port Hope and Port Granby, which are a very similar climate and have the same managements systems that we have at Chalk River.

**THE PRESIDENT:** Thank you.

Staff, please.

**MS. MURTHY:** Kavita Murthy, for the record.

I want to start off with the basic premise that a radioactive based management system shall be designed and operated in accordance with the ALARA principle to reduce radiological exposure to people and the environment.

Going beyond that, the CNSC's regulatory framework has the safety and control areas, many of which are implicated in your question, Ms. Velshi, starting with Occupational Health and Safety, Radiation Protection, Management Systems, Worker Training, which falls within Management Systems, as well as Safety Analysis and of course Radiation Protection.

So, without spending a long time on this, I do want to get some key messages out, particularly on Occupational Health and Safety and Radiation Protection, and maybe we will touch on Safety Analysis either today or later on, so we will perhaps not go too deep into that.

I will hand off to Kim Campbell to start us off on Occupational Health and Safety, going on after that to our Site Supervisor and then to Radiation Protection.

So, please go ahead.

**MS. CAMPBELL:** Kim Campbell, for the record.

As Ms. Murthy just said, within the Chalk River Licence there are licence conditions specific to occupational health and safety, radiation protection and management system. It's something that we look at very often, frequently conducting inspections and doing regulatory reviews.

To expand on that, though, I will ask Mr. Brett Legree to provide some details on the inspection program at Chalk River. So, the CNSC does have a site office at Chalk River where inspectors are housed to do daily oversight of the operations at Chalk River. And if this project is approved, they will be executing regular compliance oversight of the construction of the NSDF.

So, over to you, Brett.

**THE PRESIDENT:** That wasn't really my question, and that's not what I want to get into now.

**MS. CAMPBELL:** Okay.

**THE PRESIDENT:** What I really want to know is what kind of analysis has happened for this particular project, what is available, what are some of the areas that may be of concern to you as the regulator as you looked at the submission, please.

**MS. MURTHY:** Yes. CNSC has regulated CNL and before that AECL under the regulatory framework that we have for a number of years. If you are talking about the analysis that has gone into this particular project, I would like to call upon Vladimir Khotylev, who is joining us from Ottawa, to speak to the safety analysis aspect.

Apologies if I confused you.

**DR. KHOTYLEV:** Vladimir Khotylev, for the record.

As a safety analysis subject matter expert, I would like to confirm that in accordance with Class 1 Regulations, a safety analysis report is presented as part of the licensing submission.

CNSC staff reviewed the safety analysis report and confirmed that all parts of the analysis are consistent with existing national regulations and international guidance, including analysis from normal operations up to the credible abnormal conditions, including acceptance criteria which are to be consistent with requirements of national or international standards or regulations.

All kinds of analysis of events are reviewed by specific subject matter experts and results are confirmed to be consistent with national regulations or international guidelines.

If additional information is required with respect to specific events, appropriate subject matter experts will provide additional information. Thank you.

**THE PRESIDENT:** Thank you. That's good for now.

Ms. Maharaj?

**MEMBER MAHARAJ:** Thank you, Madam Velshi.

Just picking up on one of the questions that was asked by the intervenor, CNL, could you just give a short understanding of what macro encapsulation means and what stage of the process would it occur?

**MS. VICKERD:** Meggan Vickerd, for the record.

There's two terminologies that the intervenor used: macro encapsulation and grouting.

So, grouting we would use to meet our void space requirements in ways that doesn't meet that 10 percent void space that we want to limit from a physical property. So, we would grout a package if it had a lot of air space and pipes that need to be filled up.

Macro encapsulation is a waste processing technique that we don't take credit for in any of our safety analysis, but we could, to further enhance the long-term safety of the waste. It is used to -- you can use special formulas of grout or polymers and fill waste package where you want the radionuclide to absorb that material and retain within it that matrix long term.

None of our safety analysis has taken credit for that, but we have included it in our operational safety analysis perspective because it could result in higher doses to workers should we want to employ it. So, in the modelling we've assumed it's used in the highest dose package possible to demonstrate what the maximum dose to worker could be.

**MEMBER MAHARAJ:** Now can I just take it down a technical level just a little bit so that I can get a better visual?

So, you have a package, and you have radioactive material in it. So, when you are doing this macro encapsulation, you're filling up inside the package with this special grout. Right?

**MS. VICKERD:** Correct.

**MEMBER MAHARAJ:** So why does that create a higher level of exposure than if the package was just being handled?

**MS. VICKERD:** Meggan Vickerd, for the record.

Because the worker would spend more time with that package, spend up to eight hours a day with that package, doing processes to facilitate filling the package. So, there would be longer exposure times, which results in a higher dose.

**MEMBER MAHARAJ:** Okay. So, what I have in my mind is that expanding foam that you put around pipes to seal off the pipe hole so the mice can't get in the house, something like that?

**MS. VICKERD:** Conceptually, yes.

**MEMBER MAHARAJ:** Conceptually. I'm okay with conceptually. Okay.

So, those kinds of packages, if they're targeted for the specifically higher radioactive materials, would doing that technique create a safer situation in the long term once that package is in place?

What is the trade-off in terms of safety to the worker versus long-term safety and long-term protection to the environment and people?

**MS. VICKERD:** Meggan Vickerd, for the record.

That's correct. By using macro encapsulation in a particular package, it means that radionuclide is retained and not susceptible to migration or departure from the facility once the design life is done.

So, it would result, depending on the radionuclide, in lower dose. We call it dose optimization that we can explore. Again, we haven't credited it in our post-closure or long-term safety analysis, but because it could create a high dose to the worker we've included it as a binding scenario in our operational safety analysis.

**MEMBER MAHARAJ:** Okay. Thank you.

**MR. BOYLE:** May I add one thing?

Phil Boyle, for the record.

Just the idea of the void space may not be obvious, but if you have a package, say a box or big container and you've got some piping in it, there's a lot of void space. And as you put that in the mound and then fill it up, now that could compress. Then that could change the overall structure that you have engineered this system for.

So, there are rules about how much void space you can have. You might fill up those void spaces in order, not necessarily to shield, although it can help shielding, but because you need to do that so that you don't have a concern that the mound might deform later in life.

**MEMBER MAHARAJ:** Thank you, Mr. Boyle. And we did hear that concern raised yesterday: that if there was compaction of the material within the mound, there could be surface impacts to that.

So, filling those void spaces would be a mitigation against that outcome. Correct?

**MR. BOYLE:** Correct. And that's one of the reasons it can be referred to as an engineered containment mound and why we're not very comfortable with the dump idea, of just dumping stuff. These things are placed. There's rules about what can be where and what can be adjacent to each other, all in order to provide enough understanding that we can be assured that the mound will not deform.

**MEMBER MAHARAJ:** Thank you.

**THE PRESIDENT:** Dr. Hendrickson, another issue that you raised, which I do want to pursue but I'm going to save it for later in the day or tomorrow, is around institutional control and how does one ensure there is an enduring entity that's going to carry out those responsibilities.

I will turn it over to you to respond to what you have heard, as we end this presentation.

**DR. HENDRICKSON:** Thank you, Madam Velshi. Ole Hendrickson.

Mr. Boyle, you said that we handle materials already in our storage areas, and that's of course true. But those materials are in relatively secure, well understood environments. Placing radioactive waste in a much less controlled environment, such as the NSDF where they would be exposed to wind and rain and snow melt, and weather events such as the 190-kilometre per hour winds that impacted the Ottawa Valley on May 22nd, creates considerable uncertainty regarding worker radiation exposures and concerning the potential for dispersion of wastes and spread of contamination beyond the NSDF footprint.

So, issues such as worker radiation exposures associated with both the ground gamma dose, which will build up through time as more and more waste is put in the NSDF, and inhalation of alpha and beta particles from dust and from gas release, those issues emphasize the need for re-examining the environmental effects of the NSDF and safer and more secure alternatives, such as in-ground concrete vaults or shallow rock cavity facilities.

We don’t feel an adequate examination of the safety of those alternatives, which I think is required by *CEAA 2012*, has been performed to date.

Just to reiterate, we do strongly believe that the necessary clean-up and proper long-term management of waste is going to provide jobs for years to come, but we want those to be good jobs and safe jobs, so workers and their families can enjoy good health and a good quality of life.

We do not yet believe that a credible case has been made that the NSDF would provide those kinds of jobs and that security for residents of the Ottawa Valley. Thank you.

**THE PRESIDENT:** Thank you, Dr. Hendrickson.

I see we are going to be hearing from you again this afternoon. We look forward to that. Thank you.

Our next presentation is by the Old Fort William Cottagers' Association, as outlined in CMDs 22-H7.36 and .36A.

We have Ms. Joann McCann making the presentation.

Over to you, please, Ms. McCann.

**CMD 22-H7.36/22-H7.36A**

**Oral presentation by**

**Old Fort William Cottagers' Association**

**MS. McCANN:** Good morning. We just go by the acronym OFWCA, and because of my time limit, our submission is about 24 pages but I'm going to try and focus on a few salient points and also not replicate things that were discussed yesterday. But I may highlight them.

We are the first downriver community on the Quebec side, in the Municipality of Sheenboro. We would be the first affected by the spill or any leachate or any other kind of issues or accidents by the NSDF.

I personally live in a bay that would be the first bay downriver from the NSDF, Downey's Bay.

In 2016 our membership opposed the following: the NSDF, the granting of the 10-year licence in 2018, which we participated in, and the transport of radioactive waste and also industrial waste to the site from other sites.

OFWCA and other citizens' groups, like ORI, Ole's group, and 140 municipalities, including Montreal and the MRC Pontiac, which we ae part of, are all opposed to this mound.

Public engagement and true consultation. We weren't consulted. Municipalities in Pontiac County -- and there are 18, including the Municipality of Sheenboro -- were never consulted on this proposal until after the decision was made and the project was announced in 2016.

CNL came to our community after the decision was made about the location, the type of facility it would be and particularly that it will be 1.1 -- I hear 1.2 -- kilometres from the river. You know, after CNL came to Sheenboro to educate us about the NSDF, I left there disillusioned. I know it's under CNSC's review, and you have highly educated specialized experts. But, you know, I just felt that the site, the location, the type of facility had been already chosen and much effort and funds have been devoted to the project already.

To us as the cottagers and residents, we just felt it was an information session. We were ticking the consultation box, and the site and the facility were fait accompli.

We feel, because of that, that our trust in the process has been eroded.

Also, CNSC came to our community, to our community hall, and the whole process was explained, which was shown in the slide by the CNSC this morning. I left there thinking why is this Commission reviewing and sending comments back to CNL and tweaking a risk, foolhardy mound? And I'm not alone in that. I'm representing the cottagers and residents of Sheenboro and Fort William.

It's so close to the Kichi Sibi, the Ottawa River.

Although we are not nuclear specialists, I do know in Quebec landfill sites are not allowed to be situated so close to the river.

Site selection. There are six points here. I'm going to try to hone it into one or two.

Why did CNL so quickly choose this site that is close to the Ottawa River? As I mentioned, it's 1.1. I hear 1.2. It's very close to the Ottawa River. We feel it was extremely restricted and inadequate. We want to know why CNL didn't consider alternative sites that are not on that land. We have federal crown land at DND, at Garrison, Petawawa. Yes, some of it is used for training and ranges, but why was that not considered?

Also, there are other federal land in Renfrew County that would not require long distance and transport.

These are questions that still remain with us.

The proposed location. The site is fraught with serious issues. There are wetlands, Perch Lake, Perch Creek. You also have Chalk Bay in the rear of the proposed mound. Perch Creek would be 50 metres from the base of the mound and it flows directly into the Ottawa River.

It has been said by a number of people. You know, it is the drinking water for millions of people.

People have touched on the earthquake. There was an earthquake near Arnprior and Almonte on May 10th. We also have had a major derecho in the last month.

We learned, too, that CNL lost power. And I'm adding a question. What will happen to the monitoring of this mound when CNL loses power? Will there be a major generator back-up for the monitoring of this mound? That is an add-on to my presentation.

The groundwater table is very near the surface. We are concerned about the slope and how high it is above the river. Near Surface Disposal Facility, I think, is kind of not an appropriate term for something that is this high. It is a mound.

We also have a concern that CNSC does not adequately address that siting process which I touched upon in the slide previous.

I just want to add one other thing.

I'm not going to talk today that our submission talks about different facility alternatives, which is on page 6 of our submission.

We also raise concerns about the radioactive and hazardous waste. So, I draw attention to pages 8 and 9 of our submission and I hope that will be fully considered.

Our overall concern and even though we aren't nuclear scientists is why take a risk and approve this waste site? Safety is the utmost concern. Forget the word stakeholders. Citizens and future generations have much to lose. Our position must be respected and seriously considered by CNSC. We swim, boat and drink the water of the Kichi Sibi and we do not want this facility. We have been clear since 2016. Any waste facility must meet international standards, and in this democracy public approval must be met.

My final add-in to the presentation is that I’m a researcher of First Nation land claims. In my volunteer and professional work I’ve research cultural heritage and sacred sites in Algonquin Anishinabeg territory.

CNL is on Algonquin territory, unceded Algonquin territory. Algonquin families were displaced when the plant was built. Pointe au Baptême is the image -- if we could move to the next slide, please.

Sorry, I’m on the next slide. Oh, sorry, that’s me. Pardon me. I’ve jumped ahead.

On the left is Pointe au Baptême. Algonquins gathered there every June $21^{st}$. Directly across from CNL is Panesi Asin(ph), which is Oiseau Rock, which is a sacred rock art site.

It is also a major tourist attraction in the Ottawa Valley. People come from Ottawa and in Quebec to see this beautiful place, which is Algonquin. And it’s currently still a sacred geography to the Algonquin Anishinabeg.

Now, we are told you won’t see the mound from the river. Tourists and visitors regularly climb to the top of the rock, and I do wonder if you will see the mound from there, which takes away in cultural heritage terms when people are on the Heritage River, the Ottawa River, the Kichi Sibi, they want to feel that they are back in time, untouched, when voyageurs, explorers and Algonquins paddled the river. So when you go to the top of this rock where peregrine falcons nest, I wonder if you will see the mound, which will undermine the natural, sacred and cultural heritage of the Kichi Sibi/Ottawa River.

Thank you.

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

We will start with Ms. Maharaj, please.

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you for your presentation.

Just to pick up on your final comment in your intervention, I would like to ask CNL what is the final finished look of the mound?

I can appreciate that it’s going to rise above the current topography, but is it going to rise above as a grassy knoll? Is it rising above as a forested area? Is it rising above as a concrete encasement? Can you clarify that, please?

**MS. VICKERD:** Meggan Vickerd, for the record.

I'm going to ask my staff to see if there's any renderings in our presentations that we can pull up, either from Part 1 or Part 2. We do have renderings of what the facility proposed will look like when it's finished.

I just want to clarify. The mound will not rise above the ridge. We've talked about that ridge that the facility is going to be placed on. It's on the backside of the ridge, and in fact we've seen some cutaways in the CNSC's presentation that shows that there will excavation into that ridge to ensure that the mound blends into the topography of the area. So, that is not going to blatantly stand out above the ridge, and that is going to be assimilated as a natural feature, so to speak.

However, the facility, once we close it, it will appear as a grassy field because we want to limit the extent of vegetation on the surface.

However, certainly when we get to speak to our involvement with some of the First Nations, they have expressed an interest in understanding and being involved in what that closure looks like. So, there may be some opportunities with some of the First Nations to see if there's some cultural values that can be incorporated into that closure plan.

**MEMBER MAHARAJ:** Thank you. I just have one other short question, and it's really around this concept of consultation and the timing of decision-making and going out to the communities.

We've heard from this particular intervenor and from a couple of others that decisions were made before consultation began. Could you summarize the front-end of your consultation timing so that we can get a better sense of whether or not CNL went to the community with a plan or whether they went with options?

**MS. VICKERD:** Meggan Vickerd, for the record.

I'm going to go to our Director of Corporate Communications, Mr. Pat Quinn. But before I do, the environmental assessment process does afford the opportunity for public engagement and feedback. So, that is the process for which the public can facilitate and be part of the dialogue. We bring our proposal to them. Certainly it's a proposal. The decision-makers are the Commission. We bring the proposal to them, listen to their concerns about it. And there's many examples where we have incorporated their feedback.

And as we go to Mr. Quinn, we do have rendering of the proposed facility from the river view that one of our communications officers, Ms. Leblanc, can pull up in the meantime.

Mr. Quinn?

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

Pat Quinn, for the record. I am Director of Corporate Communications.

Commissioner, with respect to our engagement activities surrounding the proposed NSDF, I can recall from my interactions with the Environmental Stewardship Council discussions actually predating the launch of our project description in a general nature on such a facility.

Old Fort Williams Cottagers' Association is a member of the Environmental Stewardship Council and, as mentioned yesterday, this is one of the means in which we've been able to directly engage with interested stakeholders. And we have done so since the launch of the project.

I mentioned that there were 17 engagements on NSDF alone through the Environmental Stewardship Council.

Getting back, though, to engaging the community more so, in 2016 it was the launch of the project description where CNL came out to the communities nearest us to begin with. This is something that we grew over the course of the several years that the project has been going through the environmental assessment process. We attended community sessions, as Ms. McCann mentioned. Sheenboro was on that list. We have done engagement throughout Renfrew and Pontiac Counties, but we were attending Sheenboro specifically so that we could talk to interested parties there.

This engagement process provides the opportunity for interested parties to provide that feedback that Ms. Vickerd talked about. And there is the opportunity to truly influence the design and the environmental assessment process. It is with the project description that we really launched the engagement.

**MEMBER MAHARAJ:** Thank you.

**THE PRESIDENT:** Dr. Lacroix?

**MEMBER LACROIX:** Thank you very much, Mrs. McCann, for your presentation. It was quite interesting.

You have raised a very interesting point, and this question is directed to CNL.

What if during the operation of the NSDF there is a major power failure? Would it compromise the safety of, for instance, the waste treatment plant -- wastewater treatment plant? Sorry.

**MR. BOYLE:** Phil Boyle, for the record.

The facility, as a Class 1B facility and certainly as one that is doing important work like this, will have back-up power. We have at the site a series of back-up diesel generators. We call it Class 3 power, the utility is Class 4 power. And during the recent outage, all the Class 3 generators started.

We often in a situation like that will man our emergency organization just in case something happens. We want to have everyone there in the event that something happens. And we did that in fact in this last power outage.

There was no concern. Everything worked like it should, but we were all available in case it did not.

So, this site would have a back-up generator at a minimum and perhaps even a solid state power source; but at least a back-up power source.

I don't think there is much activity going on that in fact requires electrical power in order to maintain safety. It's mostly for monitory and to be sure that you have lighting and people's ability to be safe.

**THE PRESIDENT:** I have a question for CNSC staff based on the intervention, and it's to do around the siting process or the inadequate siting process. We did touch on a number of aspects of this yesterday.

The specific one I would like to get your thoughts on is around the IAEA safety guide around siting of Near Surface Disposal Facilities, which the intervenor claims you didn’t make reference to. But more importantly is: Are there requirements in there that this particular project does not meet and that even the definition of a Near Surface Disposal Facility, as envisaged by the IAEA, the proposed NSDF would not meet because it’s not really underground enough?

Your thoughts on that, please.

**MS. MURTHY:** Kavita Murthy, for the record.

You said you wanted us to speak to the siting process specifically with respect to the references that have been made to the IAEA safety guide on siting. That’s one.

And then you said is there a definition of NSDF in any of the IAEA documents that this particular project does not meet?

Those are the two you wanted? Thank you very much.

So, for the IAEA specific requirements related to siting, I will go to Mohamed Gacem. And then if he does not cover the NSDF definition within that, we will have someone else speak to that.

Mohamed, please go ahead.

**MR. GACEM:** Thank you, Kavita.

Mohamed Cherif Gacem, for the record.

The site suitability has been reviewed by CNSC staff in accordance with the IAEA SSG-29, which is the Near Surface Facilities for Radioactive Waste and particularly the stages for development of siting process.

Several sites were under consideration by CNL in the first stage. They started with the conceptual and planning stage and then selection of one or more for more detailed consideration. We heard that and we reviewed that the selection was about 15 sites within the CNL site. And the site investigation stage for detailed specific studies and site characterization, then a site confirmation stage.

The CNSC staff concluded that the selected site is suitable for the proposed Near Surface Disposal Facility, considering the fact that the site selection process aligns with the international guidelines and best practice. The NSDF and ECM is sited on a bedrock ridge, sloping away from the Ottawa River, and the elevation of the ECM is at 163 metres above sea level. And the flooding level at the CNL site is only 122 metres above sea level. Besides this, the site characteristics are well known, based on the extensive site characterization campaigns carried out previously during the site investigation and site selection.

**THE PRESIDENT:** Sorry, Mr. Gacem, all I wanted to know is our review looked at SSG-29, or whatever the number is. You just didn’t make reference to it.

**MR. GACEM:** No, we reviewed based on the SSG-29, Appendix 5.

**THE PRESIDENT:** That’s good.

**MS. MURTHY:** And then, Ms. Velshi, your other question on the NSDF definitions, for that I will pass to Ms. Nancy Greencorn and then call upon maybe Shona Thompson, if needed.

**MS. GREENCORN:** Nancy Greencorn, Director of the Wastes and Decommissioning Division.

Specifically to your question on whether the international safety standards includes various types of disposal facilities, I think it best if I can just read aloud that in accordance with the IAEA, because of the Low-level waste may have a wide range of activity concentrations and may contain a wide range of nuclides, there are various design options for nuclear disposal facilities. These options may range from simple to more complex engineered facilities and may involve disposal at varying depths, typical from surface to depths of 30 metres.

So, it does say within the safety standard it is based on the site-specific safety case, and the Near Surface Disposal Facility being proposed is in alignment with the safety standards.

With respect to the further questions on how site suitability is incorporated into our regulatory framework, we could speak to that. But I didn't know if you wanted to address that at this time.

**THE PRESIDENT:** It's really to come -- and I'm going to read what's in the CMD.

**MS. GREENCORN:** Sure.

**THE PRESIDENT:** CNL's so-called Near Surface Disposal Facility bears no resemblance to the IAEA's description of an NSDF. The IAEA NSDF facility would be tens of metres below the ground surface with waste contained in vaults or trenches. And, instead, we have a mound that rises six storeys.

So, it was specifically to that statement. And what you are telling me is that the IAEA uses a fairly broad definition for how to handle Low-level waste and there really is no specific definition of NSDF as far as depth and height, and so on?

**MS. MURTHY:** Kavita Murthy, for the record.

Yes, that is correct. SSG-29 uses the term Near Term Disposal Facility to refer to a range of disposal methods, including the emplacement of solid radioactive waste in trenches, above-ground engineered structures, engineered structures just below the ground surface and rock caverns, silos and tunnels excavated at depths up to a few tens of metres underground.

So, there isn't one definition that has been given.

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

With that, Ms. McCann, I will turn it over to you for any comments you may have on what you've heard, please.

**MS. McCANN:** A question about sort of the beautification of the mound. Is that like after it's been filled, like 50 years in the future?

The MRC Pontiac in its master plan has identified river corridors which are beautiful aspects of the Ottawa River. So, when will the mound -- and I refuse to call it an NSDF, especially since we've had this conversation about the definition of a NSDF. When will it be sort of beautified? Is that 50 years down the road?

So, when I'm at the top of Oiseau Rock, will I see it? I can see the Madawaska Highlands. Will I see the mound? And when will it have this kind of cover and sort of grass, if you could answer that?

**THE PRESIDENT:** CNL, please.

**MS. VICKERD:** Meggan Vickerd, for the record.

We did send the rendering to CNSC IT staff, if they want to pull it up. That’s a rendering of the visual, the mound, from the river, either during operations or closure.

NSDF is not going to be visible from the river. I can’t answer whether it’s going to be visible or not from Oiseau Rock because it’s at a significant elevation.

The closure and the restoration of the surface would occur after closure to after the 50-year time period.

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

Thank you for your intervention and showing up today, Ms. McCann.

With that, we will move to our next presentation, which is by Mr. Chris Cavan, as outlined in CMD 22-H7.58.

I understand Mr. Cavan is joining us remotely.

I’m sorry, it’s Ms. Cavan. My apologies.

Ms. Cavan, over to you, please.

**CMD 22-H7.58**

**Oral presentation by Ms. Cavan**

**MS. CAVAN:** Commissioners, caretakers of the Ottawa River and its millions of inhabitants, you have impressive credentials, each of you. Each one of you is charged with grave responsibility in these hearings. Please use your fine minds to open your hearts and listen to my message. The labels of Commissioner and intervenor should not define you and me in this process. All humans are equal. We all share responsibility for protecting our environment.

At the CNSC hearings in Pembroke in 2018, intervenors were barely tolerated. It was clear that we would have no effect whatsoever on the outcome. The decision to grant the 10-year licence to CNL was already made. The points we made at the 2018 hearings fell on deaf ears.

The Ottawa River is a sacred resource for all of us who live in its watershed. No one owns these waters. Together, we are guardians and protectors of this precious resource. Any risk of contaminating the Ottawa River cannot be tolerated. You must do better this time.

The health and welfare of millions of children and unborn babies, grandmothers and mothers, grandfathers and fathers, in Fort William, Sheenboro, Chapleau, Waltham, Norway Bay, Braeside, Arnprior, Aylmer, Hull, Ottawa, Cumberland, Rockland, Wendover, Hawkesbury, Hudson, Laval, Montreal and many more places along the Ottawa River are depending on you to make the right decision.

I am a mother and grandmother. Our family has gathered for 53 years at our cottage in Fort William near Sheenboro, Québec. We are the first community that would be affected by any spills or accidents that could occur at Chalk River. What is at stake for over 5 million people along the Ottawa River in these hearings is life itself. Water is life for all of us.

You must do better this time. Building this massive mound for toxins and radioactive waste this close to the Ottawa River must not be a foregone conclusion. This time you must not be a rubberstamp.

Our precious resources and the future of all species on this planet are currently in peril for many reasons. Life on earth is at a critical crossroads. Humans face more threats than have ever been recorded in our brief history on this planet. Catastrophic weather, a global pandemic and war make your decision even more crucial.

We have never seen the likes of the

tornado that hit Ontario and Québec on Saturday, May 21st. We are not in an era of being able to predict, manage or control worst-case scenarios. The world is reeling from unpredictable and frequent earthquakes, violent storms, forest fires and floods. These will continue.

Scientists are very clever, but climate change is unpredictable. No expert can predict the future for tens of years, much less hundreds or thousands of years. Arrogance about levels of knowledge or scientific expertise will not help us or the Ottawa River if it becomes contaminated. You have a grave responsibility to protect what can never, ever be replaced.

Only you know all the times over CNL and AECL's history when there were accidents, plumes or spills of radioactive materials into the Ottawa River. Industries try to keep this information from us, the public.

The proponent's own studies show that the mound will leak continually and disintegrate in a few hundred years. These radioactive and toxic wastes will be lethal for thousands of years. These wastes must not be abandoned after mere decades just a kilometre from the life-sustaining waters of the Ottawa River.

Over 5 million people have to trust that you will make the right decision. We are forced to trust our lives and our health to your oversight. It behooves each of you and your fine credentials to make the most watertight, water-right decision you can possibly make to protect the Ottawa River.

You are charged with weighing all of the nuclear industry's history and the proponent's detailed specifications for this massive dump. Political expediency, cost-cutting or rushing into an easier, cheaper solution must not sway you in your responsibility to protect the Ottawa River.

This proposed disposal facility is much too close to the Ottawa River and it must be moved elsewhere -- period. You must never jeopardize the vitality of the Ottawa River for profit. You must never compromise the river's ability to sustain all life forms, both within it and along its shores. Generations of our children are depending on you to get this right.

You repeatedly claim safety above all else. If safety really does come first, you must consider all possible risks from unforeseeable catastrophic weather events due to climate change, terrorist attacks, war, earthquakes or other geological factors. As the people charged with our safety and well-being, you accept the liability that your decisions hold for over 5 million people along the Ottawa River for hundreds and thousands of years to come.

This mother and grandmother is asking you to admit that this disposal facility is much too close to the Ottawa River and that it must be moved elsewhere -- period.

If you approve this mound in this location, you will fail to protect the Canadian public, you will fail to protect the Ottawa River, you will fail to protect future generations, you will fail to protect the environment and other life forms. You will also fail to uphold Canada's commitment to the International Joint Convention on Radioactive Waste.

You can, however, prove that you are not a captured regulator. You can prove that you are serious about our safety by refusing to approve the location of this massive leaching mound. You and you alone have the power to decide that this facility must be moved to a much safer location as far from the Ottawa River as possible. What will your personal legacy be?

Thank you for your time.

**THE PRESIDENT:** Thank you for the presentation, Ms. Cavan.

I will turn to Dr. Lacroix for the first question, please.

**MEMBER LACROIX:** Thank you very much, Ms. Cavan, for your statement.

I just want to reassure you that the interventions are essential to the licensing process. After all, it is due to the interventions that I as a Member of this Commission have been provided with new points of view, points of view that are different from the proponent and from the CNSC staff. So it is an inescapable aspect of the reviewing or licensing process.

Furthermore, I would like to reiterate that I am not a rubberstamper and I am not a captured regulator. I am totally independent and my job is to leave no stone unturned. Thank you.

**THE PRESIDENT:** Thank you, Dr. Lacroix.

Ms. Maharaj...?

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you, Ms. Cavan, for your presentation.

There is one issue that you raised that I think has been a consistent concern of many of the intervenors and I am going to ask CNL if they can give us a clearer, more concise perspective, and that is the perception that there will be continuous leaking of leachate into the environment from this facility for an undetermined amount of time. The issue is obviously critical to the protection of the environment and people both and I think there is confusion. So perhaps if CNL can give us a clean, clear picture of what that looks like, that would be helpful.

**MS. VICKERD:** Meggan Vickerd, for the record.

So clear, concise and succinct, okay.

**MEMBER MAJARAJ:** Yes.

**MS. VICKERD:** So during the operations period we have systems that will capture the leachate and transfer it to the wastewater treatment plant, where it is treated and the contaminants are removed as batch discharge. So we check to ensure it meets the discharge targets before it is released to the environment. So there are mitigations in place to ensure that the leachate is not making its way to the environment, into the Ottawa River. So there are controls.

Once the facility is closed, the base liner system, the cap system ensures that the inventory is isolated for its hazardous lifetime. So then the inventory within the facility is safely decaying while it remains isolated from the environment and during that design life of 550 years ensures that the hazardous lifetime -- the 550 years ensures that it is contained and isolated and that leachate is -- or any water is not making contact with the waste for that time period, to allow the inventory to decay.

We recognize, as does international

guidance, that we need to evaluate what happens after that design life. Now, 99 percent of the inventory is decayed within that 550-year design life, so we are left with about 1 percent of the inventory remaining. So then we ensure that our long-term modelling looks at what happens to that inventory after we cannot credit the engineered barrier system.

So in our modelling we assume that there is rain water, there is snowmelt that can make its way to the facility, but that does not mean the radionuclides that exist, some of them will stay sorbed to soils or the geosphere and do not automatically make their way to the biosphere where members of the public can interact. So we do take into account the sorption and the mobility of radionuclides in our modelling.

The modelling is conservative in assuming members of the public interact with those contaminants in the environment, but because they are quite low concentrations, very negligible, there is no significant effect, adverse effect to members of the public. We are well below the regulatory public dose limit, plus our criteria of .3 mSv. So long term there is not enough radionuclide activity that would cause a dose to the public should it migrate.

**MEMBER MAHARAJ:** So if I can just clarify then, the leachate is anticipated in your design during operations and once the facility is closed you are not expecting leachate from within the facility, you are managing surface water and runoff which you are expecting to be isolated from the materials within the mound. Is that much correct?

**MS. VICKERD:** Meggan Vickerd, for the record. Correct.

**MEMBER MAHARAJ:** Okay. That is what I wanted to clarify. Thank you.

**THE PRESIDENT:** I have a question for CNSC staff, not emanating from Ms. Cavan's intervention but from Ms. McCann's before that. It was a statement she made that landfill sites would not be allowed -- these are municipal landfill sites -- would not be allowed so close to the Ottawa River. Is this something you can comment on or should I see if someone from the Ontario Ministry of Environment is available to answer that?

**MS. MURTHY:** Kavita Murthy, for the record.

I believe the reference was that in Québec it is not allowed, in the Province of Québec. So I will take that as an undertaking and get back to you on that, Ms. Velshi.

**THE PRESIDENT:** Thank you very much. Just check it for Ontario as well, please.

Ms. Cavan, I really want to thank you for your very eloquent expression of how serious the matter is in front of us and I know words, frankly, may sound hollow, but speaking on behalf of my Panel here, the adjectives of indifference, boredom, closed minds and hearts I don't think apply to any one of us. We take this job extremely seriously and we give intervenors all the time that we can and that they deserve. And I really want to thank you for making the time and appearing in front of us and for really driving home the message that you did. Thank you.

With that, we will take a short break and we will resume at 11:05 a.m. Thank you.

--- Upon recessing at 10:50 a.m. /
Suspension à 10 h 50

--- Upon resuming at 11:06 a.m. /
Reprise à 11 h 06

**THE PRESIDENT:** Okay, we are ready to resume. If you can take your seats, please.

Our next presentation is by Municipality of Clarington and the Canadian Association of Nuclear Host Communities, as outlined in CMDs 22-H7.160 and 22-H7.161.

We have Mayor Adrian Foster making the presentation.

Mayor Foster, over to you, please.

**CMD 22-H7.160/22-H7.161**

**Oral presentation by the**

**Municipality of Clarington and the Canadian Association of Nuclear Host Communities**

**MAYOR FOSTER:** Well, thank you and good morning, President Velshi and Members of the Commission.

For the record, my name is Adrian Foster and I am the Mayor of the Municipality of Clarington. We are the proud host of, and community to, Darlington Nuclear and the Port Granby low-level waste facility. I am also the Chair of the Canadian Association of Nuclear Host Communities (or CANHC).

Today I wear two hats. I will speak firstly to CANHC's views and then to Clarington's.

CANHC represents a broad cross-section of communities, including Deep River, with a common interest as host of nuclear in Canada. Our mandate includes the sharing of best practices between members, allowing each other to leverage learnings and overall experiences. We play a key role in supporting the advancement of Canada's nuclear sector, from advocating for clean energy and responsible nuclear waste management to emphasizing the importance of environmental and health protection for our communities.

I am here today to express CANHC and Clarington's support for CNL's proposal to construct the Near Surface Disposal Facility, which is an important step in the revitalization work for the Chalk River Laboratories campus.

Chalk River Laboratories has been central to Canada's nuclear industry for the past 75 years. The work has been and will continue to be done at Chalk River and is vitally important globally, nationally and to our local communities. These activities support key developments in our health industry, in our understanding and production of clean energy, and provide economic benefits to our communities.

The NSDF is essential for enabling Chalk River Laboratories to continue to innovate and support the Canadian nuclear industry. One of the goals of CANHC is to engage with our host communities and communicate the requirements that can help Canada develop community-driven standards and oversight to provide nuclear communities long-term positive outcomes for people and the environment when hosting a nuclear facility. This includes how we responsibly deal with nuclear waste.

We want to be able to articulate best

practices when it comes to long-term management and permanent disposal of radioactive waste and we believe CNL's proposed Near Surface Disposal Facility is aligned with best practices.

Our communities know firsthand the industry's demonstrated commitment to safety standards and emergency preparedness. Each municipality our association represents works closely with the nuclear industry. It has a solid understanding of radioactive waste and the associated risks. We know how the waste is classified in line with domestic and international standards and how it is stored and monitored. We know this because of the industry's commitment to information-sharing and transparency.

We all have different kinds of radioactive waste currently stored in our communities. We know the importance of responsible radioactive waste stewardship and the need for permanent solutions to nuclear waste. That is why CANHC, along with the facility's host community, Deep River, supports CNL's proposal for the NSDF for low-level waste.

CNL is proposing a science-based design, the engineered containment mound, which has been done in other countries and is recognized by the IAEA as an appropriate solution for this classification of radioactive waste. As the environmental assessment for this proposal shows, CNL has studied and researched the environmental appropriateness of the chosen site and has developed a thorough understanding of how the facility would perform to better protect the safety of residents and the surrounding environment. We understand that the multiple barrier cover and liner system that will be used in the engineered containment mound has been subjected to rigorous testing where it was determined it could last for generations, reducing the future environmental burden of radioactive waste in our communities.

CNL's scientific expertise will also play a role in the long-term safety of the facility. CANHC is confident that CNL's lengthy commitment to environmental stewardship will continue if the NSDF is allowed to go forward.

As noted, I am the Mayor of the Municipality of Clarington and we are proud and willing nuclear hosts. We are midway through the Darlington refurbishment process, we embrace the future production of isotopes and we are excited to host Canada's first on-grid SMR. We are familiar with and informed about the nuclear industry. We also understand engineered above ground low-waste containment designs as this has just been successfully implemented at Port Granby in Clarington.

For more than half a century Port Granby was home to a Lakeshore site where many tons of low-level radioactive waste and other hazardous materials were deposited by the former Eldorado Nuclear. The location rendered it a serious environmental concern. Only a few weeks ago I attended a celebration at Port Granby with a public announcement of the completion of the project. CNL successfully relocated and safely disposed of 1.3 million tons of historic radioactive waste.

Completion of the Port Granby project represents a promise that has been fulfilled by the Government of Canada to safely relocate and dispose of radioactive waste away from the Lake Ontario shoreline to an engineered facility. Like the NSDF, the project incorporates some of the world's most advanced waste management technologies and practices to safely and better contain historic waste and has improved local environmental conditions.

Our experience in Port Granby has many parallels to CNL's current proposal at the Chalk River Laboratories. As it was the case for Port Granby, many years of planning and approvals have been required for the NSDF. There have been many years of engagement with the public and local municipalities, and a very thorough environmental assessment has been performed by CNL. This was also the case for Port Granby, which included extensive communication and collaboration with municipal staff, local residents and stakeholders throughout all phases of the project.

During the Port Granby process, CNL has shown from the start their willingness to listen to feedback from the community, to work collaboratively with municipal staff to implement important safety and communication measures, and to maintain transparency along the way.

CNL has worked very hard to incorporate environmental stewardship and sustainability. They not only constructed the Port Granby facility but also manage and monitor the surrounding environment, which includes important features such as the shoreline bluffs, key tributaries, animal habitats and a wide variety of plant life.

The enhanced protection of Lake Ontario was one of the most important driving factors for the project. The removal of the waste from the old shoreline site means that ground and surface water is no longer coming into contact with contamination. The water now is treated to very strict standards.

CNL regularly provides the results of all of its environmental monitoring and waste water treatment processes to Clarington to give us confidence that the project is producing a net environmental benefit, while having no negative impact on the surrounding lands.

We always knew that success would require the highest standards for safety and environmental protection, while minimizing disturbance to the community. I believe that the Port Granby experience shows what CNL is capable of.

Furthermore, I can attest to CNL's commitment to addressing the concerns of local residents. I recall attending early on heated community meetings where many residents expressed a number of concerns about how the project would impact their daily lives. CNL was very responsive to resident concerns throughout the entire project and took many steps to address issues and mitigate the impacts to the community.

Finally, I commend CNL for their efforts to provide local employment and business opportunities. CNL worked closely with our businesses and locally sourced millions of dollars in subcontracts, supplies and services. This shows an understanding of social licence and local commitment that is not always evident in host communities.

I fully expect that CNL will continue to implement the same level of engagement and responsiveness during the implementation of the NSDF project. I also believe that they will bring the same commitment to excellence, public transparency and collaboration that they have shown in Port Granby.

It is incumbent on the Government of Canada to address nuclear waste in a safe and responsible manner and not leave this issue for future generations to deal with.

On behalf of the Municipality of Clarington and members of the Canadian Association of Nuclear Host Communities, I express confidence that CNL has the pedigree, capability and expertise to implement the NSDF project in a safe and responsible manner.

I want to thank you again, President Velshi and Members of the Commission, for the opportunity to speak today.  On behalf of CANHC and the Municipality of Clarington, please accept this oral presentation as our pledge of support for CNL's NSDF proposal.

Thank you.  Merci.  Meegwetch.

**THE PRESIDENT:**  Thank you very much, Mayor Foster.

I will ask Ms. Maharaj to lead off with the questions, please.

**MEMBER MAHARAJ:**  Thank you, Madam Velshi, and thank you, Mayor.

I appreciate the comprehensiveness of your statement of support. That is very helpful to us.

The only question I really have for you is you have expressed confidence in the information that you have received from CNL as proponent. Did you also have any comment with respect to the outreach from CNSC staff?

**MAYOR FOSTER:** Adrian Foster, for the record.

I can't speak to outreach from CNSC staff if you are speaking of outreach to the community here. I can speak to my colleagues from Deep River, Renfrew County, who are members of the Canadian Association of Nuclear Host Communities, but while I would love to spend more time here, and it is a lovely town, it is a busy life.

**MEMBER MAHARAJ:** I understand, thank you.

**THE PRESIDENT:** Dr. Lacroix...?

**MEMBER LACROIX:** Thank you very much, Mayor Foster, for your presentation. I appreciate it. No, I have no questions.

**THE PRESIDENT:** Mayor Foster, it was very helpful to have you draw the parallels between the proposed NSDF and the Port Granby project. How far is the Port Granby facility from the Lake Ontario shores?

**MAYOR FOSTER:** I was quite worried you were going to ask that question because it occurred to me as I was sitting and listening to the other delegations.

It is quite close. So for everyone attending here, the original facility was in a gorge with a berm immediately on the lake. I would think that we are well within a kilometre of the lake at this point in time, so it is not at all far from the lake but in a far better spot.

**THE PRESIDENT:** And I know, Mayor Foster, you have been here this morning and you have heard the number of concerns from intervenors around the Ottawa River and the proximity of the proposed facility to that. Did you have to overcome similar concerns at both Port Hope Area Initiative and Port Granby Project and what advice would you give to CNSC and CNL to help those concerns in a more effective way perhaps?

**MAYOR FOSTER:** Adrian Foster, for the record.

So the quick answer is yes. As I have mentioned, early meetings were exceptionally heated with residents. Many of the residents wanted the site to remain exactly where it was and not disturb the site. The challenge that we had is there was leachate coming through the bluffs into the lake. There had been a failure, a minor failure of the berm. The concern was that in a 100-year storm there could be a significant failure and a significant amount of waste coming into Lake Ontario. So there were concerns around water and significant concerns around dust.

I can tell you I was at -- virtually attended a meeting with the residents the other night. The meeting would have taken 20 minutes in total had someone not appeared 15 minutes late, and the main topic of the meeting was where the gate to the roadway was going to be.

So advice I would give to CNL would be to replicate what they did in our communities. Because of the exposure that we have to the nuclear file, we are in front of you on a fairly regular basis and the community is engaged, but the engagement that I saw with the members of our community is amongst the best.

**THE PRESIDENT:** Thank you very much, Mayor Foster.

Ms. Murthy, please.

**MS. MURTHY:** Kavita Murthy, for the record.

You asked a question about how far the Port Granby low-level waste management facility is. It is approximately 1 kilometre from the lake and about 700 metres from the previous location, which was much closer.

**THE PRESIDENT:** So you were right. Thank you.

Thank you very much for appearing in front of us. Thank you.

Our next presentation is by Ms. Evelyn Gigantes, as outlined in CMDs 22-H7.19 and 22-H7.19A.

Ms. Gigantes is joining us remotely.

Over to you, please.

--- Pause

**THE PRESIDENT:** I think you are good to proceed, Ms. Gigantes.

--- Pause

**THE PRESIDENT:** You may need to switch off the webcast so that we are speaking in the same time zone.

**CMD 22-H7.19/22-H7.19A**

**Oral presentation by Evelyn Gigantes**

**MS. GIGANTES:** CNL did not engage properly with First Nations people directly affected by the NSDF, so CNSC staff took on the important role. In my 2017 submission I noted this would likely create a conflict of interest for them.

--- Technical difficulties / Difficultés techniques

**MS. GIGANTES:** Since then the responsibility has increased as Parliament adopted the UNDRIP Principles. In the last three months the CNSC has received three formal requests to halt these proceedings, first from the Keboawek First Nation, affiliated with the

Algonquins of Pikwakanagan; second from the Algonquins of Barriere Lake; third from the Kitigan Zibi Anishinabeg.

I give credit to the CNSC staff for effort. Report CMD 22-H7 provides 4.5 pages of staff analysis of AOPFN views, but it also states:

> "Staff comments on the AOPFN 'nuclear principles', Willing Host and Right to Free, Prior and Informed Consent:
>
> CNSC's Views
>
> CNSC staff cannot make a conclusion on this impact as it is outside of the mandate of the CNSC. The CNSC as an independent regulator does not have the authority or the mandate to dictate the location of where nuclear projects are proposed and therefore, does not have the authority to weigh in on AOPFN's request for the 'Willing Host' principle."

This is defensive and wrong-headed.

You can lower the screen, thanks.

The *Environmental Assessment Act, 2012* is clear: the CNSC has both the authority and mandate to decide if the proponent, CNL, has adequately investigated all reasonable locations and all reasonable sites for the project.

Siting: CNL now operates the AECL lands at Chalk River, where wastes have accumulated through nuclear bomb fuel production in the mid-1940s, through accidents at two nuclear reactors onsite, plus other high-, intermediate- and low-level waste either generated at, or imported to, the area.

Now, CNL wants to "make way for a bright future". So it proposes to place one million cubic metres of existing and future waste in an NSDF. Of that, 13 percent by volume would be of intermediate or higher radioactivity. It would sit in the area of current CNL operations, on the 1 percent of 4,000 hectares of AECL lands that contain those CNL operations.

Two top CNL representatives told the February 22 CNSC hearings that only AECL-owned land had been considered for a waste management site and no other AECL lands were considered appropriate for a "mound" -- an NSDF.

So the plan has always been to build an NSDF to manage a large volume of the waste at Chalk River. At a cost to build of $475 million and $275 million to fill and operate for a period of 80 years, this would be the least expensive alternative. No witness before the CNSC hearing of February 22, 2022, noted that this would also be the cheapest possible proposal, nor did any Commission Member.

Design: Perch Lake is key to existing waste management at the Chalk River lands. The NSDF would drain on a downward slope to Perch Lake, but the high water table means blasting and removing 170,000 cubic metres of bedrock to treat wastewater flows to Perch Lake.

The "sides" of the engineered containment mound are waste cells, with carefully chosen and well-packed fill and clay surrounding all sides of those waste cells.

The perimeter "berm" at ground level will be sloped and its height will vary from 2 to 7 metres. It will be made of "free-draining fill (compacted), bedrock, or a combination of the two." The berm will have high quality geomembrane liners.

These design features must withstand whatever assault the ECM will suffer while waste is being placed -- about 50 years -- plus 500 years of design life.

The threats are weather, defined as two consecutive days of 24-hour heavy rain -- no longer seems hard to imagine -- a strong earthquake with an annual probability of 1:10,000.

The NSDF would sit in the multi-dammed Timiskaming watershed, in the West Quebec seismic zone, one of North America's larger seismic faults. In 1935 this zone produced a 6.2 Richter Scale earthquake.

Table 8.4 of the CNSC staff Environmental Assessment Report (Jan 2022):

> "...seismic analysis of the ECM has shown that sandy soil below the ECM footprint could potentially liquefy under a 1:10,000 earthquake. As a mitigation measure, CNL has proposed to remove the sandy soil under the berms to the bedrock and replace it with compacted fill. During pre-closure period, any damage to the ECM due to seismic activity will be responded to."

Also, in Table 8.4:

> "During the post-closure period, the impact to human health and the environment from a beyond-design basis earthquake is shown to meet acceptable criteria under several scenarios, which consider failure of the berm and a series of landslides."

But surely that depends on whether land-sliding waste is still dangerously radioactive.

The Context. CNL's position on pages 70 and 72 in their latest submission, CMD 22-H7-1:

"Radiologic Content

The NSDF will contain only low-level radioactive waste. Low-level radioactive waste contains primarily short-lived radionuclides (...half-life ≤30 years) and restricts the number of long-lived radionuclides (...half-life >30 years); thus, isolation and containment are only required for periods of time up to a few hundred years. Long-lived radionuclides are included in the NSDF inventory as they are intrinsically part of the radiological fingerprints of waste streams at CRL and other CNL sites.... It is not practical, technical, or economical to separate the long-lived radionuclides from the waste streams, especially since many of the waste streams are in the form of soil and building debris. However, the concentrations of

> long-lived radionuclides that are proposed in the NSDF inventory are limited...."

CNL also takes the position that:

> "...there is a limit of 400Bq/g on average for long-lived alpha-emitting radionuclides..."

And:

> "Similarly for long-lived beta and/or gamma-emitting radionuclides, the allowable average activity concentration is 10,000 BQ/g."

This whole approach of "averaging" amounts to confusing the issues and confusing the public. What we need to know is what threat is posed by dangerous long-lived wastes should the NSDF fail, particularly in the first 50 years while it is being filled and then closed.

In its Environmental Assessment Report of January 2022, CNSC staff outlines potential problems and a long list of "commitments" by CNL to address them.

The Licence: To sum up, CNSC staff are telling the Commission to approve the construction of the NSDF and CNSC staff will make sure CNL carries out all promised monitoring and successful remediation of whatever problems might occur.

It is my strong belief some problems could arise that won’t be possible to "remediate".

I disagree with the position CNSC staff have taken in recommending construction when remediation may not be possible.

I also believe once the NSDF is built at a cost of $345 million, CNSC staff will find it near impossible to recommend the NSDF stay closed.

I believe that legacy wastes at the CRL must be dealt with.

I also believe no more nuclear waste should be generated or received at the CNL site.

Adding the proposed new CNL "hot cell" laboratories or new SMR waste is both insupportable and downright foolish.

We need a whole new approach to the awful nuclear waste problem at Chalk River. The current CNL application for a licence to construct the NSDF should be denied.

Thank you.

**THE PRESIDENT:** Thank you.

Let's start with Dr. Lacroix, please.

**MEMBER LACROIX:** Thank you very much for your presentation.

This is a question for CNL. When you

perform a safety analysis for extreme weather events or climate events or earthquakes, what sort of a tool do you resort to? What sort of a computational tool? Is it an in-house model or is it a commercial code? And also, are these analyses performed from a probabilistic point of view or a deterministic point of view? So could you elaborate a little bit on this?

**MS. VICKERD:** Meggan Vickerd, for the record.

So to answer that question I would like to go to Mr. Mark Luckett, who is joining us virtually. He can certainly speak to the types of codes we use for seismic walling, which were not in-house, they are an industry type code.

So Mr. Luckett...?

**MR. LUCKETT:** For the record, Mark Luckett, AECOM.

Thank you, Ms. Vickerd.

Yes, with respect to seismic modelling we do use industry recognized software. In the case of the NSDF, we use a computational model called FLAC which is used in the geotechnical world for assessing seismic events and the consequences or effects they have upon the structures being modelled.

We also -- in addition to FLAC, when we

look at the berm, we use a computational fluid dynamic program called SLOPE/W, again an industry recognized software that is used in analyzing dams, tailing ponds and other earth and berm-like structures. So through both of those software we did look at settlement and displacement and what we see from the results of both of those analyses is that the berm does remain intact and any settlement is within the acceptable criteria that we have established.

So perhaps I will leave it there and I can answer further questions if there are any.

**MEMBER LACROIX:** Thank you. Thank you.

**THE PRESIDENT:** Thank you.

Ms. Maharaj...?

**MEMBER MAHARAJ:** Thank you, Madam Velshi.

And thank you for your presentation.

I would like to ask a short question to CNL about a statement that was made in the intervenor's written submission. In her submission she referred to a bathtub effect and that was addressing the question around the side wall design of the facility and whether or not it was high enough to prevent filling. I'm not sure I understand exactly what that means and I was wondering if you could provide some clarity.

**MS. VICKERD:** Meggan Vickerd, for the record.

So the bathtub scenario represents the -- we look at a wide range of scenarios of multiple things that can happen, how the features behave, what events might happen to the facility and what are the consequences. So the bathtub scenario actually represents a scenario where we assume the cover system degrades faster than the base liner system, the base liner system being made of compact -- having a layer of compact clay, the cover system being an engineered barrier.

Now, its design life is 550 years, but through geomembrane testing the candidates selected are expected to perform for much longer, but we haven't recognized that in our modelling. Our modelling is conservative and assumes it starts to degrade after the design life. So that means that precipitation, rainwater, snow, can enter the facility and the waste becomes saturated and then potentially spill over the berm.

Now, when we picture a bathtub we think that it is on a horizontal plane, but remember, the facility is on a topography or an elevation, so the amount of waste is actually saturated to only 1 percent and there is no consequence because if you recall from the design basis, the inventory is substantially decayed and less than 1 percent remains.

So even though that may be an event that happens far into the future, there is no consequence. There is no significant adverse effects to the public or the environment, if that were to happen.

**MEMBER MAHARAJ:** Thank you very much. That’s much clearer now.

**THE PRESIDENT:** Ms. Gigantes, I have a question for you. In your written submission on page 15, you make a statement that the Members of the Commission should know by now that serious questions have been raised about the accuracy of the CNL and subsequently the CNSC estimation of the background concentrations of the local soils at the CNL location.

I’m not quite sure what are these serious questions.

This morning we heard of an errata, but that was more on the references as opposed to the levels itself.

Can you clarify for me what those questions are around the background concentrations, please?

--- Pause

**THE PRESIDENT:** Maybe while you are looking at it, I can ask CNL. Do you know what those questions about background levels may be referring to?

**MS. GIGANTES:** Not precisely. What I have done in my written…

**THE PRESIDENT:** I'm sorry, we can't hear you, Ms. Gigantes.

--- Pause

**THE PRESIDENT:** Ms. Gigantes, our technical folks are saying you need to sign off from the Webcast.

--- Pause

**THE PRESIDENT:** Ms. Gigantes, sorry, there seem to be some technical issues. It seems like you can't hear us and we can't hear you.

We will see if we can maybe get you on the phone a bit later on to ask some additional questions. Thank you.

Before we move to the next intervenor, Ms. Murthy, you had something to share with us?

**MS. MURTHY:** Kavita Murthy, for the record.

A number of interventions mentioned the plot that shows the grey bar with the wrong reference. I can't speak for her but I'm guessing that this might be what she was referring to.

**THE PRESIDENT:** Okay. I think when we get to the next intervention -- and you're right, I remember others mentioning it – we will try to get greater clarification on that. Thank you.

Let’s move to our next presentation, which is by Ms. Lynn Jones, as outlined in CMDs 22-H7.136 and 136A.

Ms. Jones, the floor is yours, please.

**CMD 22-H7.136/22-H7.136A**

**Oral presentation by Lynn Jones**

**MS. JONES:** Thank you, Madam Chair.

Good morning, everyone. I appreciate the opportunity to speak to you today. My background is public health. During my Master of Health Science training, I learned in no uncertain terms that there is no safe level of exposure to man-made radiation released by the nuclear industry.

It is this understanding -- I actually don’t need the slides until about halfway through. Thanks.

It is this understanding that underpins and motivates my intervention today.

I would like to start by noting that four Algonquin First Nations asked that these hearings be suspended because they have not been consulted adequately, or at all, on the NSDF plan. I believe the CNSC should have respected their requests and suspended the hearings.

I think it’s important to note that this licensing hearing is the first opportunity the public has had to comment on the NSDF proposal as part of the EA process since August 2017. At that time, almost five years ago now, there was a huge outcry and hundreds of critical comments were posted on the document registry from indigenous communities, concerned citizens, municipalities, independent scientists and NGOs.

There was to have been a 60-day public comment period on the CNSC's EA Report and a full environmental assessment hearing, but these were removed from the EA process. This prompted three civil society groups to issue a report just prior to the Day 1 hearing in February on critical flaws, errors and omissions in the CNSC staff's case to approve the NSDF.

The three groups that collaborated on the report were the Concerned Citizens of Renfrew County and area, the Ralliement contra la pollution radioactive and the Old Fort William Cottagers' Association. They asked that the information be provided to Tribunal Members and posted on the Impact Assessment Registry for the NSDF.

Unfortunately, the document was not posted on the registry, as requested, and many of the issues identified in that document are still outstanding, as you will hear in interventions later today and tomorrow.

Before moving on to my short slide

presentation about the expected disintegration of the NSDF, I would like to respond to something I heard in this room last night.

Dr. Lacroix, you asked how Canada is viewed around the world in terms of its radioactive waste management and nuclear regulation. I heard CNSC staff say that an IAEA peer review team found that Canada is doing a great job and that Canada is number one in terms of nuclear regulation and radioactive waste management.

I must tell you there is a jarring disconnect between these statements by your staff and my understanding of what the IRRS Report in fact said. There is a post on ConcernedCitizens.net about the IRRS Report. It can be easily accessed from the home page. Quote/unquote: good practices were only identified in six out of the 26 areas of Canada’s nuclear safety framework examined by the peer review team. In the other 20 areas, the team made suggestions and recommendations for improvement.

The final report included numerous critical statements. I will just read a few of them.

The IRRS team found, quote: no evidence beyond the principles contained in the policy framework of a “governmental policy or strategy related to radioactive waste management”.

Quote: There is no systematic evaluation of justification for the various practices involving radiation sources in the licensing process. CNSC regulations do not comprehensively cover all IAEA fundamental safety requirements.

And the last quote from the IRRS Report: The current radiation protection regulations and requirements are not in accordance with GSR Part 3 with respect to optimization of radiation protection.

So that is some of what the peer review team actually said.

High ranking Canadian officials have also made critical comments about the CNSC in recent years. In testimony before the House Standing Committee on Natural Resources in 2016, Canada’s Environment Commissioner said the Canadian Nuclear Safety Commission was quite difficult to work with. I would say that the Commission was aggressive with the auditors.

In April of 2017 the Expert Panel on Reform of Environmental Assessment noted that it had heard many concerns about lack of independence at the CNSC and its tendency to promote the projects it is tasked with regulating.

You might also be interested to know that the Nuclear Energy Insider publication is on the record as urging SMR proponents to come to Canada to take advantage of its “benign regulatory environment”.

So, I honestly think you need to take your staff’s assertions that CNSC is number one in the world with a big grain of salt.

At this point I would like to share a few slides about the expected disintegration of the mound.

IAEA Document SSR-5, Specific Safety Requirements Disposal of Radioactive Waste, states numerous times that the preferred strategy for the management of all radioactive waste is to contain it and to isolate it from the accessible biosphere.

It is clear that the NSDF would not contain and isolate radioactive waste from the accessible biosphere. One only needs to look at the table in the EIS entitled “Maximum Concentrations of Radionuclides in the Treated Effluent and East Swamp Stream”. Just above the table is the statement: Both aquatic and terrestrial species will be exposed to contaminated surface water and sediment in East Swamp Stream, Perch Lake, Perch Creek and Ottawa River.

The table itself lists 29 radionuclides that will be present in the treated effluent. They include a large quantity of tritium and four isotopes of plutonium.

It was curious, or maybe kind of alarming, that the maximum concentration of Plutonium 241 increased 50-fold between the draft EIS and the final EIS. It would be good to know the reason for that and why the tritium more than doubled.

So, the NSDF is clearly not going to contain and isolate the waste from the biosphere. And that is while the mound remains intact and the wastewater treatment facility operates. Sometime shortly after the institutional control period ends, according to CNL's performance assessment for the NSDF, the mound is expected to disintegrate in one of two predicted scenarios, which are: leaching through the base liner and the second one is the bathtub effect overflow scenario.

The picture on the left is taken from the performance assessment. It shows the bathtub effect. There is a quote in red on the right: Upon cover failure, untreated leachate discharges into Perch Creek along its northern stream bank, approximately 1.5 kilometres from the Ottawa River. At a daily average flow rate of 120 cubic metres per day, the total waste volume will require approximately 25 years to fully discharge.

So, this is a table from -- I guess that was from the draft EIS. That is showing radionuclide flow out of the mound, including the four arrows are pointing to isotopes of plutonium as it disintegrates.

Then this is a pie chart showing the contribution of various radionuclides, such as Carbon-14, polonium and Caesium-137, to the radiation dose that would be received by an infant downstream in Pembroke under the bathtub scenario of normal evolution of the Chalk River mound.

I'm wrapping up. Sorry, I just realized I'm getting very close to the end there.

So, again, clearly the proposed NSDF will not contain and isolate wastes from the biosphere. This appears to be a bargain basement approach to radioactive waste management put forward by people who think it's okay for radioactive materials to be allowed to contaminate our air, soil and drinking water.

There are much better ways to deal with radioactive waste. The CNSC's mandate is to protect people and the environment from radioactivity produced by the nuclear industry. The Commission cannot approve the requested licence amendment authorizing construction of the NSDF and uphold its mandate. The two things are incompatible. They will have to choose one or the other.

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

Ms. Maharaj, over to you, please.

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you, Ms. Jones, for your presentation.

I wanted to just clarify perhaps with staff the concept of the good practices, what that means and whether a finding by the IAEA that doesn't say good practices means that there were bad practices.

Perhaps staff could respond to that.

**MS. MURTHY:** Kavita Murthy, for the record.

So, in an IRRS mission, typically they have good practices which are things that they want to demonstrate to other countries that should be followed by other countries. There are suggestions and there are recommendations.

Canada did get a number of recommendations that we did not accept because some of those recommendations related to provisions that were already provided for in our regulatory framework.

I will ask Mr. Ramzi Jammal to provide more clarity on that, please.

**MR. JAMMAL:** Ramzi Jammal, for the record.

I do welcome the intervenor for seeking clarity on what was said yesterday. So let me clarify for the intervenor and then I will go into the definitions of good practices.

Dr. Lacroix asked the question yesterday:

How do we -- from international benchmarking, where do we sit from numerical order?

My response was internationally there is no such thing as classification. But if we go by the number of good practices that the IRRS mission has given to Canada or the CNSC, we have six good practices.

I'm pretty sure the intervenor has access to the IAEA website, by which if you correlate good practices given to the CNSC in Canada against other missions, we have the highest number of good practices of any mission for the last three years. That's the IRRS perspective.

Myself, I lead many IRRS missions internationally. So, the definition of a good practice is exactly as mentioned by Ms. Murthy. It is how can the host or other member states take that good practice and implement nationally, based on the good practices? And that's part of the peer review. It's not just looking assessing against the safety standard. It's what good practice exists that can be adopted by other member states.

On the recommendations and suggestions, the recommendation, if you look at the IRS Report itself, there are two segments. There is the justification for the recommendation and there is a justification for the suggestion.

The recommendation literally addresses the deficiencies against the safety standards. So, in other words, if there is an element -- the intervenor mentioned RP element. So, over time, the safety standards improve or there will be new publications. So, we work towards the implementation of the new publication. Hence, they give you a recommendation to say GSR, for example, hypothetical, 2.3 is not being applied. So you apply it.

So, as part of the IRRS mission we did publish the management response and the acceptance of recommendation and suggestion. In other words, we will be undergoing a peer review process between ’23 to ’24 as a follow-up mission, to look at how Canada, or in specific the CNSC, has implemented such recommendation suggestion.

In conclusion, good practices to be adopted by other member states and team members, they take it back to their countries. Recommendations are deficiencies associated with the prescriptive requirements of the safety standard. When I say it is the prescriptive element. And suggestion is look at this and then keep improving in that direction.

Those are the three high level components from what it means.

The good practices outside the IRS mission, those are peer reviewed under the treaties, or we call them convention under the UN. And that good practice is applicable to all contracting parties.

So, again, at the last Convention of Nuclear Safety, Canada was the one or two -- I think there were two contracting parties receiving good practices, and Canada was I believe the only one who got the good practice.

So, again, it’s an indicator of the Canadian regulatory framework that can be adopted and implemented either by a contracting party through a legal treaty or via a peer review process.

That’s what I tried to communicate yesterday.

I do commend the intervenor for seeking clarity on this.

**MS. MURTHY:** Ms. Maharaj, if I may, there was a reference to a recommendation which led to the Government of Canada starting the policy review, which again IRRS missions, because they are not directed at an agency, they are directed at a country, do look at other parts of the government.

**MEMBER MAHARAJ:** Thank you very much. If I can just ask Mr. Jammal one clarifying question.

Is there a category for you’re doing fine? What I heard is there is a recommendation if there is a deficiency, suggestion to improve, and there is a good practice, which means this is a level of performance that could be utilized by others as exemplary.

But is there something in the middle that says you're doing fine on this part?

**MR. JAMMAL:** Ramzi Jammal, for the record.

Definitely in the report itself, the report recognizes the regulatory framework of Canada as CNSC being mature and our readiness for innovation and everything else. So, the report itself has a section describing the regulatory framework of Canada, its maturity and the capability of overseeing the regulatory activity, facilities and activities in Canada. There is a section in the IRRS Report identifying the maturity of the Canadian program.

**MEMBER MAHARAJ:** And we got a good grade there. Right?

**MR. JAMMAL:** Again, Commissioner Maharaj, there is no number, I would say. It is qualitative to say Canada -- for example, when there are deficiencies, so you highlight what the deficiencies are but you give an overall impression of the program. And the overall impression of the Canadian regulatory program is mature, respected and very well recognized by international peer review.

**MEMBER MAHARAJ:** That's what I was looking for. Thank you.

**THE PRESIDENT:** Dr. Lacroix?

**MEMBER LACROIX:** Thank you very much for the presentation. This is a question for CNL.

Could you explain to us the aging process of the mound during the post-closure period, the normal aging process?

**MS. VICKERD:** Meggan Vickerd, for the record.

Are you looking for how the geomembranes itself might degrade?

**MEMBER LACROIX:** The entire NSDF, once we have reached the post-closure period, how will it -- will it disintegrate? Will it -- how will it erode? What will happen to it?

**MS. VICKERD:** Meggan Vickerd, for the record.

So I think we will focus first on the features, the engineered features of the mound and what degradation processes may occur.

For that, I will go to Mr. Mark Luckett to explain some of those processes, but what I want to identify before I go to Mr. Luckett is within the specifications of the candidate material that we would pick for the geomembrane, the manufacturers would identify constituents which we need to restrict their entry into the mound to ensure that they do not degrade the liner faster than anticipated.  That list of constituents has been included in our "Waste Acceptance Criteria" document to ensure that those constituents are controlled so that the facility and the geomembrane survive as long as we have intended the design life to be.

So over to Mr. Mark Luckett.

**MR. LUCKETT:**  For the record, Mark Luckett, AECOM.  Thank you, Ms. Vickerd.

Perhaps just quickly on the geomembranes and to pick up Ms. Vickerd's thread there.  I think we will hear more this afternoon on this, but the geomembranes have been demonstrated to have a lifespan that does go far beyond the 550 years and in fact we see lifespans that are upwards of 1,000 years.  So they will be around for a significant period of time and they will continue to do their job for that period of time.

The remainder of the berm and the cover system itself, so if we look at the berm, it is configured or made up of natural materials that have no known lifespan.  So the underlying free-draining natural materials that have been referenced this morning by a couple of intervenors will be there and will hold back the waste in the containment mound.  The cover system, again, is comprised of natural and synthetic materials and has been demonstrated to be very effective at keeping infiltration out of the engineered containment mound.

Perhaps I should add that underlying the secondary liner -- so we have a primary liner and a secondary liner. Underlying the secondary liner is a 750 mm compacted clay liner which is consistent with *O. REG 232*, and again, that liner, compacted clay has no known lifespan. It will be there forevermore essentially.

So perhaps I will leave it there and I am happy to answer further questions if there are any.

**MEMBER LACROIX:** You have noticed that I used the word "aging" instead of "disintegration" and I'm not sure that I fully understand what Ms. Jones means by "disintegration of the mound".

**MS. JONES:** Are you asking me?

**MEMBER LACROIX:** Yes, I was asking you a question.

**MS. JONES:** Okay. Well, I mean that guy who just spoke, he said that the base is going to be there forever. That is simply not true. I mean the performance assessment looked at that, it looked at what it was made out of and it said that it is only going to last 400 years and shortly after that it is going to start to degrade in either one of two ways or maybe a combination of both. I mean that is why we don't put radioactive waste on top of -- that is going to be around for 10 -- 100,000 years on top of the ground, because we all know there is natural erosion and that things happen and tree roots grow into things and animals burrow into things and, you know, water infiltrates. One of those scenarios is going to happen and it is going to -- I mean, you know, I showed you the bathtub scenario diagram from the performance assessment. It clearly shows the -- and it describes a rate at which the contents are going to flow into the Ottawa River.

**MEMBER LACROIX:** I understand what you mean by "disintegration", thank you. Thank you very much.

**THE PRESIDENT:** Thank you, Dr. Lacroix.

Ms. Jones, any final words you would like to share with us before we move to our next presentation?

**MS. JONES:** Well, I would just again like to thank you for the opportunity and I really do hope that you will refuse to grant the licence amendment. I honestly think it is completely incompatible with your mandate and I do believe what you said earlier today, that you care about this, you do want to do the right thing and I think the right thing is to not approve the amendment at this time.

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

We will move to our next presentation by

Dr. Erwin Dreessen, as outlined in CMDs 22-H7.21 and 22-H7.21A.

Dr. Dreessen, please proceed.

**CMD 22-H7.21/22-H7.21A**

**Oral presentation by Erwin Dreessen**

**DR. DREESSEN:** Good morning, Members of the Commission. Thank you for the opportunity to speak to you today.

Before asking you the questions that are contained in my written submission, I wish to state the following by way of context.

I have attended all the webinars on the NSDF Project that were offered by the Commission staff and I thank them for their efforts, especially seeing that doing so took many of them out of their comfort zone.

I have also read the staff report CMD 22-H7 and several related documents.

As well, I have read the submission by the Canadian Environmental Law Association, which you heard about yesterday, which engages in a depth of analysis that is beyond my means.

But, as a lay person, like CELA, the bottom line I reach is that it would be better if this project would not proceed.

I support the arguments that you heard yesterday from the Greenspace Alliance of Canada's Capital. That is a group which I co-founded almost 25 years ago.

Specifically, in my reading, the recommendation to proceed rests to a large extent on faith in modelling results.

Models can be wrong. Having spent much of my professional life on model building, I should know.

The extremely long timeframes of the models employed to support the NSDF proposal increase the uncertainties by several orders of magnitude.

It would be better to adopt a wait-and-see attitude: Continue to store radioactive material in temporary facilities while supporting the search for viable long-term solutions.

Now, I have also reviewed the history of staff recommendations compared with Commission decisions, and I could be wrong of course, you could surprise us, but I believe that the likelihood that the Commission would refuse the application seems rather small.

Therefore, being a pragmatist, I pose some questions which I hope you will find useful and I trust that staff or CNL will respond to and that may make for a marginally better project.

Next slide, please.

So the first question is about Cobalt-60, about which we heard a lot yesterday and, I must confess, without providing much clarification.

Looking at the WAC document, Waste Acceptance Criteria document, Table 13, which is about licensed inventory at placement and at closure, it shows that Cobalt-60 would be present in concentrations of 94,700 Bq/g at placement and 15,300 Bq/g at closure.

But now when I look at Table 4 of the same document about radionuclide concentration limits, there I see the concentration limit of 1,000 Bq/g for long-lived beta-gamma emitting radionuclides if it is in non-leachate controlled waste, which is 92 percent of the total package waste, or 10,000 Bq/g if it is leachate-controlled.

So this leaves me with a puzzle:  Why would such high concentrations of Cobalt-60 be allowed?

The next slide, please.

The following questions are about surface water quality.  I go here by Table 6.1 of the EA Report that is labelled "Water Quality Modelling Results".

The model results show that after treatment, aluminum, phosphorous, copper and lead in the Ottawa River exceed drinking water quality standards as set by Health Canada.  I find that in the last column where it says "All", the "All" includes the Ottawa River.

But staff concludes, without evidence that I could find, that any exceedances would not be measurable. I suggest that the Commission should insist that surface water quality standards be adhered to.

The second part of this question is that -- and again, looking at this table, Table 6.1 -- almost all post-treatment exceedances are already observed in the baseline data for surface water quality and the model results show that they are made worse for 28 out of 39 elements.

My question to you is:  Why would CNL not be tasked with cleaning up the effluent, even if it is the result of legacy Chalk River operations?  If not they, who would do it?

Next slide, please.

Now, that same Table 6.1 of the Environmental Assessment Report lists just five radionuclides potentially in surface water.  But going back, Table 13 of the WAC document showed that 30 radionuclides would be licensed to go into the facility. So where are the other 25?  Why are they not in Table 6? If it is because the missing radionuclides would not show up in surface water, I would be curious to hear what that assumption is based on.

Next slide, please.

The Environmental Assessment Report on page 236 starts with a discussion about surface water resources during operations, and later, on page 241, it jumps to after the end of the 300-year institutional control period.  It seems to me there is a gap here.  Why is there no discussion of effluent during the 30 years of closure and the 300-year institutional control period?

As an aside, it really is a puzzle to me why closure takes 30 years.

Next slide.

Finally, in light of the many uncertainties associated with this project, it is absolutely vital to closely monitor surface and groundwater on at least an annual and preferably a quarterly basis.

For the sake of integrity and transparency, I request that the Commission make it an unambiguous condition of licence that all monitoring data be made available to the public as they are produced.

If you turn to the next slide, please.

And it would be nice if you would keep that up while any follow-up questions are being asked.

Thank you very much for hearing me and I look forward to answers to my questions.

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

Dreessen.

I will turn to my colleagues for questions and we shall start with Dr. Lacroix, please.

**MEMBER LACROIX:** CNL, as long as there is monitoring, will the data be publicly available?

**MS. VICKERD:** Meggan Vickerd, for the record. Yes.

**MEMBER LACROIX:** Thank you.

**THE PRESIDENT:** Okay.

Ms. Maharaj...?

**MEMBER MAHARAJ:** Thank you, Madam Velshi.

I would like to thank the intervenor for such a concise summary of potential discrepancies and, to be honest, I would just like an answer to those and they are right there on the screen.

**THE PRESIDENT:** Okay. Well, why don't we go through them.

I think question 1 we spent a lot of time yesterday addressing that, so I don't know if there is anything additional, CNL, you would like to add.

**MS. VICKERD:** Meggan Vickerd.

Perhaps we would like to clarify, Cobalt-60 is a short-lived radionuclide with a half-life of 5.27 years; cesium has a half-life of 30 years. So therefore, cobalt has actually a lower half-life than

Cesium-137. That is perhaps a point of clarification for this intervenor's understanding.

**THE PRESIDENT:** And while we are on that, what is considered to be long-lived? Would tritium be considered long-lived?

**MS. VICKERD:** Meggan Vickerd, for the record.

No, tritium would be considered a short-lived. Long-lived typically the threshold is 30 years. So anything over 30 years would typically be considered a long-lived radionuclide.

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

Then let's move to question number 2 around concentrations of aluminum, phosphorous, et cetera, exceeding Health Canada standards.

**MS. VICKERD:** Meggan Vickerd, for the record.

So I will have Mr. Dolinar. He can speak to both questions 2 and 3.

**MR. DOLINAR:** George Dolinar, for the record.

So the intervenor has referred to Table 6.1 of the CNSC staff EA Report. It represents data that comes out of the Environmental Impact Statement, so I can speak to it from that perspective. I am not speaking to the EA Report from CNSC staff but to the table and the data contained.

For those items that were identified by the intervenor, these are sort of naturally occurring in higher concentrations in this geographic area of the world, or of Ontario. So if we measure aluminum for example in the Ottawa River, we will find a range anywhere from about 120 -- in the table 129 mcg/L and other surface water is in the area of up to 631. You know, our effluent discharge target, just to focus in on that one, is 50 mcg/L. So we are well below sort of the normal variation we see in the natural environment without impact from our operations or activities. This is true with different numbers, but it is true for the contaminants that were expressed in that particular question from the intervenor. So this is just sort of a natural background of these metals in the local environment.

Question 3 is why the discrepancy? Again, maybe CNSC staff want to refer to this, it is their table, but these are nuclides of concern from the assessment perspective. So yes, there are many more nuclides that are present in the inventory, but these are ones of particular concern because they factor into the assessment in a number of different areas.

I will leave it there to see if there are any further questions.

**THE PRESIDENT:** Thank you.

Well, let's get staff's perspective on both those questions, please.

**MS. MURTHY:** Kavita Murthy, for the record.

So for the discrepancy, question number 3 -- I have Dr. Elias Dagher who is joining us remotely today who is prepared to take both of the questions. Thank you.

**DR. DAGHER:** Thank you very much, Ms. Murthy.

My name is Dr. Elias Dagher, for the record. I am an Environmental Risk Assessment Specialist and also an Effluent Specialist at the CNSC.

So when we do look at the table there are a couple of points that I would like to clarify. This table does come from -- the information in it does come from the information that is submitted as part of the EIS, so it is in the EIS, but there are a couple of key pieces of information.

The first piece is that the maximum predicted wastewater concentration before treatment -- so that is the maximum influent concentration that is coming in and that has been discussed. It was discussed yesterday, it is something that is based on leachate and wastewater characterization studies and it is quite conservative.

The effluent discharge targets that are also presented in that table, they essentially are based on -- so they apply at the end of pipe for all contaminants with the exception of tritium, which takes into account some dilution from the East Swamp wetland.

For the non-radiological hazardous substances, they are based on achieving the most restrictive water quality guidelines, which are those for protection of aquatic life.  So it doesn't mean that they are going to be released at that target, they have been derived to be protective of the most restrictive, most protective environmental quality guidelines, which are for the protection of aquatic life.

Similarly, for the radiological substances, so the nuclear substances, the effluent discharge targets were calculated for protection of human health, using very conservative Health Canada drinking water quality guidelines, but also there were effluent discharge targets that were calculated for the protection of aquatic biota.  So those were using a very conservative and protective radiation dose benchmark of 9.6 mG per day and that is in accordance with UNSCEAR and also with the

Canadian National Standard N288.6.

So the reason why it is important to understand that is the contribution of both radiological and non-radiological contaminants from the NSDF site itself, from the wastewater treatment plant during the operational period is going to be essentially negligible. There is going to be a negligible impact to the surface water, to the Ottawa River and it is going to be protective of both human health and the environment. Those discharge targets are very, very protective and very conservative.

When we go to look at that final maximum range of modelling results for surface water quality after treatment and we see that there are levels that exceed those discharge targets, as stated before by CNL, that is because those concentrations in the receiving environment, so in those background concentrations, are naturally elevated. So it has nothing to do with the contribution of effluent that is being released from the NSDF wastewater treatment plant to the receiving environment and eventually into the Ottawa River. Those are naturally there and they are from other sources.

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

Ms. Murthy, did you wish to add anything? Thank you.

Okay.  Question 4 then.

**MS. VICKERD:**  Meggan Vickerd, for the record.

So with respect to the way that we have assessed effluent, effluent loading is primarily going to happen in the operations enclosure period and then once the system is capped, we are not predicting to produce effluent, except for a little bit in the closure phase. But certainly the operations phase has been assessed and that is bounding.  Once the cap is on, we do not expect effluent and an interaction directly with surface water. So there would be no predicted impacts during the institutional control period.

And if I could just clarify question number 5.  Commissioner Lacroix asked for as long as CNL would be monitoring, would data be available, and that is correct.  But the particular intervenor did ask would it be available as produced, and for that certainly I would like to go to Mr. Dolinar to clarify that, you know, we do quarterly reporting and annual reporting, so it is not necessary as it is produced.

**THE PRESIDENT:**  I think it was on a timely basis, so there may be some times when you want to report more immediately than on a quarterly basis.

**MR. DOLINAR:**  Yes, correct.  I can

elaborate if you want to hear more.

So we have an environmental assessment follow-up monitoring program.  It covers all aspects of the NSDF facility, so it covers construction and operation for the sake of this discussion.  We will be producing annual reports summarizing the information, including data tables from, you know, all the sample acquisition and what the results are.  We will be producing, you know, trend plots and so on over time.  That will be done on an annual basis.

We also have trigger levels indicated within the EAFMP.  So, Madam Velshi, you are correct that, you know, if we exceed any of those thresholds, like an action level, that would trigger more immediate reporting and a release of results to explain the situation.  Thank you.

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

Dr. Dreessen, did you wish to add anything?

**DR. DREESSEN:**  Yes, if I may.

**THE PRESIDENT:**  Please.  Please proceed.

**DR. DREESSEN:**  First of all, the staff said that Cobalt-60 is short-lived.  That is not my understanding I'm afraid.  It has a half-life of 5.27 years and that is more than the half-life of CS-137, which I read is the criterion to distinguish between a short and a long term. So that is a little strange.

The statement was made that, well, the impacts will be negligible because it is naturally -- the elements that I mentioned, aluminum, phosphorous and so forth, they are occurring naturally. Well, of course they occur naturally, the question is in what concentration, and the table shows clearly that after treatment the concentration will be higher than the standard. So I find it a little difficult to say no problem, they occur naturally. So I find that response quite unsatisfactory.

I do appreciate the response about the timeliness of the monitoring data and I trust that indeed that will be -- that timely release will be practised. Thank you.

**THE PRESIDENT:** Okay. Thank you very much both for your presentation and for appearing in front of the Commission today. Greatly appreciated. Thank you.

With that, we will take a break for lunch and we will reconvene at 1:30 p.m.

Thank you.

--- Upon recessing at 12:25 p.m. /
Suspension à 12 h 25

--- Upon resuming at 1:30 p.m. /
Reprise à 13 h 30

**THE PRESIDENT:** Welcome back. Ready to resume our hearing with our next presentation Concerned Citizens of Renfrew County and Area as outlined in CMDs 22.H7.74 and 74A. Dr. Hendrickson will be presenting. Over to you, Dr. Hendrickson, please.

**CMD 22-H7.74/22-H7.74A**

**Oral Presentation by**

**Concerned Citizens of Renfrew County and Area**

**DR. HENDRICKSON:** Yes, thank you, Madam Velshi. I'll start with the slides, if I can?

I just have a couple slides showing the degree of contamination from the plumes, and this has been discussed quite a bit. I think we all agree that Chalk River Labs is a fairly highly contaminated site as a result of things like the NRX meltdown in 1952 and discharges into the liquid dispersal area. So Waste Management Area A is the oldest of the waste management areas, and it's contaminated the East Swamp, which is actually where the exfiltration gallery would discharge from the NSDF, so there is already quite a bit of contamination there. The adjacent South Swamp has much higher levels of contamination from Waste Management Area A, and Waste Management Area B also has plumes of Carbon 14, tritium, Strontium 10:32:25 so forth.

We hardly need to go through this because I think we're all agreed that this legacy waste, as it's known, really does need some attention.

But I did want to start with this slide which was shown this morning. It was, I believe, slide 25 in the CNSC Staff presentation which shows the, quote, approximate range of radioactivity and rocks in the Pembroke/Renfrew area as being, I'd say, between 500 and 3,000 Bq/g. And unfortunately, this is a major error. Even the most radioactive uranium ore sample in that Ontario Geological Survey report that we've been referring to would have far less radioactivity than even the lower limit of the gray band, and that most radioactive sample had 0.11 percent $U_3O_8$ and 5 percent bohrium salt. But then when you look at what's called specific activities and you convert that to Becquerels/gram, it still only comes up to 228, which is way less than the lower bound. And so the location and width of that gray band in slide 27 is grossly incorrect by orders of magnitude, and yet that's been repeatedly cited as a way to sort of assure the public that this material is going to decay down to insignificant levels within a short period of time.

We ask that that be corrected. We put it in our submission and notified the CNSC Staff of this error, and we think it's because the units should have been Becquerels/kilogram instead of Becquerels/gram, and yet we haven't heard any response. But that kind of error does give us concern that perhaps the overall environmental assessment and safety case hasn't been as rigorous as it might have been.

And we've already talked about the preference of our group and other groups, looking at alternatives such as a geological waste management facility which we know is not likely to be possible at the Chalk River site because of the high water table and fractured rock, but there are adjacent areas that should have been explored in a proper aerial survey in the aerial survey stage required by SSG29(4) for sites for a geological facility, and many advantages: less likely human intrusion, no infiltration of precipitation into the waste and so forth.

Facilities like this have been in operation since the '90s. This particular facility is not a true deep geological repository like 600, 700, 800 metres. It's only 100 metres or so. That's a possible sort of thing.

And we've talked about above-ground concrete vaults. Well, there already are above-ground concrete vaults at Chalk River and here there are at least three of them and they're called modular above-ground storage (MAGS) units. But those could be emptied out and the contents possibly put in the mound if this project is approved.

We do think there are better ways, and we ask all the time: What would you do if you're not keen on this NSDF mound? Well, build more MAGS, upgrade the groundwater treatment facilities, which we've already talked about which are doing some good in capturing the plumes. Take as much of the wastes that are in older facilities like Waste Management Area A, B, C and put them in these above-ground concrete storage units and stop shipping waste from White Shell and other places and commercial waste until we've got a good plan for what we're going to do. Do a proper siting process and hold off on things like the reactor decommissioning and taking down the plutonium recovery facility until we have proper facilities, particularly for the more long-lived and intermediate-level waste.

So I wanted to run through that fairly quickly to leave some time to talk about some other matters, such as the nature of the wastes at Chalk River.

The IAEA General Safety Guide, GSG1 classification of radioactive waste, devotes special attention to waste from research facilities such as Chalk River, White Shell, and it says:

> "The waste generated from research reactors and some disused radioactive sources is particularly significant because owing to its level of activity concentration and the half deny lives of the radionuclides, it does not meet the waste acceptance criteria for near surface disposal facilities."

And then it goes on:

> "Research facilities, for example, hot cell chains, glove box chains, pilot plans for checking fuel fabrication processes, particularly the fabrication of mixed uranium plutonium oxides, known as MOXs, for fuel reprocessing, particular advanced schemes, and for post-irradiation examinations, as well as their analytical laboratories generate types of waste that are

> often different from the typical waste generated by industrial plants."

Think of nuclear power plants.

> "Owing to the presence of non-negligible amounts of long-lived alpha emitters, waste from research facilities generally belongs to the ILW Class and even in some circumstances to the HLW Class."

That is a perfect description of the wastes at CRL. That description is lacking in CMD 22-H7 or in the EIS.

We have a partial list of radionuclides for the mound, but the waste inventory program for CRL has over 200 radionuclides. We've got roughly 30 of them in the inventory. What about the other 170? Well, some are very short-lived but others are not.

We've got a very incomplete picture right now of what's going on at Chalk River, and we hear repeatedly that long-lived radionuclides constitute a small proportion of the total radioactive inventory. That is false, and I have to explain with some technical detail why that is false.

First, let's start with mass. We talked

about the mass of Cobalt-60 yesterday, 2 kilograms. You'll recall that. It's easy to calculate mass. You take the Becquerels and you take the specific activity, that's Becquerels per gram, divide the Becquerels by the Becquerels per gram, and you get grams. It's not that hard. So do it for the two natural long-lived alpha emitters, U-238 and thorium-232, which are present in large amounts at Chalk River. And what do you get? You get 6 tonnes of U-238 by mass and six and a half tonnes of thorium-232. I mean, that's way more than the 2 kilograms of Cobalt-60.

Just to explain this further. Bear with me. So over the entire half-life of something like cobalt or U-238 or thorium-232, how many disintegrations total over that total half-life. That's the radioactivity. And the answer is: 15 trillion trillion for Cobalt-60. That sounds like a lot. 11,000 trillion trillion for U-238. 12 million trillion trillion for thorium-232. So, no, the inventory does not decay by 99 percent in 100 years and long-lived waste does not make up a vanishingly small proportion of the total. It's most of the total.

Another problem -- just a brief one -- is that the statement that Cobalt-60 is expected to be the only radionuclide released in a significant quantity from the wastewater treatment plant. Well, we talked about plutonium-241, but let's look at tritium. Tritium would be released in immense quantities from the wastewater treatment plant. So why do we have these simply erroneous statements in CMD 22-H7, page 275 of 590? It doesn't provide great confidence in the work that's been done to assess this facility.

Let's look at the question of end state and release from regulatory control briefly, if we may. You really shouldn't licence a disposal facility without clarity on what end-state institutional control, regulatory control, mean in a disposal concept. And end state is central to disposal.

Here's what the IAEA Safety Glossary says:

> "End state is the state of radioactive waste in the final stage of radioactive waste management in which the waste is passively safe and does not depend on institutional control. In the context of radioactive waste management, end state refers to disposal."

So where do we hear about end state? It's super important and we're just not getting it. I'm sorry.

So in our detailed submission, we ask a whole series of questions, and maybe I can go into a little more detail, if there's time?

**MR. SAUMURE:** Sorry, Dr. Hendrickson, if you could wrap up fairly quickly, that would be appreciated. Thank you.

**DR. HENDRICKSON:** I'll just say some of the things -- one very important thing is there is a comprehensive decommissioning plan for Chalk River which does have some estimates of the quantities of long-lived and short-lived waste but mostly long-lived in all the different waste management areas. It's not been included in the reports that Canada sends to the International Atomic Energy Agency under the Joint Commission, but the data are there. Not all of them are in that report, but some are available that aren't in that report. That report should have been the starting point for developing a proper disposal facility, and we don't even see it referenced.

But yet that's the decommissioning plan, and it does have numbers like for Waste Management Areas A and F and the liquid dispersal area, the thorium pit. And when we look at those numbers, when you look at the radioactivity in those waste management areas, it vastly exceeds what could possibly go in the NSDF within the licensed inventory. It's not the quantities, it's the radioactivity that is way in excess. So why build a facility that cannot address the radioactivity in the legacy waste that are at Chalk River and instead build something that either you're going to put waste that hasn't been properly characterized and will vastly exceed the licensed inventory, or if you adhere to the licensed inventory, then you're just going to put almost uncontaminated dirt and very low-level building debris. But that's not what's at Chalk River. I told you what's at Chalk River. And that's what the GSG1 says.

So we've got a real dilemma here. We're going to either waste a lot of money on something that's not going to do any good for the taxpayers of Canada, not do anything to clean up the Chalk River site, or we're going to put in waste uncharacterized that's going to vastly exceed the safety limits for the facility and cause a huge pollution problem for future generations.

**THE PRESIDENT:** Thank you, Dr. Hendrickson.

Let's start with Ms. Maharaj, please.

**MEMBER MAHARAJ:** Thank you, Madam Velshi and thank you, Dr. Hendrickson.

I think I'd like to get a little more clarity around the concept of whether the NSDF is intended to be a total remedy to all of the contamination that may be on the Chalk River site or whether it's a partial remedy for the bigger picture and is focused on a particular type, the low-level waste that we've talked about and the possibility for some limited intermediate-level waste, or as Dr. Hendrickson is concerned, maybe more waste of a difficult nature than it's designed to account for.

CNL, please.

**MR. McBREARTY:** Thank you, Commissioner Maharaj. This is Mr. McBrearty for the record.

I think to answer your question and the short answer is really the NSDF is really the first stage of cleanup. It is designed to clean up low-level waste. We are quite aware, as the Intervenor has pointed out, there is high-level waste, there is intermediate-waste on our sites and in our buildings. As a matter of fact, as we have cleaned out and started the D&D of our facilities. We have been able to actually segregate through our characterization process a significant amount of material that initially could have been thought that it was going to be contaminated, but through our characterization, our planning stage, we've been able to sort out and characterize that most of that material is actually, quote, unquote, clean waste. It's not radioactive. A lower percentage of that is low-level waste and a very small percentage of that is intermediate-level waste. The intermediate-level waste will be stored and continue to be stored until a final disposition program or process is determined by the nation of Canada.

We actually have intentions in the future to modernize our intermediate-level waste storage facilities. The Intervenor brought up the SMAGS and MAGS that we have. It is our intention, as we continue to generate intermediate-level waste from our decommissioning efforts, because we know there's ILW in these buildings, to actually be able to store that waste until a final solution is available.

That's kind of the -- from the FD portion of our facilities, decommissioning portion of it.

If we step a little further back, we have high-level waste at our waste management areas, Waste Management Area A and Waste Management Area -- I'm sorry, Waste Management Area B and I think it's D or G? Yeah, thank you. And the eventual plan for that is that it will go to the deep geologic depository, and when the NWMO is able to successfully site and construct that facility.

I think I stated way probably way back in January first when we talked about the future of the Chalk River site and again February when we did Part 1 of the hearing and I think also yesterday, our plan is a multi-phase plan, and if we look at it from a big picture and high-level waste, that will go to the DGR, and that will de-inventory Waste Management Area B and Waste

Management Area G. And then intermediate-level waste we will store as we have been safely storing up until now until a future disposition is available. Low-level waste will be treated if it meets the Waste Acceptance Criteria of the NSDF and it will be placed into the NSDF.

I'll just kind of stop there and I'll turn it over to Ms. Vickerd to give any more clarity or maybe provide a little bit more definition on our integrated waste strategy for low-level waste.

**MS. VICKERD:** Meggan Vickerd for the record.

I guess the only thing I would add to that is that it's all laid out in our integrated waste strategy. The integrated waste strategy is reflective of the existing Canadian framework and policies and it outlines how CNL has proposed to manage, ensure that there is a disposition for all of the waste that we generate at AECL-owned sites and that is available to the public in both official languages and our project website, plus we've given numerous presentations at various forums on integrated waste strategy.

**MEMBER MAHARAJ:** Thank you.

**THE PRESIDENT:** Maybe just to clarify then that you are highly confident that all the low-level waste on the Chalk River site and then wherever else it may be coming from that's there today and in the -- you know, for the life of that site, that this NSDF, the million tonnes, is adequate for that?

**MS. VICKERD:** Meggan Vickerd for the record.

Yes, CNL is confident that the forecasted waste volumes of low-level waste Chalk River, White Shell, G1, Douglas Point has been accommodated for in the forecast and design basis with application of waste optimization, the waste hierarchy principle, and recognizing that Port Hope and Port Granby are already managing 1.7 million cubic metres of low-level waste.

**THE PRESIDENT:** Thank you. Dr. Lacroix?

**MEMBER LACROIX:** Thank you very much, Dr. Hendrickson, for your presentation.

Could you put back the slide number 27 showing the radioactivity concentration versus time, and this is a question for CNSC.

Dr. Hendrickson mentioned there is something wrong with this block so could you provide us with further explanation?

**MS. MURTHY:** Kavita Murthy for the record.

So Mr. Gacem will provide you with an explanation. Please go ahead.

**MR. GACEM:** Mohamed Cherif Gacem for the record.

So the graph that is presented in our CMD -- PowerPoint in CMD number 1 for Part 1 has an error in the -- I would say the gray bound, and the run reference was the reference for that.

However, for the Y axis, it has the correct, I would say, Becquerel per gram unit.  It's not kilogram per unit -- or gram units.

So the confusion maybe is because Dr. Hendrickson has used a different, I would say, reference that has been referenced in our CMD and in CNL's Safety Case document, which is corrected.

So in our graph we reported the actual data provided by CNL and there is no error in that.

**MEMBER LACROIX:** Does it answer your question, Dr. Hendrickson?

**DR. HENDRICKSON:** Ole Hendrickson for the record.

What I suspect happened is that the error is in the units for the gray band only.

**MEMBER LACROIX:** Furthermore, on this graphic -- I know there's a lot in the graphic.  Could you explain to me the shape of the blue curve?

No, no, no.  CNSC, I'm sorry.

**MR. GACEM:** So the blue curve represents the decay of the total activity of the waste inventory per time. So you can see at 100 years -- I can't see the -- yeah. So by 100 years, the radioactive concentration will be almost around 5 or 6 Becquerels/gram and reaching about --

**MEMBER LACROIX:** Essentially what I want to know is that after, I don't know, 10 years, there's a drop-off. Is it due to the fact that the short-lived radionuclides have decayed and then there is a sharp decrease in radioactivity?

**MR. GACEM:** That's correct.

**MEMBER LACROIX:** You've answered my question. Thank you very much.

**THE PRESIDENT:** Question to CNL around the statement on only a small portion of the inventory is long-lived and Dr. Hendrickson walked us through some numbers, both by weight as well as by activity, and what does "really small" mean? I just wanted to get your perspective around, was this small portion and is 6 tonnes and 7 tonnes considered to be small?

**MS. VICKERD:** Meggan Vickerd for the record.

So what I will elaborate on is the Intervenor has used uranium as an example. Uranium exists naturally in soils and building materials, and on average within soil uranium is present in 0.05 Becquerels/gram. So even if we take a sample of soil that has been unimpacted by our activities, you're going to find uranium in it.

Our inventory has proposed -- does have long-lived anthropogenically or created uranium contamination from the Chalk River Laboratories, but the concentration, that limit we set for ourselves, would result in an average concentration in NSDF of 0.145 Becquerels/gram, only three times more than what's naturally present.

So when you look at the volume of soil -- yes, there could be a lot -- but taken into consideration the relative amount that's naturally occurring, the significance isn't that great.

Before I let the mic go, if I could just correct the graph, the concentration. There was not a mistake. The clarification, if you go to CNL's slide deck this morning, slide 20, we did note an errata. The Ontario Geological Survey produced a number of reports for the Pembroke/Renfrew region in 1981. So there are a number of reports produced that year. So we clarify what report is relevant for the data that we utilize. If you want an expansion on the difference between those reports, I can go to one of our experts available virtually, Mr. Labriola.

**THE PRESIDENT:** I don't need you to go through that, but what we would appreciate is, with that correction, just send us the revised one with the right references on it.

**MS. VICKERD:** This morning we did produce the errata on page 20 of our slide deck, but we can certainly send the figure with the corrected --

**THE PRESIDENT:** I meant the figure with the corrected reference.

**MS. VICKERD:** Noted.

**THE PRESIDENT:** Thank you. And then getting to this whole question around end state and abandonment and institutional control.

The first one is end state is when -- do you agree that it's after the end of institutional control phase?

**MS. VICKERD:** Meggan Vickerd for the record.

End state is at the end of the institutional control phase or at the point of closure, actually, I would say, because once you decommission the facility and close the facility, our decommission plans need to identify what our planned end state is. And CNL has submitted a preliminary decommission plan already for NSDF as part of our license application, which does identify that the planned end state of the facility is as a disposal facility. That is a type of land use. So the planned end state is a disposal facility.

**THE PRESIDENT:** No, but if I look at the different phases of the project, so after the 30 or 50 years of operation or placement of waste, is that -- and before institutional control begins, is that the end state or is it after whatever the 300 or 500 years of institutional control?

**MS. VICKERD:** Sorry. Meggan Vickerd for the record.

Trying to think of how to answer that.

Once we close the facility -- so once we open the facility and start operating under an operating licence, it's a disposal facility. Once we close it, that is the end state. It's a closed disposal facility.

**THE PRESIDENT:** So the question then -- and it was, Mr. McBrearty, something that you said yesterday that caused some commentary around abandonment, and disposal means you actually at some stage have abandoned. It's no longer storage. And is that once institutional control is over then? And this may seem like semantics, but I just want to make sure that there's consistency in understanding of the terms.

Why don't we get staff to comment and then you can respond to that. Staff?

**MS. MURTHY:** Kavita Murthy for the record.

I will hand this off to Dr. Matt Herod, please.

**DR. HEROD:** Dr. Matt Herod for the record.

Disposal is not abandonment. It's clear in the IAEA guide that the end state refers to disposal. That's the direct quotation. So the end state of this is a closed disposal facility. The institutional control period occurs after closure. However, it is also a regulatory requirement that facilities not be unduly dependent on active institutional controls and that passive safety be the key safety features during the institutional control period, and so the end state occurs at the point of closure. The institutional control period is an administrative control that ensures land use restrictions are maintained during that time and allows for monitoring of the facility in its closed state.

**THE PRESIDENT:** But if I think of the different licensing stages, so that would be the operations licence and then when you enter institutional control, it's still under the oversight of the regulator; and then once that ends, isn't that considered like an abandonment? I see Mr. Ramzi wants to chime in.

**MR. JAMMAL:** Ramzi Jammal for the record.

Just to clarify, Madam President, with

respect to abandonment.  Dr. Herod did mention the stages. I want to make it very clear:  No one can abandon a facility or a nuclear facility or a waste disposal facility or anything without the permission of the Commission.  So in other words, we're talking about the word "abandonment" as just walking away from it.

So the key point here on that stage, so there is the IC, which is the Institutional Control, but even the Institutional Control cannot be released from the oversight of the Commission without the Commission approval, and at most the IC, which is monitored by other regulatory bodies, and then even at the end, the requirement for abandonment requires an approval by a regulatory body.

**THE PRESIDENT:**  Right.  But we're getting to that same point.  After institutional control, when there is approval to say you no longer need to be under institutional control, is that the same as saying it's now abandoned?  Because there is no active oversight of that facility.

**MR. JAMMAL:**  Ramzi Jammal for the record.

Well, in principle, that's correct.  So in other words, if there is a passive, no interaction, or just completely -- let me give you a hypothetical.  It's completely equal to background.  There is no measurable activity. There is nothing that's then -- then that is allowed. But at the same time I want to reconfirm that it's not just walk away from it. As it degrades, becomes passive, yes, at some point you reach a decision to say, that is literally no action required, no intervention is required, so it's -- I mean, it is abandonment, but at the same time the facility is or the site is -- this is within the fence of a nuclear facility. That's what I'm trying to say. So it's always -- there is a controlled environment. We're talking about NSDF. I'm not generalizing at all here.

So if this was outside, based on international practices, if it becomes equal to background, there is no activity whatsoever, there is no measurable -- anything that is above regulatory limits, the answer is what we call a passive, then you can -- again, I'm having difficulty with the verb "abandonment." Can you stop the regulatory oversight? The answer is yes.

**THE PRESIDENT:** Okay. Well, maybe this will be helpful: When would institutional control stop? Like, what criteria need to be met?

**MR. JAMMAL:** Ramzi Jammal for the record.

The criteria will be met by a regulatory body in order to determine that institutional control is over.

We can speak of existing sites/facilities. Let's take uranium mining in Saskatchewan where there has been transfer of institutional control --

**THE PRESIDENT:** No, sorry. If you can do it specifically for the NSDF. There have been certain assumptions made that in 300 years or 500 years, no longer needed to. What's been assumed in the modelling? That you're at background levels?

Ms. Murthy?

**MS. MURTHY:** So Kavita Murthy for the record.

The word "abandoned" creates the perception that a nuclear facility is simply being abandoned and left unregulated with potential hazards remaining. That is not the case. Rather, it is the cessation of a licence or the release from regulatory control under the *Nuclear Safety and Control Act*. The control of the residual risks must be managed by an applicable jurisdiction, such as a federal government, a provincial or a territorial government.

So at what level is NSCA licensing no longer required for the NSDF? To give answer to that question, I'll ask Matt Herod to go.

**DR. HEROD:** Dr. Matt Herod for the record.

At the cessation of licensing, the

critical barrier to allow that cessation to occur is the dose received by a human intruder and that is derived directly from the International Commission On Radiological Protection and the IAEA and it's in the Canadian regulatory framework for waste as well. And that dose must be below 1 millisievert to a potential inadvertent human intruder at the end of the institutional control period. And CNL's post-closure safety assessment modelling shows that that is the case for the NSDF. That number is also extremely highly dependent on the licensed inventory for the NSDF, and that is why the WAC and the licencing inventory that we are discussing right now is of great importance during operations as it dictates at what time the facility could be released from licensing and a potential human intruder would receive a dose below 1 millisievert.

**THE PRESIDENT:** Thank you. Any further questions, Ms. Maharaj?

If you have additional ones later on, you can. I just wondered if you had any while Dr. Hendrickson was here.

**MEMBER MAHARAJ:** Sure. I do actually have just one point of clarification for Mr. Ramzi.

In terms of the -- "abandonment" is a word that has a certain emotional content to it and it does convey that sense of walking away, and I appreciate that in order for a facility to be abandoned properly, there needs to be an order of the Commission allowing it to be abandoned.

Now, my understanding is that in order for a facility to be abandoned by an order of abandonment, that is when the legal liability of the owner of the waste stops being responsible for that waste any longer. Is that your understanding? Is that what we mean by abandonment?

**MR. JAMMAL:** Ramzi Jammal for the record.

That's a tough question, and the reason it's a tough question, it's not binary. It's not zero or one.

**MEMBER MAHARAJ:** Okay.

**MR. JAMMAL:** So in principle, yes. But it's not really -- what I'm trying to say, we're talking about the NSDF itself. The message I'm trying to say, there is a decay that's going to take over time, and then as Dr. Herod mentioned, there is a requirement by which you can say below the 1 millisievert level or the recommendation of ICRB.

What I'm trying to say, in this facility, this place called CRL, regardless of the passive being management of that spot, we call it the NSDF, it's still within a controlled environment in CRL towards the future. So in other words, what I'm trying to say, it's within an existing licence site so the abandonment is not just the walking away from it.

So what I'm trying to say there will be always -- as long as there is a Canada, as long as there is a government, then there is an activity that's taking place on the CRL level looking after the phases of the cleanup, the phases of the regulatory oversight.

Your question is, when there is an approval by the authority for abandonment, then we look at, what is the outcome of this abandonment? Is it the returning of the site -- this is outside the NSDF. If you are asking me a hypothetical question, I will answer it.

What is the end state of that place? Is it a green field? Is it a brown field? For what purpose is it being done? Then it becomes a decision to say, I'm going to return that spot to be a green field. Then the Commission gives the authority to do so and that becomes a return to its original state, being a green field. Or if it's done for purposes of industrial application, that is a brown field. So, again, that is abandonment, but it's through an oversight -- regulatory oversight. And that's the message I'm trying to convey. I hope it's clear.

**MEMBER MAHARAJ:** I think so. And I think what we've heard from the Intervenors is this general concern or conflation of the concept of institutional control and abandonment by CNL, and I think that's where the misunderstanding is happening, and I think you've helped to clarify that.

So the fact that the NSDF is closed, it's now a closed disposal facility, that's its state, and it goes to passive management in the institutional control phase, doesn't mean -- and please correct me if I'm wrong -- doesn't mean that CNL has abandoned the site because "abandoned" has a specific regulatory and legal meaning.  And I think that's where the confusion is coming around.

**MR. JAMMAL:**  Ram Jammal for the record. You put it very eloquently.  Yes, that's correct.  Thank you.

**THE PRESIDENT:**  CNL, did you wish to add anything and add further confusion to this?

**MS. VICKERD:**  Meggan Vickerd for the record.

Perhaps AECL can certainly step in and reaffirm their commitment to the waste management too and the liabilities.

But from CNL's perspective, you know, we -- we use institutional control -- we use the 300 years as a planning phase.  We utilize the language "at least 300 years," but we will continue institutional controls for as long as necessary, which is an important aspect of this conversation.

And we specifically have not used the language "abandonment" in our application or the EIS because we recognize the concern that arises, rightly so, in that when you have a disposal facility, you want some reassurance that there's some regulatory control and certainly some responsibility by the waste owner.

And with that, let's go to AECL.

**MR. MACDONALD:** For the record, Alistair MacDonald.

I actually think everyone probably got there and I think all I can do is add to the confusion, but I will reinforce a couple of points.

At AECL we are here in perpetuity to take responsibility for these sites and these liabilities and we will continue to do so. CNL also are there in perpetuity and will take responsibility for managing these sites, whatever the situation is on the regulatory aspect.

I think Mr. Jammal and others were talking about the discernment between the different licensing phases, and I think that's also covered in the EIA. I'm looking at section 3.2.4 of the post-closure phase which discerns some factors that will be used to describe when institutional control may need to continue and when perhaps institutional control could be dropped. But whether there's institutional control required, regulatory or otherwise, both AECL and CNL will continue to take responsibility for these sites as part of the wider picture.

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

With that, I'll turn to you, Dr. Hendrickson, for any thoughts.

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

The current regulatory framework used by the CNSC does not have something called a licence to dispose. There are site preparation licences, construction, operation, decommissioning, and a licence to abandon. The licence to abandon is the final licensing stage and environmental assessment is supposed to cover all licensing stages.

I personally intervened in hearings on a licence to abandon the Saskatchewan Research Council's Slowpoke reactor. And in order to remove a facility such as that from regulatory control, it must be passively safe. You must say that the waste or whatever radionuclides are remaining, which there may be some, are less than the exemption levels that are specified in the CNSC's regulations.

So as Dr. Herod said, the inventory that remains is extremely important in making a decision about whether you can remove a facility from regulatory control. And that's part of the reason why we're having so much discussion about the inventory for the NSDF; and discussions, for example, about how much of the federal waste would go in the NSDF. Because in 2017 the draft EIS said that clearly all the low-level waste would go in the NSDF. Mr. McBrearty says now it's only a starting point, which perhaps it could be. And then we hear: Well, no, no, it could accommodate all the waste. So I think we're still in a bit of a state of confusion about the capacity.

As I pointed out, Waste Management Areas A, B, C thorium pit, they are all contaminated with large quantities of long-lived radionuclides and not all of them are naturally occurring radionuclides. Take the 27 grams of U-233 in the thorium pit. That was manufactured because that's weapons-grade material. That was part of the early history of Chalk River, was not to just produce plutonium for U.S. weapons but also uranium-233, which is a fissile material. So those 27 grams of U-233 are equivalent to 9.5 times ten to the tenth Becquerels which is 35 times the licensed inventory of 2.74 times 10 to the eighth Becquerels.

So here we've got one facility with one radionuclide with 35 times more than the inventory for the NSDF. But that number, 27 grams, that's taken from the comprehensive preliminary decommissioning plan. So maybe you don't believe that.

So then look at Appendix E in CNL's own reference inventory report which shows CNL's own measurements of radioactivity in Waste Management Area A, the liquid dispersal area, the cesium pond soil that's been shipped from White Shell to Chalk River, and Waste Management Area F, last but not at least.

And when we look at CNL's own measurements of thorium-230, another fairly long-lived radionuclide, an alpha emitter, in Waste Management Area F, CNL's own measurement shows that exceeds the licence inventory for the NSDF by 23-fold.

So licence inventory is important. Knowing what you're starting with, what you have to deal with, is extremely important. And having only these bounding inventories or sort of maximum potential quantities does not tell us whether this particular proposed facility is either in the economic or -- is either economically or technically appropriate for the problem that we face.

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

Dr. Hendrickson. Thank you for your intervention.

**CMD 22-H7.94/22-H7.94A**

**Oral Presentation by**

**Canadian Nuclear Workers' Council**

**THE PRESIDENT:** We will move to our next presentation by the Canadian Nuclear Workers' Council as identified in CMD 22-H7.94 and 7.94A, and we have Mr. Bob Walker with us to make the presentation.

Mr. Walker, over to you.

**MR. WALKER:** Good afternoon, President Velshi and Members of the Commission. For the record, I'm Bob Walker, National Director of the Canadian Nuclear Workers' Council. With me today are Dr. Michael Ivanco beside me, and I will introduce him further in a couple of seconds, and at the table behind me is Darcy McGrath. Darcy is a nuclear operator at Chalk River and chief steward with the Power Workers' Union.

The Nuclear Workers' Council was formed in 1993 as an association of unions representing workers across Canada's nuclear industry, and this includes the unions at CNL's Chalk River Laboratories site.

The goals of our council are to ensure that our perspectives are heard by decision makers, to strengthen our role as partners in the nuclear industry, to enhance public knowledge about the benefits of Canada's nuclear industry, and probably most importantly is to share our experiences with one another and find more information on our website.

Our priority has always been the same, and I've been in front of the Commission many times and I've always said this, our number one issue is health and safety of our members, and when I say health and safety of our members, in our mind that means protection of workers, the public, and the environment because they're all so closely interrelated. If workers are being protected, the environment is being protected.

Our members at Chalk River are highly skilled nuclear professionals. They work near Chalk River with their families and friends. Nothing is more important to them.

On the NSDF specifically, we started following the process quite early. We asked -- June 17, 2018, we had been in discussions with CNL and we asked for more information on the project. So the Nuclear Workers' Council, the United Steelworkers, Professional Institute of the Public Service of Canada, the Power Workers' Union all met with representatives from CNL to review the project and tour the proposed site. We did have questions and concerns prior to that. They were addressed to our satisfaction.

Following that, I participated in both CNSC and CNL webinars on the NSDF and reviewed information found on CNL's website. I also consulted my predecessor, Dave Shier, and I consulted with experts outside of CNL, including Dr. Ivanco. I observed Part 1 of the public hearing and reviewed the CMDs.

To make sure our submission had the most value, the decision was made to ask Dr. Ivanco to put together a report to support our submission. So that's what we did. Michael is Past President of the Society of Professional Engineers and Associates and continues to represent SPEA on the CNWC Board. He worked at AECL Chalk River from 1984 to 1997, where he had daily interaction with professionals working in waste management and moved to the Engineering Division in Mississauga where he worked until 2015. Dr. Ivanco continues to be a sessional lecturer at the University of Toronto. We did share a draft of his report with our member unions at Chalk River and they were satisfied with the report.

And I'll turn it over to Michael.

**DR. IVANCO:** Thanks, Bob. I forgot to mention -- and this is not Bob's fault -- I'm also Past President of the Chalk River Professional Employees Group, a union which I organized. It's a small matter. I just want to mention, when I was reading through the reports I was pleasantly surprised to find out in a way that one of the buildings that forms much of the inventory for the NSDF is Building 107. And when I was at Chalk River, that was where we had our official survey coffee room. So I was in building 107 twice a year for almost 13 years having coffee, and that building housed Solid-State Science Division and also Waste Management Division, so I had a great deal of interaction with people over the years in Waste Management Division, and I was also head of the safety committee for that building. So we did inspections quarterly of every laboratory, with Geiger counters of the attic, and I wanted to mention that my familiarity with that forms a lot of my opinion in the report.

We mention in the report, of course, Chalk River contains a legacy of nuclear materials. It's almost 80 years long. None of it is in waste disposal sites. All of it is in temporary storage. And from our point of view, the nearest surface disposal facility is just the first provision to deal with disposal of waste that's in temporary storage at the site. I don't think it's ever been presented as the be all and end all for waste disposal at the site.

The largest amount of nuclear legacy material by volume and mass is the low-level waste, and the vast majority of the low-level waste is not radioactive but consists of relatively benign materials with trace contaminants.

In the report we meant to use building 107 as an example. For those not familiar with what the waste is like, building 107 was a temporary World War II building, and they're called temporary for good reason. If you look at the construction of that building, it was a long, narrow building with partially a full basement. But most of it was built like a back yard deck. It had concrete pylons supporting a joist structure with earth underneath that supported floors. A single-storey building with a big attic.

I know when we did tours of those buildings, it had laboratories of various different kinds. Our group -- I was in waste isotope separation -- had a laboratory in that building. There were chemical laboratories. They're historical laboratories where we knew they had handled radioactive materials, and those would have been fission products from mostly NRX -- mostly NRX -- so they contained the entire periodic table of elements, essentially.

Surely we were certainly aware that there was contaminants in that building, and when we went to the attic and did those inspections there was a lot of HVAC duct work, there was fume hood exhaust pipes, and they were generally understood to probably be contaminated with alpha.  But most of the building material that's being disposed of is probably concrete, lumber, metal, piping, probably linoleum, wood, and all of these things -- many of them will be slightly contaminated with other things and that's why my understanding is it's very hard to separate those things from the radioactive elements from the non-radioactive ones.

But the Canadian Nuclear Workers' Council is of the opinion that an engineered disposal facility such as the NSDF is far superior to the status quo which is temporary storage.  We believe this is a statement that all Intervenors would agree with.  We can put in more temporary storage, but it's really just kicking the can down the road.

And if we accept the previous statement that, you know, disposal is better than temporary storage, then really the remaining questions are where should the facility be located and what level of containment is sufficient for public safety?

Now, with respect to location, I mean, we read the reports, there is a relatively compelling case to be made that the disposal facility should be on the Chalk River site, and of the places on the Chalk River site, the

Perch Lake basin watershed seemed to be the best location because that had the longest transit time of any potential contaminants to the Ottawa River.

This graph has been shown by a lot of people. I only point to it to point out that within 100 years of the NSDF, which we would expect this site to still be managed and be under some administrative control, the inventory is about three times natural background of soils in the area, which is not a huge number.

So we don't mean to suggest that low levels of radiation are harmless, but we make the point in our written submission that we live in a naturally radioactive environment, so we all are exposed to radiation. Most of us are mostly exposed to radon gas in our basement, if we have a basement. There are places in the world where natural background radiation is much, much higher than any radiation that would be connected with the NSDF and no harm has been associated with those levels of radiation.

We believe that the barriers between the NSDF inventory and the food chain are based on natural barriers that have been shown to be effective for containment of radioactive material on time scales far beyond any potential hazard associated with the NSDF, clay being particularly effective, such material. It's been shown to contain movement of radioactive materials from the natural reactor in Africa that existed 2 billion years ago, which was sedimentary rock surrounded by clay. And in 2 billion years the radioactive byproducts haven't proved very far.

The Cigar Lake mine in Saskatchewan has survived glaciation, hundreds of Ice Ages and Rocky Mountain formation and it's remained relatively intact protected by clay.

So in our conclusion, the NSDF, which is an engineered disposal facility, we believe is a huge improvement over the status quo. We point out that the NSDF is not unique with "first of a kind" risks. There are two other low-level waste disposal facilities in Ontario that have been mentioned and there are seven such facilities in the United States, five in operation, one under construction, and one that has been capped and closed.

For these and other reasons stated in our written submission, we believe the NSDF proposed for the Chalk River site will be a safe depository for the intended waste.

**MR. WALKER:** So in closing, the Nuclear Workers' Council fully supports CNL's application. We have a shared responsibility to safely dispose of the radioactive waste and not leave it for future generations. The NSDF provides a safe and responsible solution and addresses environmental concerns. The NSDF is protective of the environment, the Ottawa River and human health. We recommend that the Commission determine that the NSDF Project is not likely to cause significant adverse environmental effects and approve CNL's application to construct the NSDF.

Just before I say the last sentence, I want to say that we have confirmed with the unions at site that they have been kept updated on the project from CNL and have no concerns about the project.

So once again I would like to thank Members of the Commission, CNSC Staff and all Intervenors. This public process that we're going through right now and the strong regulatory oversight we see every day serves to protect the environment and maintain the high level of health and safety in our workplaces and communities.

Thank you.

**THE PRESIDENT:** Thank you very much, Mr. Walker and Dr. Ivanco, for the presentation.

Let's start with Dr. Lacroix, please.

**MEMBER LACROIX:** Well, thank you very much, gentlemen, for this presentation.

Dr. Ivanco, you put your finger on

something that has been nagging me for a number of hearings and meetings, is the confusion that prevails around the half-life and the radioactivity, and I would appreciate if CNSC, if it's already not been done, to come up with a fact sheet that would explain the effects of the half-life on the activity of an unstable radioactive isotope and also to explain the effect of a specific activity because a previous Intervenor wanted to say that -- I don't know off the top of my head -- one gram of Cobalt-60 has the same activity as I think it's 1600 tonnes of uranium-238. So for people, this is, "Ah, how come?" But it's a very simple calculation and it would be nice to specify this in a fact sheet and once and for all clarify this misconception.

**MS. MURTHY:** Thank you, Dr. Lacroix. We will take that as an undertaking. I will have staff in Ottawa check and see what's on our public website, and if it is not there, I agree with you that in terms of communicating, there is specific activity, and activity and half-life. It is important. If we find it before the end of these hearings, we'll make sure that we flag it. Otherwise, we will take it as an undertaking thank you.

**MEMBER LACROIX:** Well, you should thank Dr. Ivanco for this.

**MS. MURTHY:** Thank you, sir.

**THE PRESIDENT:** Ms. Maharaj?

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you, gentlemen, for your presentation.

I just wanted to tell you that it's really good to hear from people who are actually there and get a sense of how you feel about your safety personally and the information that you've been given by CNL. I have no additional questions for you, but thank you.

**THE PRESIDENT:** Dr. Ivanco, I wanted to thank you for the historical background on the Chalk River site. I found that extremely interesting.

And the question I have for you, and I don't know if you were here earlier in the day, Mr. Walker, but there were some Intervenors who are raised some concerns around the impact of this project on worker health and safety. I wondered, as you walked us through, you know, the different webinars you attended and documents you reviewed, did you or anyone on your team look at the safety analysis report that looked at the impact on worker health and safety for this project and have any comments on that?

**MR. WALKER:** Bob Walker for the record.

Thanks for the question. We actually talked about that a little bit at lunchtime.

I think the way I look at it is health and safety is -- it's always alive. It's an issue you're always looking at, both what you have today and what you expect coming in the future. And there's a very active site health and safety committee, it has representatives from all the unions at the site, and they are continuing to look at issues as they arise. So even if they looked at it in detail today, the details will change tomorrow and the day after. But they are very active. Dr. Ivanco has been on the health and safety committee at site. Darcy has been on the site health and safety committee and now one of his stewards is on that committee for him.

Did you want to add anything?

I hope that answers your question.

**THE PRESIDENT:** Well, maybe just a supplementary question: Does the health and safety committee look at the specific proposal or is it just the day-to-day activities that is the primary focus of those committees?

**MR. McGRATH:** Darcy McGrath for the record.

Personally, I haven't sat in on the health and safety meetings recently, but I do know that it's, yeah, it's more the day-to-day operations is what they're going for, whereas the proposed NSDF is further down the road. But the actual decommissioning of all of our buildings and stuff, that is where our health and safety is, and CNL has done a great job with all their pre-job briefs, getting everything set, having all of the protective stuff that we need to do our jobs on a daily basis up there. But as far as the actual proposed site, I don't believe the health and safety committee is at that stage yet.

**THE PRESIDENT:** Thank you very much. Thank you for the intervention and for your appearance today. Much appreciated. Thank you.

**CMD 22-H7.60/22-H7.60A**

**Oral Presentation by Kerry Rowe**

**THE PRESIDENT:** Our next presentation is by Mr. Kerry Rowe, as outlined in CMDs 22-H7.60 and 60A. Mr. Rowe, the floor is yours, please.

**MR. ROWE:** Hello? Yes. President Velshi and Commissioners, for the record my name is Kerry Rowe, I'm a Professor at Queen's University. I also acted as an external reviewer of the NSDF area system and as a reviewer of the studies conducted at Queen's University by a colleague.

I would like to begin by emphasizing that we've come a long way in the last 40 years from the dumps of the last century. We're now dealing with fully engineered facilities. We have won regulations, whether it be Ontario's municipal solid waste for large landfills, the Canadian Council of Ministers of the Environment on hazardous waste, we've got four decades of research and practical experience -- that's all gone into the design of the Engineered Containment Mound.

To illustrate how far we've moved forward since those two regulations I referred to were promulgated, let us take an example of a composite liner because all of the systems have a primary composite liner.

The geomembrane, if it has no holes, will have no leakage. If we assume that there is a slip within an area of 100 square millimetres per hectare in a 12-hectare site, so there are 12 such defects, then we would calculate for the designs of the Ontario reg 232 or CCME that the leachate that would be collected would be around 0.55 litres per day in the secondary system. To put that in context, if we think about a one litre milk bottle, it would be a little over half full from the entire 12-hectare site leaking through the primary liner.

If we look at the NSDF design under the same conditions, it's 90 times smaller, at 0.006 litres per day, barely covering the bottom of the milk bottle. Indeed if we put it in a medicine glass, it is right down at the bottom. Now, that is the leakage through the primary system.

There is the potential for leakage through the secondary system if we have exactly the same number of defects of the same size, 0.0008 litres per day. Substantially smaller but -- except at the sump, that is extremely unlikely. It has a probability of less than 0.0006 or about 1 in 1600 at any location other than the sump.

Let's talk about the sump. It is where the leachate will be collected in the primary collection system and in the secondary system. There there is a greater probability you could get leakage through the primary system. But for that reason, there's an extra level of defence in the sump, with an extra composite liner below the secondary system.

So I compared it with our modern regulations for municipal solid waste and for hazardous waste and it is superior.

Let's now go to some of the low-level facilities in the United States, and I have five of them here all with a primary liner system, all with a leachate collection system. Three and the ECM all have a protection layer but the protection layer for the geomembrane is much more robust in the ECM system. Two of them have a single geomembrane as the primary liner, one is a composite liner with compacted clay, two have a composite liner with a geosynthetic clay liner or GCL, as does the ECM.

Now if we go to the secondary system, one has none. We see that the ones with a secondary system all have a leak detection and secondary leachate collection system. Two of them plus the ECM have a protection layer of the geomembrane, and again the most robust protection layer is in the ECM. You'll see three have a composite liner with compacted clay, one with a geosynthetic clay liner, and the ECM has both a geosynthetic clay liner and compacted clay.

So if there is a hole in the geomembrane, the potential for limiting leakage to a negligible amount is best by far with the ECM.

So the next question, of course, is how long will it last? And if we look at the key components in the barrier system, all with the exception of the geo membrane have natural analogues that have been around for millennia. The one that we need to spend most of our time talking about is therefore the geomembrane.

So how long will the geomembrane last? And the answer to that question depends in part on the geomembrane, the polymer and series of chemicals we call antioxidants and stabilizers added to protect the geomembrane.

It will also depend on the exposure conditions, the chemistry of the fluid in which it's going to be in contact and, very importantly, temperature. The expected temperature of the liner is about 6 degrees at the moment, but it is designed for 10 degrees.

So CNL commissioned Queen's and a colleague to perform a study of five different geomembranes from three different plants. Based on the data that came from that study, three survived the first screening, which was a very conservative screening, leaving two of them eliminated on a very conservative basis.

At 10°C, the one I'll call XTB, had an expected service life in excess of 2,000 years. In a worst case, taking very worst case assumptions of 1100 years and very good stress crack resistance. Another one was over 2,000 years even with its worst case and had very good stress crack resistance.

A third one under worst case scenario was at 670 years, still more than 550 that's needed. Its stress crack was still adequate for 550, but it wasn't as good as the others, so it was eliminated, leaving two primary candidate geomembranes for use.

So we have six lines of defence: Long travel time, contingency plan, monitoring. Then the primary engineered components, the secondary barrier system, the primary barrier system, which are most important during the operating period because once the waste is in place, the final cover is what will control what gets into the landfill and therefore what is either collected as leachate or what can potentially escape.

And the final cover is as good or better than those in the U.S., and let us not forget, it can always be repaired.

So good design is essential, and this is a very good design.  But that is sufficient for getting us to approval.  The next step is to build it.  And there you need excellent construction quality assurance to make sure that it's built with the correct materials and to ensure it is constructed in accordance with the design and specifications.

So in summary the system has a service life conservatively estimated to be in excess of 1,000 years, well in excess of the 550-year design life.

It has multiple levels of defense before you even consider the natural system, and is robust.

It will withstand a failure of any one of the components of the system without any impact on the environment.

So I'll pause there for questions.

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

Dr. Rowe. Let's go to Dr. Lacroix for questions please.

**MEMBER LACROIX:** Thank you so much, Professor Rowe, for your presentations and your submissions.

I was looking forward to meeting you in a sense that your submissions provided us with many -- you raise many questions that I never even thought about it.

So you shed some new light on the problem.

And most of my questions you've already answered.

But anyway, I will ask them so that the audience and the auditor -- not the auditor, but listeners, who didn't have a chance to read your submissions they will at least hear from you.

Some of these questions also have already been answered by CNL Yesterday, so I don't mean to be disrespectful to CNL, I just want to hear it from Professor Roe.

And the first question concerns the -- I guess it's document 68.

No, that's not the one. It's the suggested questions. Yes, the supplementary information, exactly.

Now, again, many intervenors still use the word "radioactive dump" or "nuclear dump", and once and for all what is the difference between a dump and a disposal facility?

**DR. ROWE:** Dumps were characterized by basically somebody wanting to get rid of waste and they found a convenient location.

A convenient location was generally a hole in the ground or a valley that could be filled up.

There was no engineered or minimal engineered design that went into them, in most cases none whatsoever.

There was very little control of waste in many of the old dumps.

So you had co-disposal of Altamera and fridges with barrels of hazardous waste.

And you had little or no engineering operation, so the person controlling the sight was the person driving the bulldozer.

And they figured out where things went and they covered it up, and it was and out of sight out of mind approach.

And of course we learned that doesn't work.

And that's really what got me into this business.

In 1978 when President Carter declared the first State of Emergency at Love Canal, Niagara Falls, I figured there had to be a better way of solving and dealing with waste.

And I spent the last 40-plus years trying to do so.

And that's what we've been able to achieve is a society that we now have properly engineered and proper operated facilities where waste is not randomly selected.

You have heard about the selection waste for this particular facility.

It's not randomly placed.

It's placed in an ordered and intentional manner to optimize the overall performance of the facility.

**MEMBER LACROIX:** Okay.

So people should no longer refer to the NSDF as a dump?

**DR. ROWE:** It is definitely not a dump.

**MEMBER LACROIX:** Okay. That is correct. The second question concerns again some intervenors think a concrete vault will be more resilient to earthquakes than the proposed NSDF. So I want to hear your opinion on this.

**DR. ROWE:** Yes, concrete is a brittle material.

It can crack on it's own even without any earthquake.

And I am sure many of you have been in buildings where you have seen that happen.

It is a porous material.

And because it is brittle it doesn't withstand an earthquake unless you put an awful lot of reinforcing steel in it, and even then it can still crack and the reinforcing steel can degrade.

And you have probably seen many bridges where that has happened.

And it is not a secure way of, in my opinion, for dealing with waste including in earthquakes. Whereas the geo-membrane is until it reaches the end of it's service life. At the end of it's service life it will crack and that is it's mode of failure.

But until you reach that point it is quite ductile.

And so there has been no record of any significant effect to line, and I'm talking about geo-membrane line landfills in California when they have had large earthquakes and they have gone over it very carefully.

**MEMBER LACROIX:** Okay.

Yesterday we had an intervenor who was concerned about the rupture of the bottom liner.

And he pretended that we could reach a point where we would have to excavate all the material, the waste, in order to correct the situation.

Have you ever seen such a situation in your career?

**DR. ROWE:** Well, geo-membranes can rupture.

As I have said before their ultimate failure mechanism is stress cracking. I've never heard of it or seen evidence of it occurring it in a landfill situation.

It can occur in ponds.

But, again, this is where mentioned a term called stress crack resistance is very important.

Some of the geo-membranes produced in the last century had quite low stress crack resistance and were prone to stress cracking.

And particularly if they are subjected to a lot of tension.

So in ponds when they get very cold that could induce the tension that could cause the cracking.

But the manufacturers changed that somewhere around 1995 or '97 and we now use a modified polymer that has a much higher stress crack resistance. And looking at the geo-membranes for this particular proposal it was one of the major considerations was the stress crack resistance and the other was anti-oxidants.

**MEMBER LACROIX:** And specifically to the NSDF, are you concerned about the thawing and the freezing of the membrane?

**DR. ROWE:** No.

**MEMBER LACROIX:** No.

**DR. ROWE:** I'm not concerned about it either in the base or in the cover.

In the base it will be covered up fairly quickly with waste.

But in the areas that are not going to be quickly covered they are putting in additional material to keep the geo-membrane from being.

And also the clay liners.

The clay liners are probably more susceptible, the compacted clay liner.

But if you put enough material on it, which is the intent, then you don't have a problem.

And the cover as you will notice is fairly thick.

And, again, the reason for that is to keep the frost penetration from the liner system.

Frost penetration and getting cold has all been considered in the design.

**MEMBER LACROIX:** You also mentioned in your submission, you show concern about the construction of the site, the deployment of the membrane itself to avoid ripples.

And I understand, but at the same time how do you deploy such a membrane without the factors of a ripple in it.

**DR. ROWE:** It's not a matter of deploying it without ripples, it's a matter of when you cover it.

Because this is a photograph of a geo-membrane on a cloudy November morning at our full-scale field test sight. And this is the same geo-membrane near midday.

Those ripples appear because the geo-membrane when it gets hot in the sun expands. And that extra material has to go somewhere, and so technically we call it buckling.

So these wrinkles or waves as somebody referred to them come because of the geo-heating of the membrane, and at night it will go back to that.

This shows you how wrinkling can increase during the day.

This is the landfill site in Barrie, Ontario.

And you can see after about 9:00 in the morning and 5:00 at night this black geo-membrane the wrinkles start to develop and there are more wrinkles but at night they go away again.

This geo-membrane is a white geo-membrane. The white reflects a lot of that heat. And our studies show it's about 20° cooler during the day.

And that reduces the amount of wrinkling because the wrinkling is directly related to the temperature of the geo-membrane.

And as it cools down so does the temperature where it's placed those wrinkles go away.

And they will come again the next day if the sun shines.

So it's a matter of being careful and placing the cover material.

It doesn't matter if the wrinkles are there before you cover it, but when the cover gets locked in -- don't want to lock in those wrinkles or a significant amount of wrinkles because if they get a hole that increases the potential for leakage.

If it gets a hole it doesn't matter but you don't wish to take the risk.

That is an important part of employee performance is making sure that the contractor is limited to when they can cover the geo-membrane.

**MEMBER LACROIX:** And when they expose the membrane, it's not just one membrane it's many membranes that are stitched together.

**DR. ROWE:** They are actually welded together.

**MEMBER LACROIX:** Oh, I see. Okay.

**DR. ROWE:** By what is called a dual-wedge welder.

And it actually does two parallel welds with an air gap in between them. That air gaps is used for testing the weld. You pressurize the air gap and make sure you an maintain the pressure and make sure that the two welds are intact.

That is, again, part of the quality control and quality assurance to make sure that the welds are in a welded state.

**MEMBER LACROIX:** I will pass it to my colleague.

I don't have any more questions.

Thank you very much.

**MEMBER MAHARAJ:** Thank you very much, Professor Rowe.

I just have two small follow ups to my colleague's questions.

You talk about the cover being repairable.

And that is something that should give us confidence if there is some concern it can be repaired over time or if there is some damage to it, over time it could be repaired.

And we spoke a little bit about whether the bottom liner could be repaired and I don't think I was clear as to if it was damaged some how could it be repaired?

**DR. ROWE:** The question is if it is damaged can it be repaired?

The answer is, yes.

Of course the practicality of doing that depends on when it is damaged. Most damage occurs during construction. And that is why I recommend and it is my understanding why CNL will implement leak detection surveys.

So there is a way of actually when the geo-membrane is put down and welded, checking that it's got no holes that are so small they would be undetectable.

When you put cover material top of it, that is another period where there is a risk there could be damage.

You can do another leak location survey, identify if there are any holes and go and fix them.

Most holes that are going to occur will occur during construction.

There are techniques, well proven, and they will identify it and fix them before you start putting any waste in place.

You also get a pretty good idea before you put your waste when you will get a heavy rainfall because a lot of water will come in, and will be able to check that the system is not leaking significantly at that point before you put waste in.

It's a large-scale location survey which I wouldn't recommend only relying on that.

But those ways you can detect and repair all, but the smallest, possible hole.

Something as smaller than a pin hole.

And even those can sometimes be detected but it depends on the circumstances.

You can easily get in and fix it.

If you have got a few meters of waste and you pick something up you can move the waste and fix it.

The more waste you have the more difficult it gets simply because you have got to move all the waste.

But you can always fix it if you can get to it.

**MEMBER MAHARAJ:** So why wouldn't the biggest risk of damage to the bottom liner be when you are actually putting the waste in?

I'm sort of picturing the last time I put a tarp down in a tent and I walked on it before I swept underneath very well and you are walking on little lumps.

You don't know it until you put weight on it.

**DR. ROWE:** I don't a full drawing of the facility in my slide deck here.

But it; has multiple layers above the geo-membrane.

I don't have a good drawing for it.

But the geo-membrane is there.

And they have a sand protection layer above that and that is to protect the geo-membrane from damage during construction and also subsequently.

And then it has got more layers above that.

So you have quite a substantial amount of material.

I'm not sure if someone can help me out with a figure that shows the entire cross section.

It's in my submission.

**MS. VICKERD:** Meggan Vickerd for the record.

CNL's part 1 so CMD 2020-H7-1.

We've two figures, figure 20 is the baseliner figure cross section.

**DR. ROWE:** Then there is the 200 mm thick sand protection layer. A womb and geo-textile separator, which is there for construction reasons. Then a 19 mm clear stone layer. 300 mm thick and that is the leeching collection drainage layer. Then a granular filter 300 mm thick.

So you've got 800 mm of soil above the geo-membrane before you get to the waste.

And all of that is providing protection to the geo-membrane.

So the risk is mostly when you place that stone layer if that was to do damage.

But that is why we have the 300 mm of sand to minimize the risk.

**MEMBER MAHARAJ:** It's 300 mm of sand.

**DR. ROWE:** 200 mm of sand. Eight inches.

**MEMBER MAHARAJ:** Thank you.

So eight inches.

And then were looking at a weight of a tonne coming in on top of it.

**DR. ROWE:** Well that's eight inches and then you have got 300 mm of stone and then another 300 mm of granular A which is a filter material you see on roads, for example, three, six and 200 is 800 mm of material and then they will be spreading the waste out so that it goes in layers in a progressive manner.

So the geo-membrane is quite able to support the stresses.

It's tensile stresses it doesn't like and the design is made to minimize tensile stresses.

**MEMBER MAHARAJ:** Okay.

My final question is your analysis of the amount of leeching that could leak through if there was a slit.

You have used an assumption of 100 $mm^2$ of a slit, and I think, if I have done my math correctly, if you are talking about a block is about a one-centimeter block, it's just little.

Why did you pick that size of a slit?

**DR. ROWE:** Well because studies of size of holes in geo-membranes finds that is the median sized hole you are likely to expect.

That is the probable size of a hole would be that size.

It could be in the form of a circular hole because a workman drops a tool and it could penetrate it.

And it could be a slit 100 mm long and 100 mm wide, that's a knife cut that has gone in it. Both of those are detectable with leak detection system.

But I used that as an example so I can compare the three different designs the two designs for municipal and hazardous waste with ACM and show much better performance.

Of course you can pick different sized holes and do a similar calculation, in fact I did to demonstrate the importance of limiting wrinkles, which is an important part of quality assurance.

**MEMBER MAHARAJ:** Okay.

So that 100 mm square is an industry assumption that you use often?

**DR. ROWE:** You commonly find that when people are doing their design that is a number that they go to.

That's why I picked it.

**MEMBER MAHARAJ:** Thank you very much.

That's been very helpful.

**THE PRESIDENT:** Dr. Rowe you showed us a comparison with five other facilities in the United States. Did you look at any in Europe by any chance?

**DR. ROWE:** I had a limited time for searching.

I comparable type of facility in Europe. I'm not saying they don't exist, but I've quite frankly found the easiest ones I could and did the comparison.

**THE PRESIDENT:** And based on Dr. Bart and the failure mechanism what is your thought about the ability to treat the waste?

**DR. ROWE:** I'm sorry?

**THE PRESIDENT:** The ability to treat the waste, you know, based on the leech rate.

Is that a feature that would be advisable to have for the NSDF.

**DR. ROWE:** I haven't thought about that.

It's not normal to do that.

I really haven't thought about it.

I want to think further about it before I give an answer.

**THE PRESIDENT:** If you think about it in the next few days and have a thought on it please do share it.

I appreciate that.

Thank you very much for showing up today and for your presentation.

And as you can see from the questions a high level of interest in what you had to say.

So thank you.

**DR. ROWE:** Thank you.

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

We'll move to the next presentation by Ms. Gabriellle Psotka as outlined in CMD's 22-H7.80 and 22-H7.80A.

Ms. Psotka, over to you, please.

**CMD 22-H7.80/22-H7.80A**

**Oral presentation by Gabrielle Psotka**

**MS. PSOTKA:** Gabrielle Psotka for the record. I work for CNL as a waste characterization specialist.

So these are the topics I'm going to cover today.

But first a little bit about my background as well as my involvement with the group NAYGN. Then I will talk about the characterization process and why I believe it is a robust process. And finally, make some concluding remarks.

A little bit about me.

That's a picture of me and my dogs in front of my house enjoying the Ottawa River.

I'm a resident of Deep River and I'm actually on one of the emergency routes to the site.

So I'm very close to the Chalk River site.

My background is in environmental engineering at the University of Guelph.

And I have been a waste characterization specialist since 2017.

And over those years I have supported a wide-range of characterization projects in Chalk River, at nuclear power demonstrations, Douglas Point ,and Gentilly.

As well, I'm the vice president of the NAYGN Chalk River chapter.

I will get into that in a moment.

A little bit about the North American Young Generation and Nuclear.

One of our pillars in our group is public information and we work very hard to be advocates for nuclear technology.

As an example, we go to high schools and elementary schools and try to teach children and teens about nuclear technology and what we do at CNL.

So I'm a huge advocate as well as the waste management we do at Chalk River.

A little bit about why this project is very important to me.

One, as I said, I live in the community and clean access to drinking water and the river is a huge importance to me.

Secondly, I'm interested in the long-term solutions for our liabilities.

I have seen our waste stacked many containers high, and this is not a long-term solution.

By definition of a metal container, containers corrode and this won't last ages.

We need a disposal facility we can't just store our low-level waste in containers.

Next with my characterization that I have executed over the years, I've seen a lot of contamination on the site and I believe there is a huge urgency to clean this up now.

And we can't continue our soil remediation activities without the NSDF.

We need a place to dispose of the low-level waste.

And finally, I'm very confident in the extensive safety studies that I have performed over the years.

Now a little bit about the waste characterization process.

I know there has been a lot of interventions and questioning about how the process works.

So I want to mention that all of our waste, including our legacy waste that has been packaged many years ago is characterized modern characterization approaches standards.

And I will go quickly over the flow chart here.

The first step is to assess our waste.

I will give an example of a water treatment plant at Chalk River that I characterized.

So this is looking into the history of the building where there are spills and active components stored in certain rooms.

Was there active piping?

And this is where we look into the history. And we collect scooping surveys.

These are basically non-intrusive checks where we might take dose rates and check for beta, gamma and alpha contamination to kind of get an idea of what we are dealing with in a facility we are decommissioning.

The next step is to develop a waste characterization plan.

And this follows the data quality objective process.

In here we determine how many samples we're going to take.

For instance, in this water treatment plant that I characterized we took samples of the roof, the concrete basins, to determine how far contamination traveled through, the floor tiles.

Pretty much any materials in the building we obtained samples for radiological and non-radiological for contaminants.

So we execute this characterization plan and then we write the waste characterization report.

And in this report we summarize the data analysis.

And that's where I would develop a waste fingerprint.

The waste fingerprint is determining the ratios between the easy to detect radionuclides and the difficult to measure radionuclides.

So, for instance, Caesium 137 is something we can easily see by gamma spectroscopy so we might ratio different difficult to measure like Technetium 99 to Caesium to determine the ratios.

And that's used for the final disposition of the waste.

And once we go into remediation.

This is when for instance in the building I characterized we actually removed a layer of the concrete because I determined how far the contamination traveled in the concrete so we sliced off that layer.

And finally I think the most important part of the characterization process is the verification of the waste once it's actually from a building.

And will go into that shortly.

And I want to mention that we followed the CSA N292 standards ISO Standards and IAEAS documents throughout this process.

Quickly I wanted to mention that some people might think we take a sample, we have the results, and we're done.

But actually characterization is actually iterative.

So we have our planning.

Our implementation of getting samples.

Our assessment and our decision making.

So in the building I characterized one of the systems, I got my samples, and I got the data back, and the data didn't align with what we thought it would do.

I had to go back and redo another way of sampling and get more samples to confirm.

So this shows this it is an iterative process and we want to make sure that we meet the waste criteria for the NSDF.

In terms of the verification of waste.

I wanted to outline that this year, for instance, is a gamma spectrometer we can use and this can point at packaged bins of waste.

And in these bins we can see the easy to measure gamma emitter, for instance, Caesium, Cobalt, Niobium and even Americium sometimes.

So this data can either help us one, confirm that waste can be cleared that we don't see any of these atherogenic radionuclides in the waste.

Or two, we can confirm that our samples that we took initially, align with final package of waste.

Because samples are kind of a representation of the whole building that we are characterizing.

So this is another verification that we do.

But I want to mention previously that waste was characterized by using hot spots on packaging.

We didn't use this technology.

And that was more for worker protection and storage and not for disposal.

And we need these processes to ensure that waste meets the waste acceptance criteria.

I wanted to briefly touch on the sort and segregation facility that we are operating.

As many intervenors had mentioned there's some legacy packages.

We do not have enough data on those packages and they will not go in the NSDF as is.

We need to characterize those packages to meet the newest waste acceptance criteria.

So as you can see in the photo here a worker actually took some wood out of the package and is surveying it.

What is interesting is we have found some clean waste, some low-level waste and some intermediate-level waste in these legacy packages we went through.

We are making sure to fill all of the gaps and characterization for both the radiological and the non-radiological components.

Now, in conclusion I'm very confident in our waste characterization process.

It's very robust.

It's iterative, as I mentioned before as in my example.

And we have a sort and segregation facility to deal with the issue of the legacy waste that has poor data much of which doesn't have non-radiological data and so we're fill the gaps.

I believe that we need to clean up the site urgently.

And we can leave this for future generations.

Here is a picture of the water treatment plant that I was involved with, and it was successfully decommissioned and the waste was segregated.

And with that I will ask if there are any questions on the waste characterization process.

**THE PRESIDENT:** Well, thank you very much for the presentation. And let's start with Ms. Maharaj.

**MEMBER MAHARAJ:** Thank you, Madam Velshi.

And thank you Ms. Psotka that was a fabulous presentation and very well done. We have heard a lot about waste characterization and we now understand exactly how that happens.

That is very helpful.

I have one question for you about the legacy waste.

When those packages are ultimately opened and it's either a good day or a bad day when you figure out what is in those packages.

What happens to the waste if it's able to be characterized if it's mixed waste.

Is it repacked in separate packages for different levels?

What is the process in that case?

**MS. PSOTKA:** Gabrielle Psotka for the record.

We open a waste package and let's say maybe in one section there was a hazardous constituent that was found, and maybe some of the other waste wasn't hazardous you would make sure to repackage that waste based on the acceptance criteria.

I'm not sure if that answers your question.

Basically we get our samples of the waste, we would send it to the lab.

We would get the results and then we would know how to disposition the waste afterwards.

**MEMBER MAHARAJ:** So is it possible then, with the legacy waste, in particular, where you don't have good information about it yet.

Let's say if you get a package and you open it up and this is mixed waste. You refer to there being -- sometimes you discover that there is some non-radioactive, some clean waste in there.

I think what I understand is that you take that bundle of material and segregate it and repackage it into the individual packages of waste.

Is that correct so far?

**MS. PSOTKA:** Correct.

**MEMBER MAHARAJ:** If you have a package of intermediate-level waste it would go into the intermediate waste storage, and if it's low-level waste it would go into the low-level storage until this NSDF is made, is that right?

**MS. PSOTKA:** Correct.

**MEMBER MAHARAJ:** So is that an activity currently an ongoing activity.

Is CNL at the place where it's investigating what this legacy waste that is in packages is and getting it ready to be put into the NSDF?

**MS. PSOTKA:** Yes.

So we've started the sort and segregation process. We're doing it sort of in sections.

We will work on a bunch of containers from similar storage areas that might have had similar history.

And so we kind of treat them --

**MEMBER MAHARAJ:** In bunches.

**MS. PSOTKA:** -- in bunches kind of based on the history.

For instance, if there was a few packages from NRX we would kind of treat those.

And we would also look at maybe in one package we found some radionuclides we would compare that to the next package and kind of see if they align and to understand to the waste variability that we were trying to understand.

**MEMBER MAHARAJ:** Thank you very much.

**THE PRESIDENT:** Dr. Lacroix, please.

**MEMBER LACROIX:** Thank you very much for your presentation. I just found out that the characterization process is an iterative.

It's like the delicencing process.

I find it interesting.

Speaking of characterizing, gamma emitters, I think it's quite straight forward but how do you characterize low-energy beta emitters?

**MS. PSOTKA:** Gabrielle Psotka for the record. We send it to the laboratory and they then do a destructive analysis on the sample and then that would give us a value.

Say, for instance, you are looking at Tritium.

Tritium you can't see by gamma spec.

So for those difficult to measure radionuclides we are looking at sending samples to accredited labs and analyze the results.

**MEMBER LACROIX:** Great.

Thank you.

**THE PRESIDENT:** Mrs. Psotka, I think that you have heard that one of the biggest recurring concern has been around the waste inventory and having a good handle of what that is.

So as you work on the characterization of legacy waste, what fraction of the legacy waste has been characterized to date and what kind of timeframe doesn't CNL have to get this done?

**MS. PSOTKA:** Gabrielle Psotka for the record.

In terms of the legacy waste I might have to go to my colleague Jerome Bezner to talk a little bit about that.

But I know there is the former data base from the 1990's that We are looking into and there was some buildings that were used for waste inventory.

For example, one of the 200 series buildings at Chalk River.

So we're using that data for the inventory.

One thing I would like to point out is that as I'm characterizing buildings I'm actually finding a lot of similarities between the ratio of radionuclides from different buildings.

A lot of the storage of radionuclides start from the same place.

And I'm finding the ratios are lining up between the different buildings.

We have a site-wide finger print or scaling factors.

And as we are developing this we are seeing new buildings as we characterize them if they align with this generic one that I'm developing.

This will help a safe sampling in the future as we're finding, like I said, the waste is very similar between the buildings.

With the only exception is if a certain facility had some sort of experiments with a fuel processing or something for sure that will have different ratios between radionuclides, but I'm finding a lot of them to be similar.

**THE PRESIDENT:** Ms. Vickered?

**MS. VICKERD:** Meggan Vickerd for the record.

So I don't have an exact percentage but to give you an idea the waste inventory data base that we were referencing in 1995 and the data in it is fairly good.

There are gaps which demonstrate we need to go back and collect more information before the waste can qualify for the NSDF.

The information before that there is information before, there is information but it's more vague.

There is a characterization information or fall of our waste, just some different levels of information.

For some of our earlier legacy waste we have done certainly sufficient scoping characterization, process knowledge or even, resurveys, or characterization in situ of waste.

We have talked about the very early waste management area.

We have done some preliminary characterization campaigns of waste in that area to have sufficient understanding of some forecast estimates of low-level waste that would be produced should that area be characterized.

But as Ms. Psotka outlined characterization is iterative.

We have scoping information at this point to confirm low-level waste forecast, but we would go back and do more detailed characterization as we recovered that legacy waste to see if it qualifies for NDSF or to confirm it qualifies for NDSF.

**THE PRESIDENT:** And what fraction of your waste is pre 1995 waste?

**MS. VICKERD:** I will have to get that information for you and bring it back after the break or first thing tomorrow.

I do know currently.

We have roughly 300,000 cubic meters already in storage.

I will get that information for you pre-1995 and post-1995.

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

With that let's take a break and be back at 3:40 p.m.

Thank you.

--- Upon recessing at 3:25 p.m. /
Suspension à 15 h 25

--- Upon resuming at 3:41 p.m. /
Reprise à 15 h 41

**THE PRESIDENT:** Is Ms. Gigantes on the line?

**MS. GIGANTES:** I am indeed!

**THE PRESIDENT:** Perfect, and we can hear you.

**MS. GIGANTES:** My headphones just arrived.

**THE PRESIDENT:** Perfect.

**MS. GIGANTES:** First time I've use them. So you want me to roar through it, eh?

**THE PRESIDENT:** You got it. Let's do it.

**MS. GIGANTES:** Okay.

**THE PRESIDENT:** Thank you.

**MS. GIGANTES:** Away I go. I'll put on my glasses.

From the start, in 2016 --

**THE PRESIDENT:** Oh! You don't need to do it from the start. Sorry.

No, we got through until when we asked you questions and then you had some comments.

**MS. GIGANTES:** Okay.

**THE PRESIDENT:** Right.

**MS. GIGANTES:** Okay.

Yeah, my comments were attached to CMD 22-H7. So CNSC waste tables from their report in January 2022. And I have it at page 56; that's the way I printed it out, I guess.

And there they report the elements that they're concerned about. Most of the first part of the table -- number 61, I believe it is -- is non-radioactive elements, and you will see that, in several cases, their target estimates of how much of each of the elements will be in the surface water after discharge, after treatment, there are several that don't meet standard. For example, iron, lead nitrate, phosphorous, selenium, silver sulphate, chromium, copper, barium, aluminum.

But most of those will not be discharged -- by estimates of staff -- won't be discharged as far as the Ottawa River. Some will, and that's noted.

Then, when we get to the radioactive elements, we get a notation that gross beta, which is that huge conglomerate, 'will be over discharge target, even after effluent discharge treatment."

And that is a concern because we don't know what's in that gross beta and it is -- for example, the discharge target was 5 -- and I don't know what the measurement is -- but the maximum rage of modelling result for surface water quality after treatment for the gross beta can go as high as 293. There is no indication where that would end up; for example, it's not like the non-radioactive elements where they measure whether it's likely to end up in the East Swamp weir or the Ottawa River. When it's the Ottawa River, it says "all." But whether you get to the radioactive elements of this section of the report, they don't indicate -- it's not available. It says:

> "Water body where effluent discharge is exceeded is not available."

And, you know, that's bothersome, in my view.

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

Let me turn to CNSC Staff to respond to

the concern, please.

**MS. MURTHY:** Thank you for repeating your question. Kavita Murthy for the record.

Ms. Velshi, we have Dr. Elias Dagher, who is joining us remotely today, who is standing by to provide the response.

So please go ahead, Dr. Dagher.

**DR. DAGHER:** Thank you, Ms. Murthy. Dr. Elias Dagher for the record.

We had provided a response earlier to this, and I will go ahead with it again and maybe provide some additional clarity.

One particular thing to note is the difference between effluent discharge target, what would actually be released in the effluent, and then the receiving environment. So those are three things that should be considered as separately.

So the effluent discharge target, they're like design targets so they're established using very protective guidelines. The receiving water guidelines. So for non-radioactive nuclides, so hazardous substances, they're based on very protective protection of aquatic life, CCME Water Quality Guidelines for protection of -- for releases of radionuclides, so nuclear substances, they're based on meeting the most restrictive of either drinking water quality guidelines for protection of human health or a radiation dose benchmark for the protection of aquatic life. So those are the effluent discharge targets and they're quite stringent and it doesn't mean that the effluent is going to be released at those levels.

You see the maximum predicted wastewater concentrations before treatment. So those are before -- those levels represent maximum estimated levels that would occur before treatment of the wastewater treatment plant. So there will be treatment for a majority of those and they would be lower during the operational period than what's actually there. So it kinds of provides a bounding scenario of what those maximum effluent concentration levels would be before treatment.

The third column there, so the maximum range of modelling results for surface water quality after treatment. So you mentioned those. That's actually the receiving environment. So those are what are the concentrations in the receiving environment. It's not what the concentrations that are going to be released necessarily from the effluent discharge to there. So the effluent that's going to be released has to be lower than those effluent discharge targets.

When we see numbers for parameters in that column of the maximum range of modelling results that exceed the effluent discharge target, that's because there's already background concentrations that exist that are higher than in the effluent. So those are not a contribution from the NSDF wastewater treatment plant.

Does that help clarify?

**MS. GIGANTES:** I think I understood all that before. But what you're telling me is that we're adding to an existing mess. We're adding.

> "The maximum range of modelling results for surface water quality after treatment."

And we don't know where that column is going to end up because in the radiological part of the table: "The water body where effluent discharge limit is exceeded is not available."

That's not true when we get -- when we're dealing with the normal mineral contributions of the effluent where there is an estimation of where most of those will end up, and some of them will end up as far as into the Ottawa River, and those are a concern to me.

**DR. DAGHER:** So Dr. Elias Dagher for the record.

So what you're seeing -- so I will defer -- I will provide a short response and then I will defer to CNL to provide an additional response on the "Not

Applicables" that are in that column, because primarily this comes from the EIS submission so it's in CNL's EIS report.

So the main aspects from this are that the receiving environment water body, so that's the Ottawa River and different areas, where you see those exceedences, those are going to come from background -- natural elevated background. Some of it may be natural, some of it may be from other activities that may be occurring within the Ottawa River upstream or downstream. The main point, though, is that there is no contribution from the NSDF facility on the impacts of that --

**MS. GIGANTES:** But there's no benefit to the treatment by the facility of the waste that's going to be discharged.

**DR. DAGHER:** So the waste that is discharged is being treated to the best available technology, economically achievable. So any of the leachate that is being collected from the ECM is being treated to extremely low levels. You're talking about levels that are below drinking water quality and below CCME guidelines for protection of aquatic life in the receiving environment.

**MS. GIGANTES:** That's not how I read those tables, you'll forgive me for saying.

**THE PRESIDENT:** Let me ask CNL on the "Not Available" question, please.

**MS. VICKERD:** Meggan Vickerd for the record.

Mr. Dolinar, our Director of Environmental Protection, will take this.

**MR. DOLINAR:** George Dolinar for the record.

I'll explain a couple of things about the table. Some of this is -- I'll try to word it differently from earlier today instead of just repeating things.

The vast majority of the non-radiological items listed in this table, the first 20 columns or 20 rows or so, 25, are non-radiologicals.

If we go through the table and the way it's presented here, existing baseline concentration refers to what we'll see in the environment currently. So this is naturally occurring. This is not as a result of our activities.

The first item in the first row in the table is aluminum, so I went through that briefly. We see aluminum in terms of concentrations in the natural environment up to 600 micrograms/litre. Our effluent discharge target is less than a tenth of that, so 50 micrograms/litre. So we will have no impact based on the natural presence of aluminum in the environment, is sort of the intention of what's presented there.

N/A means "Not Applicable," because the discharge criteria is not exceeded in any of the receiving waters downstream from the discharge area.

I can go through another one of these potentially, but tritium is maybe one where there's a lot of interest. So tritium we expect the maximum predicted concentration of tritium in the leachate collected from the NSDF is 140,000 Becquerels/litre. The effluent from the treatment system in terms of the catchment area for the Perch Lake basin, the flow from the leachate treatment system is less than 1 percent, it's like 0.6 percent of the overall flow in that watershed or the Perch Lake basin. So although those concentrations are significant, from a measurement point of view they're orders of magnitude below any impact to -- at that level they're orders of magnitude below any impact to aquatic species in Perch Lake, and that's at the point of discharge. So once it enters the lake, there's assimilation and the way we drop by orders of magnitude again. I also want to point out just for the record perhaps that in all of these instances, tritium included, when it comes to protection of the Ottawa River water quality, there are no thresholds that are exceeded for drinking water. We don't even get close to any thresholds of drinking water concern.

The overall conclusion for all aspects of the EIS is there are no significant adverse environmental impacts associated with this proposed facility. This is true for the wastewater treatment facility which operates for 50, 55 years or so. So a small fraction of the overall NSDF lifetime. No impacts associated with the effluent from this facility.

**THE PRESIDENT:** Thank you for that.

**MS. GIGANTES:** Thank you.

**THE PRESIDENT:** I did have a question from Ms. Gigantes' intervention. It's to CNL. One of the comments made is that after you did your alternative means assessment, the disposal method that was selected is the cheapest. Is that factually correct?

**MS. VICKERD:** Meggan Vickerd for the record.

Compared to alternatives -- I guess status quo would actually probably be the cheapest. Compared to geologic disposal, yes, that would be an accurate reflection, but that does not mean that it's not appropriate nor safe for this application --

**THE PRESIDENT:** I just wanted to make sure that that was factually correct. So thank you for that. Ms. Gigantes, thank you for taking the time to join us.

**MS. GIGANTES:** Thank you. I appreciate it. Bye now.

**THE PRESIDENT:** Bye-bye.

We'll move to our next presentation, which is by Ms. Georgina Bartos as outlined in CMD 22-H7.84 and Ms. Bartos is joining us virtually. So Ms. Bartos, over to you, please.

**CMD 22-H7.84**

**Oral Presentation by Georgina Bartos**

**MS. BARTOS:** Hi. As a cottager for over 70 years, 10 kilometres downriver from CNL, in a place of greatest beauty, I shudder at the thought of an above-ground facility for nuclear waste so close to the Ottawa River, Canada's capital, and Montréal.

In spite of all the technical, scientific, and practical rationale, it makes no common sense to me. Wouldn't it be safer to bury nuclear waste far from the river, even if it's less convenient and costs more? How can we possibly be confident of this NSDF protection 50 or hundreds of years in the future? Our world is changing. Land changes over time, as do water levels and climate. What if we have a regime change or an enemy targets CNL land with a missile or a bunker-buster bomb? What if we become depopulated or experience a geologic, astrological or climatic event, not to mention fires, terrorists, scavengers, and mechanical failure. We need our waste more permanently disposed of, away from water.

In 1943, after Canada signed on to the World War II atomic bomb program, a reactor was constructed at Chalk River. In the next decade, two nuclear accidents produced large amounts of waste and excess exposure to radiation for populations downstream. We will never know the full extent of disease or birth defects. These have not been tracked or recorded over time.

No known water treatment can remove all contaminants that may flow from the proposed NSDF into Perch Lake and eventually into the Ottawa River.

Most of us have already been impacted by nuclear tests in the U.S., nuclear accidents far and near, air travel, microwaves, and helpful medical radiation like X-rays, but why add to it, even a little bit?

Will another nearby NSDF be planned as nuclear waste continues to be produced? Is this a gradual, almost undetectable catastrophe that will sneak up on our children, grandkids and descendants for thousands of years? Will CNL provide all Valley residents with wearable radiation detection devices that track over time?

According to the IAEA, all ionizing

radiation is harmful above natural levels. Something wrong here.

In the '80s, three college neighbours, including me, were diagnosed with thyroid cancer. My specialist told me there had been a 20 percent increase in Ottawa cases. When I tried to locate more information, these facts were no longer to be found. Why is there still such secrecy surrounding the dangers of uranium mining reactors and nuclear accidents?

I don't hear anyone chatting on the bus about the contents of the proposed NSDF or the increased tritium levels all over Canada since the advent of CANDU reactors, nor do I hear about Canada lowering its allowable tritium levels that are many times higher than other countries. Tritium cannot be removed from NSDF effluent, and only less than half would decay before reaching the Ottawa River. Something wrong here.

One reason Chalk River was chosen in the '40s for a reactor site was its isolation. Now all communities have expanded along the river, as has cottage country. Even the Islands that my childhood friends and I used to call our own have cottages on them or are used by the Old Fort William Cottagers' Association as recreational islands. As the population grows, so does CNL.

An NSDF and SMR are planned. These two

growth trends directly oppose each other. Something wrong here.

My oldest and dearest cottage friend Sally was awkward, dyslexic and a little slow. Reading was a chore she did every day before we could go out canoeing, exploring or reading in our treehouse. Her parents from Ohio built their cottage on the river. Several years before, we built next door in 1953. They spent four months there each year. Sally and her family fished in Chalk Bay every summer, across Thunderbird Bridge and fished in Sturgeon lake. They cooked lots of fish every summer and took frozen fish home with them to keep for the winter.

They hammered a pipe and dry point into the sand in front of their cottage and screwed a pump on top, painting it red. They drank water from the river, filtered through sand. We all had similar wells. Yes, we knew about the nuclear plant just upriver, but we didn't know that nuclear waste sneaks into your body without you knowing, waste that cannot be seen, heard are or tasted. We didn't know about the nuclear waste buried in trenches and leaching into the Ottawa River. We didn't know about the nuclear accidents in the '50s or take precautions. We didn't know about tritium leaks later. We trusted the seemingly pristine environment.

Sally was diagnosed with leukemia. Later, she developed bone cancer, brain cancer, and Hodgkin's disease. Her father had prostate and liver cancer and mother ovarian cancer. Their grandson in a nearby cottage died of pancreatic cancer and his wife thyroid and ovarian cancer. She was a young woman. This is a familiar story all down the river.

Every summer, we hear planes from Petawawa military grounds flying high and low above the pines, carrying military personnel on training flights. We hear explosions that shake the ground and have cracked our windows and dishes in the past. We have found live ammunition on our beach and at our tent shredded by a helicopter. Accidents happen.

In our present volatile world, with threat of war and even nuclear war, an above-ground NSDF makes no sense. In an attack, the enemy first targets airports and the military. Could CNL get hit by a miss on Petawawa? Isn't a CANDU reactor, SMR or NSDF vulnerable to severe damage, accidental or planned?

My 4-year-old neighbour put this in perspective. He said: "Whoever heard of putting poisoned stuff in a container on a hill with water all around? Water goes downhill. That's crazy."

No one knows how to build anything strong enough to last forever.

Thanks.

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

We'll start with Ms. Maharaj with questions, please.

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you, Ms. Bartos, for your presentation. You obviously have a great passion for where you live and for the Ottawa River.

I don't have any specific questions for you today. Thank you.

**THE PRESIDENT:** Thank you. Dr. Lacroix?

**MEMBER LACROIX:** Thank you for your presentation. No, I don't have any questions.

**THE PRESIDENT:** Thank you. Thank you very much for your intervention and for a very heartfelt presentation. Thank you. Much appreciated.

**MS. BARTOS:** Thanks.

**THE PRESIDENT:** We'll move to our next presentation, which is by Northwatch as outlined in CMD H7.138, 138A, and 138B, and we have got Ms. Brennain Lloyd making the presentation.

Ms. Lloyd, over to you, please.

**CMD 22-H7.138/22-H7.138A/22-H7-138B**

**Oral Presentation by Northwatch**

**MS. LLOYD:** Thank you very much, President Velshi and Members of the Commission.

My name Brennain Lloyd and I am presenting today on behalf of Northwatch. We're a regional environmental non-government organization in northeastern Ontario, so our members reside in Robinson-Huron, Robinson-Superior, Anishinaabe Aski Nation territory and in the unceded Algonquin territories of the Temiskaming Ottawa Valley.

I'm joined I hope by Zoom by Emily Han from Hutchinson Environmental Sciences and was also assisted in this intervention by Dr. Marvin Reznikoff from Radioactive Waste Management Associates, and Dr. Reznikoff would welcome questions in follow-up.

So it's been a long five years but a very short 10 minutes, so I want to be very efficient with our limited time, so I'm going to limit myself to just a few observations about the review process, and I'll note that there's been no role, no public comment opportunity since 2017 when we commented on the draft EIS. And I -- you know, it's understated to say that I was surprised to be limited to 10 minutes for Northwatch's three reports, three presentations.

Standard expectations in a federal environmental assessment review process are written information request process, presentation time assigned per topic, opportunities to ask questions during the hearing, an active registry, next-day transcripts, and assigning of undertakings, and we don't see that in this environmental assessment review. I understand you're conflating it with a licensing review, but I think those absences are problematic.

Oh. Did I just put it the wrong way? I seem to have -- my time is going by and my slides are not.

Now we're moving.

So comments from our general submission on the CNL Near Surface Disposal Facility. I'm going to focus just in two areas that follow on discussions that have been very active the last few days in this hearing. The first is around monitoring and I think closely related to that are the issues around contingency planning and retrievability.

As we set out in our submission, it's Northwatch's view that the purpose of monitoring is to determine if a facility or a method or a practice are performing as per expectation and are protecting the environment and human health.

A robust monitoring program -- and I'm not persuaded that we do have a robust monitoring program set out by CNL for this facility, for this project -- but a robust monitoring program will have a feedback loop, and that feedback loop will drive to contingency plans, to additional mitigation measures, and somewhere in that mix we've had a lot of discussion about retrievability. Somewhere along that continuum we would expect that retrievability would be an option. These are all moving parts. They have to fit together. They have to be purposeful. We don't see that. We don't see a robust monitoring program. We don't see transparency and disclosure around monitoring results. And I think it was yesterday -- the days are combining -- but I think it was yesterday, Commissioner Maharaj, you asked CNL if it would be would be possible to retrieve the waste, and CNL said not anticipated but not impossible.

There's a big distance between not impossible and having a plan, being purposeful, having some contingency measures that are set out, having some thresholds that say performance, when it's this much off, we're going to do something different. And we don't see that. So there's not a robust monitoring program and there isn't that follow-up feedback loop that leads to action which would be protective.

The second area I want to follow up from the last few days' discussion is around alternative means, and this includes both alternative sites, examination of alternative sites, and alternative designs. And I think we've been -- you know, these two parts of the same conversation have I think been interlocking over the last few days.

Intervenors have pressed on these issues, both alternative sites -- the site selection process, alternative designs, and I think the theme of CNL's response has been along the lines of: This is a step. It's better than the status quo. But this is not a step, this is the step. This is a 300-year step, according to CNL's proposal. So there's a continuum from, you know, slightly better to doing the very best, and I think that it is your job as the Commission to make sure that this project lands, or any project that comes before you, land as far as you can drive it towards very best.

And I'll give you an analogy. If I'm caught out in the rain and I have an umbrella, that is better than the status quo. If the status quo was me without an umbrella, that's better. But a tent would be better yet. And a snug house would be best. And I would say that you need to drive CNL to a snug house standard. An umbrella is not what you should approve.

And in terms of an EA decision, "unlikely to cause environmental harm" is not the same as "It'll cause less harm than if we didn't do anything at all." So I think in terms of your decision on the environmental assessment, it's not enough to just say, "Well, they did something." It is different than the "No, do nothing" approach.

Again, Commissioner Maharaj, I appreciated you raising the cautionary principle yesterday and discussing it in terms of is it least impactful or is it just meeting a threshold? And I think you need to drive again the snug house standard is the least impactful approach to managing these wastes.

The comparative sites that was undertaken, comparative site study undertaken by Dr. Marvin Reznikoff, in the draft EIS and final EIS, CNL presented an overlapping shortlist of sites. And in those documents, they said that the presentation was because they demonstrated the effectiveness of the approach.

This morning, CNEA positioned it slightly differently and said it was a lessons learned, that they looked at these sites for lessons learned. And I'd like to know what lessons were learned and how those lessons were applied to their proposal. How did their proposal change because of the lessons they learned from looking at these sites?

Dr. Reznikoff looked at three of these sites and what we learned from reading his report is Oak Ridge had an impact on Bear Creek, a very definite impact. It was insufficient in its design. It didn't have the water storage capacity, and there was wildcard decision-making on the part of the subcontractor. Hanford, the pump stopped for seven months before it was noted. There was a falsification of records, the compaction records. This drove me to go back to the EIS and look at the references to compaction. I saw nothing in the EIS. Maybe it's elsewhere. I saw nothing in the EIS that told me that we were protected from any different outcome necessarily at this project, and there was authorization creep at Hanford -- size, waste categories, you know, including effluent being used as dust suppressant. So there's real effluent creep. What did the CNSC learn from looking at these in terms of halting that authorization creep? Will the project you approve be the project that is delivered over time?

And then at Frenald, we saw citizens engaged in decision-making, not just webinars. We saw that the project was -- you know, I think we have to credit some of that project's success to the fact that it was post-operation. They were no longer generating waste. And there was a real emphasis on recordkeeping and making those records transparent.

So I'd like -- you know, I'd like to know how CNE applied those licences, how AECL has considered the weaknesses those examples uncovered in the GoCo model, in the government-own-contractor-operated model, because there were certainly some weaknesses revealed, and how has CNSC strengthened your oversight mechanism to avoid replication of some of those unfortunate developments?

In terms of the Waste Acceptance Criteria, Emily Han from Hutchinson reviewed this area and identified three areas, three problematic areas: Uncertainty in communications in the licensing document. Some information, important information, things like landfill gas, groundwater monitoring may not have been fully considered from an environmental perspective. And there were differences in approach from International Waste Acceptance Criteria, things like considerations for particle and radionuclides suspension and leak detection protocols. Important items.

In terms of questions, I'm going to limit myself to four questions that come out of the areas we've just discussed, and I would encourage you to ask: How has CNL's Near Surface Design Facility, design operational plans, been improved upon by the lessons learned?

Number 2, what mechanisms are in place, for example in the Licensing Condition Handbook, to protect against the lack of oversight and related operational failures that Dr. Reznikoff's study identified?

Clearly and in detail can CNL describe the monitoring regime, the feedback loop to operational decisions, such as retrieval, additional mitigation measures, changes in operational protocols, and so on?

And can CNL clearly describe how waste will be characterized, how recordkeeping will be undertaken, how those records will be made publicly available, fully publicly available, not annual summaries, not aggregations, not averages. Fully publicly available, including available for third party review. And what are the related contingency plans when and if unexpected volumes fail to meet the Waste Acceptance Criteria?

Starting on some questions.

In conclusion, we will be providing final comments. We will base our review on evidence to date and what continues to be disclosed and discussed in the last remaining days of the hearing.

But I wanted to touch on one additional issue, and that is this issue of abandonment. It's section 4 of the *Nuclear Safety Control Act*, it's a licensing stage, and there was some reference today to it becoming emotional. And I would suggest to you that if emotions are being attached to the term, my observation it's the licensee and CNSC staff that are doing the emoting. I don't think the Intervenors are doing the emoting. We're referring to a licensing stage.

The Near Surface Disposal Facility has been described as disposal, but then CNL wants to back away and make it as if it's not final. They don't want to say that there will be a licence to abandon. But that is the last licence stage, and I think you need to get fair and square and upfront with CNL: Is this a disposal project or is it a storage project? And if it's a disposal project, then I think that we can assume they will go through all the licensing stages, including a licence to abandon. And that's not emotional on my part. That's recognizing that there are a number of licensing stages. And that's the last one. Thank you.

**THE PRESIDENT:** Thank you, Ms. Lloyd.

Let me turn to Ms. Maharaj to start the questions, please.

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you for your presentation.

I'd like to start with the waste characterization question that you asked. We had a presentation about the process of waste characterization by an Intervenor right before the break, and I'd like to bring that back to CNL and ask you to provide more detail around the process of waste characterization for the different categories of waste that you're going to be bringing into the facility. So there's the legacy waste, there's the construction waste -- I'm talking about sources here, not levels. So there's the legacy, there's the construction, there's the soil remediation that we heard from Ms. Psotka. Are there different mechanisms for characterizing those different sources of waste before they're in place, or is the process of characterization the same regardless of source?

**MS. VICKERD:** Meggan Vickerd for the record.

So the characterization process is the same regardless of the source. There may be different types of information available depending on where the waste is coming from. For example, in the first step of the process, knowledge, you know, and we have an existing building. We have a plethora of information we can pull from, from environmental monitoring or emission monitoring that was done, that building, the waste that was generated from that building during its operation, it's records and logs of its operation. So when we -- so that's an example. Like there's just different types of information at each of those stages.

The waste characterization process presented is captured as a standard within our waste management function that is applied to all of our operations who are going to generate waste. It's the same process regardless of the source.

**MEMBER MAHARAJ:** I think we spoke a little bit about this earlier in the morning, and if you can just please confirm. The results of the waste characterization and any of the monitoring programs, those results I believe I heard you say will be made available as frequently as practical, not necessarily daily but maybe quarterly or annually depending on the type of reporting. Is that where you're at?

**MS. VICKERD:** Meggan Vickerd for the record.

I'll defer the environmental monitoring reporting to Mr. Dolinar, but with respect to -the waste inventory is something that CNL is required to report on in our annual compliance monitoring report and the CNSC does identify the types of information that we're required to report on. We've also identified that prescribed information in the waste acceptance document that CNL has submitted to CNSC staff as well. So there's identified what information we will report on for inventory being placed into the facility.

And to Mr. Dolinar for environmental monitoring.

**MEMBER MAHARAJ:** Please.

**MR. DOLINAR:** George Dolinar for the record.

So annually we produce two reports, so give an indication of what we intend to do for NSDF as well. But annually we currently produce two reports for the Chalk River site: One is around effluent characteristics, end of pipe, end of stack kind of reporting, and we also produce a second report called environmental monitoring which looks at various receiving media, like surface water -- you know, the Ottawa River is part of that, air, vegetation, it includes foodstuffs that I mentioned earlier, it includes even to some degree game animals on a limited basis. All of this information that we gather through these monitoring efforts is contained in these two monitoring reports. We summarize things. We're often criticized with producing too much information, so we try to summarize things to make it simpler to understand sort of the key results. But all the data that we collect is available in those reports.

I think it's worthwhile mentioning, you know, quite specifically that for the NSDF we have an environmental assessment monitoring follow-up program. It includes all phases of the project, so including construction. You know, at the first start of tree-clearing, we would begin looking at dust emissions and so on. Throughout the construction phase, people are concerned with sediment. All of that is monitored, monitored from both a site inspection point of view as well as looking at receiving areas, you know, right through operation and then into closure.

There are action levels and for maybe people unfamiliar with action levels, action levels are thresholds that are determined that beyond which we would be reporting immediately to the CNSC that something is sort of outside the normal operating envelope. We would trigger an investigation as a result of an action level exceedance. I should mention that internally we set some thresholds below actions levels. We will start investigations before they get to the point where they'd be reported to the CNSC. This is the kind of thing that we discuss regularly at venues like the Environmental Stewardship Council, for an example. We don't hide these things, my personal view, but it's shared across the company, is, you know, if you can share information regarding what led to this occurrence, you can improve, you know, your processes, your behaviours to maybe prevent the next event or something like that. So we share these results. We have mechanisms for sharing these in realtime throughout the organization.

So lots of information is available on the environmental assessment sort of topic. We're prepared to and intend to share that information as much as possible, and as you can tell, I'm happy to talk about it, maybe more than people want to hear.

Anyway, I'll park it there for now.

**MEMBER MAHARAJ:** Just one short follow-up question. You indicated that you provide an annual summary of environmental monitoring information and the Intervenor specifically said that summaries aren't necessarily meeting her needs or her wants.

Is there a mechanism or a process by which an interested person can get more detailed information if they want to understand the data that went behind the summary?

**MR. DOLINAR:** Yeah, George Dolinar for the record.

So we have certainly done that, whether there's been specific interest. I can point to like an earlier Intervenor I think in day one was the City of Ottawa. Ian Douglas, for example, had a request for specific data from the Chalk River site which he was aware that we were collecting. So we're happy to share that information.

The only caveat I would put with that is sharing raw information sometimes can be misleading. I don't like the idea of just sharing like a table of numbers without context, without explanation because they can be misinterpreted.

So in the case of the City of Ottawa, that sort of part of it is largely removed. You're handing it off to somebody who is, you know, is accustomed to processing this kind of information. But with other potential receivers of this information, I just want to put that caveat in there, that sometimes some level of context is important to put along with that.

**MEMBER MAHARAJ:** Thank you.

**THE PRESIDENT:** Thank you. Dr. Lacroix?

**MEMBER LACROIX:** Thank you very much, Mrs. Lloyd, for your presentation.

And correct me if I'm wrong, but you seem to put into question the robustness, the transparency, and the feedback of the CNSC monitoring program. So I would like to see if they could comment on this.

Did you mention this --

**MS. LLOYD:** Sorry. Did you say CNSC's monitoring program or CNL's?

**MEMBER LACROIX:** CNL. Sorry. I was not sure.

**MS. LLOYD:** I could have commented on --

**MEMBER LACROIX:** No, that's okay. That's all right. I wasn't sure. It's CNL.

Yeah, let me redirect the question. So I would like to hear from you guys, CNL, do you feel that your program is not robust enough, not transparent enough, and the feedback -- I guess the feedback is the key question here.

**MR. BOYLE:** So Phil Boyle for the record.

I would just say that what you just heard from George Dolinar I think is a good description of certainly how we want to run the program and how we think we are running it. It doesn't mean that everybody sees the transparency the same way. Perhaps we haven't had enough interaction. So that certainly is a potential here that needs some more investigation.

But from our perspective, we certainly think the program is robust. We certainly have the attitude that we want to share and have people understand it. We do have the concern that Mr. Dolinar mentioned of a lot of data that doesn't have context and can be misunderstood and perhaps that becomes the story before it becomes understood and then it's very hard to get people to understand the actual thing. So we want to sit down with people and talk them through and that takes some amount of time, but the general position would be that we're quite comfortable with it.

But if you would allow me, I'd like to pass this to Pat Quinn, our Communications Director, who might be able to say more. Thank you.

**MR. QUINN:** Good afternoon. Pat Quinn, Corporate Communications.

With respect to sharing information, of course, we are open and transparent. People can access information through our website, make requests of Corporate Communications for specific reports or documentation, and in particular with Northwatch, Ms. Lloyd and I actually do exchange emails and information. So Ms. Lloyd knows that she can contact me or my department and then I'll reach into the organization. So if there's something on performance reporting, Mr. Dolinar is most definitely a go-to resource for me and I bring these folks together.

**MEMBER LACROIX:** Speaking of the communication with Northwatch, I was reading in your supplementary information, document CMD H7.1B, on page 23 of 25, in table 2, it says that Northwatch did not meet with CNL offer to discuss the 2019 revised draft EIS. And I was a bit disconcerted by this comment. Could you -- any? Mrs. Lloyd?

**MS. LLOYD:** As I recall, and I don't -- you know, let me tell you what I recall of that. CNL offering to meet to discuss the draft EIS after they had already submitted their revised EIS. So what was the purpose of that engagement? They've already submitted their revised EIS and they want to meet to discuss our comments from 2017. Frankly, I just didn't see the utility in that kind of meeting. I'm always happy to go on a road trip, but I didn't really see the purpose, in all honesty.

**MEMBER LACROIX:** CNL response?

**MS. VICKERD:** Meggan Vickerd for the record.

We have recognized we've had a significant number of comments on the 2017 draft EIS, so once we submitted a revised draft EIS that we believe addressed a number of the comments, we hadn't yet submitted formal responses that you see posted now on the IA website to the public's comments and how we incorporate them into the EIS. So we offered it as an opportunity to a number of Intervenors one-on-one meeting to discuss the comment and how it's been incorporated into the revised draft EIS as a mechanism for informal engagement as to what had changed in the EIS.

**MEMBER LACROIX:** Thank you. Yes, please.

**MS. LLOYD:** If I could, Commissioner

Lacroix? But the point is, it might have affected their record of how they responded to comments, but it wasn't going to affect their project. It wasn't going to affect their revised EIS.

So, you know, for me it's secondary whether it, you know, assists them in their documentation. I want it to affect the project. That didn't seem to have any potential from that meeting.

**MEMBER LACROIX:** I understand your concern about the feedback. That's right. I understand. Thank you very much.

Yes, please.

**MS. VICKERD:** Meggan Vickerd, for the record.

The 2019 was still a draft, so there is still an opportunity to provide feedback into a final version of the EIS. So if we did not make that clear to the intervenor, certainly that is an improvement of communication we can make.

**MS. LLOYD:** But the draft that had been submitted to the CNSC, in my understanding, it was draft only because CNSC was doing another round of assessment for sufficiency. So my understanding is that CNL would have hoped that at that time it was their final EIS. It was draft because CNSC hadn't completed their review, not because you were waiting to hear from us again on it. True?

**THE PRESIDENT:** Okay. Well, we will -- I think the messaging here is there is clearly room for improvement in communications on what the expectations are and I can see why you decided what you did. It wasn't worth your time if you weren't going to be able to influence the outcome.

One of the other potential questions that Ms. Lloyd has suggested the Commission ask both CNL and the CNSC is around the comparative sites analysis done as you did your benchmarking, in particular the three low-level disposal facilities in the United States that are in RWMA's report and what lessons did you learn and what have you incorporated in the NSDF project as a result of that.

Why don't we start with CNL and then we will move to CNSC staff to get some details around lessons learned.

**MS. VICKERD:** Meggan Vickerd, for the record.

So I will provide a couple of examples of what we took away for lessons learned specific to some of the facilities mentioned in this comparative analysis.

Specifically from Oakridge, we did take a look at their operation and they -- one of the lessons learned we took away from that was the need for a sacrificial liner as you are filling a cell. So we do have that incorporated into our design and that was an example of the lessons learned we took away from Oakridge and incorporated into the project.

From Hanford, Hanford is a very arid site compared to our climate and location, but certainly we took away from that the importance of dust mitigation and so NSDF, specifically during construction and during operation, we have dust mitigation plans prepared or going to be prepared.

With respect to -- I'm just trying to remember which facility had the water management problem. Okay. So Oakridge -- a number of actually, I would say, near surface facilities do share with us the lessons of water management. We took that away actually as a lesson learned from our own operation at Port Hope and Port Granby and so with that we did ensure that the design basis for our water management took into consideration very extreme events and certainly I can go to Mr. Mark Luckett to expand on that if you want more details as to what that looked like from a design basis.

**THE PRESIDENT:** Not particularly, but I was -- you know, of the three projects the one that was kind of the most successful was the Fernald facility -- at least in this report that has been submitted -- showed some attributes that made it successful and I just wondered if some of those were lessons that you had incorporated.

**MS. VICKERD:** Meggan Vickerd, for the record.

So when we are looking at these facilities we look at it from a design basis planning perspective. The framework within the U.S. and the framework within Canada is different in the processes we follow. We recognize that they certainly have specifically good practices from a communication engagement and certainly we believe that there are examples where we have certainly exceeded some areas of public engagement and communication and we can certainly provide some examples if you would like us to.

**THE PRESIDENT:** Thank you. I mean that was the one I was particularly interested in, because it was the citizen engagement that was highlighted.

And then maybe to CNSC, because there seemed to be a lot of lessons around oversight and what could be done differently and better.

**MS. MURTHY:** Kavita Murthy, for the record.

So just as Ms. Vickerd has said, the regulatory framework within which the U.S. DOE sites are regulated is very different from the CNSC. We are an independent regulator, DOE self-regulates, so there is a difference.

But beyond that, CNSC is part of a number of forums, including the IAEA's forum on the Safety of Near Surface Disposal Facilities. This forum targets policymakers, regulators, operators' safety case at present and a lot of very, very detailed technical meetings take place where specific regulatory experiences and methodologies used for safety assessments are discussed over the course of a week. There is actually one meeting that I attended in which there was a specific forum on communication.

There are technical meetings that we have with U.S. operators and the regulators and technical exchanges that we do in terms of meeting with them, talking about specific projects, and Fernald is definitely one of the ones that I have heard discussed, and even in those there are specific sessions or roundtable discussions on communication strategies.

I know Mohamed Gacem has been involved in a number of these for a bit longer than I have. So, Mohamed, if I have missed something, please go ahead.

**MR. GACEM:** Mohamed Cherif Gacem, for the record.

I think Ms. Meggan and Ms. Murthy covered it off, but I want just to add that one of the lessons learned that we have seen from what has been done in Spain or in France is the weather cover. The mobile weather cover has been used in Spain and in Centre de l'Aube in France, so we pushed and requested CNL to have this designed and implemented and this is a prerequisite for operation of the NSDF.

In addition to that, the fact that water management is another issue and we learned internally here from operations of the Port Hope Area Initiative projects, long-term safety and long-term waste management at Port Hope and Port Granby.

So, to be brief, this is most of what we learned from what we shared, from what we got from international best practices either in the U.S. or in Europe.

**THE PRESIDENT:** And kind of in hindsight, what would you share as learnings as a regulator from this NSDF project to date that you would share with your international counterparts, countries that may be contemplating disposal facility for low-level waste?

**MR. GACEM:** Mohamed Cherif Gacem, for the record.

Dr. Matt Herod participated in last

year's -- I think last year -- Waste Management Forum. He presented the "NSDF Waste Acceptance Criteria" paper on that, which had, I think, a good perception or reception from the international community.

And as Ms. Murthy indicated, I participated in a number of forums on Near Surface Disposal Facilities and each time I provided a presentation on the NSDF, going from the licensing review that we did and I think the final one, or the most recent one was on the post-closure safety assessment.

CNL did their part as well I think when they attended that forum as well.

**THE PRESIDENT:** Ms. Murthy...?

**MS. MURTHY:** Kavita Murthy, for the record.

So you asked what lessons would we -- if we were giving our experiences to other regulators looking at a similar project, what advice would we give.

From my involvement and experience with this project that has dated back to about four or five years now, I would say communication of technical material in layperson language and communicating throughout the process, both for the regulator and for the proponent, from beginning stages to the end, producing material along the way that informs them of what stages the projects are in, because these projects do take many years and memory is short and people are dealing with a lot of different things at all times. Those have stood out to me as things that need to be done well and need to be done continuously.

And beyond that, I think one of the other things is transparency of information, I think producing information, you know, without prejudging whether it is technical, too technical or not, being able to put that information out fast is important.

**THE PRESIDENT:** Thank you.

Mr. McBrearty...?

**MR. McBREARTY:** President Velshi, thank you for the opportunity to comment.

I would like to comment a little bit on the intervenor's remarks on operations, designs, what has been learned from lessons in the U.S. and oversight. And at some point here I am going to turn it over to Mr. MacDonald from AECL to talk about the GoCo model here a little bit.

But I would like to touch on how CNL operates from an operational perspective, lessons learned and incorporation of lessons learned from other projects, as I mentioned I think earlier today or yesterday, into our operations.

The projects that were noted in this

intervention have spanned about two, two and a half decades, if not longer, and there have been lessons learned. Some of those were first of a kind in the world. The operational issues that occurred in some cases were site-specific and contractor-specific. They were personnel-specific issues.

The management systems, the oversight that we have at Canadian Nuclear Laboratories, overseen by AECL and also by the CNSC, I believe provide the right level and robustness of oversight to ensure that if operational incidents do occur they are addressed immediately and corrective action is taken as quickly as possible.

Obviously, the goal is not to have those occur, so we have a very robust operational experience program and feedback program for all of our operations. We can demonstrate that on a routine basis for all the operations we do over four provinces today in operation.

So I think it is important when we -- when the intervention looks at operational issues that occurred at some of these sites, some of those are site-specific, they are operator-specific. I believe that CNL, overseen by AECL and CNSC, have very robust processes in place to ensure that from the design perspective and the operational perspective we have that well in hand.

I would like to turn it over just very

briefly to Mr. MacDonald just for a few comments that he can perhaps share from the federal perspective on the management system that is in place, so the GoCo model.

**THE PRESIDENT:** Mr. MacDonald...?

**MR. MacDONALD:** Okay. Thanks very much, Mr. McBrearty.

Yes, for the record, Alastair MacDonald from AECL. Maybe I will just make a couple of, as Mr. McBrearty said, brief points.

This intervention makes a link between some issues in the Fernald, Oakridge and Hanford and a link to the GoCo model, and I will just say something about the Canadian GoCo model.

It is a relatively young GoCo model and it has had the benefit of the learning from the U.S. and other jurisdictions, both GoCo models and other. So I think that the model that we have here takes a lot of the lessons that we have learned from across the world. We have a strong team of people that are internationally engaged and we keep doing that, and we also enable CNL to make sure that they are internationally engaged as well. So we absolutely, you know, encourage and enable the lessons to be learned from across the world.

So I really think I just wanted to make that point about we learn from some of these other jurisdictions in our GoCo model and I would say it is not the same, it is purpose-built for the challenges that we have in Canada.

Thank you.

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

Ms. Lloyd, over to you for any comments you may have, please.

**MS. LLOYD:** Thank you. If I could, two comments.

One, I just want to follow up on this discussion we have just heard. I maybe misheard, but I thought that you had asked CNSC if they had taken anything from the lessons learned outlined in Dr. Reznikoff's report and what I heard from them was other forum, but I didn't get any sense that they had actually read the report and considered that in the context of their operations. I'm sorry, I didn't mean to say that you hadn't read the report, just in their response I didn't see that reflected. So I just wanted to comment on that.

And I think that, yes, the GoCo model maybe is relatively new in Canada. That might mean that we have no evidence of Canadian-specific problems, but we don't also I think have evidence of Canadian-specific success. So I would guess that probably somebody from DOE also would have expressed confidence in the model prior to some of these developments. So I will just leave it at that.

I did want to add in a closing comment kind of way, and this is anticipating the next intervenor. So this is my only time to say it, but I will say I anticipate that our level of concern might increase after we hear our next intervenor. Maybe not. It is the Nuclear Waste Management Organization. They sent a two-page letter from Laurie Swami supporting the NSDF and then they sent seven slides, 35 words in total. Derek Wilson is to be the presenter and one of those slides said, "NWMO's Work on the Integrated Strategy for Radioactive Waste", an initiative that has not been discussed I think in this hearing to date.

And I will note that we disagreed with the Minister assigning this role to the NWMO, we think it is outside their mandate as set out in the *Nuclear Fuel Waste Act*, and we are curious to see how NWMO brings that into this process and regret that we won't have an opportunity to speak afterwards.

We would encourage the Commission to ask the NWMO how they see themselves as waste generators, and maybe ask CNL. The NWMO will be waste generators in their concept design for the deep geological repository and the used fuel packaging plant. They say what they will generate low- and intermediate-level waste and it will be sent offsite to a licensed facility. Is that CNL's facility? We don't know. That may be an area for question.

But I guess my question for the Commission and maybe more for counsel and the Registrar is: What is the mechanism if an intervenor after us introduces new evidence? We know in our final comments we can't introduce new evidence. How do we introduce a responding document if NWMO or someone else brings in an entirely new topic after our opportunity for oral intervention? How do we deal with that? Can we file additional documents? Do we file them as exhibits? What do we do if an intervenor after us introduces an entirely new topic which is of, you know, fairly direct interest and concern to us?

**THE PRESIDENT:** Thank you.

Well, I don't think you need to answer it now, but we will make sure that we do provide a response to your question --

**MS. LLOYD:** Okay.

**THE PRESIDENT:** -- on how you do that. Okay?

**MS. LLOYD:** Great. Thank you very much.

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

With that, now that you have set the stage for NWMO, let's move --

**MS. LLOYD:** Introduce them?

**THE PRESIDENT:** Yes, let's introduce them.

And our next presentation is by the Nuclear Waste Management Organization, as outlined in CMDs 22-H7.81 and 7.81A, and we have Mr. Derek Wilson presenting this remotely.

Mr. Wilson, over to you, please.

**CMD 22-H7.81/22-H7.81A**

**Oral presentation by the**

**Nuclear Waste Management Organization**

**MR. WILSON:** Thank you and good afternoon.

For the record, my name is Derek Wilson, Chief Operating Officer of the Nuclear Waste Management Organization, or the NWMO.

I would like to start by acknowledging that today I am speaking to you on the traditional territory of many nations, including the Mississaugas of the Credit, the Anishinabeg, the Chippewa, the Haudenosaunee and the Wendat peoples, and I would like to further acknowledge that Toronto is now home to many diverse nations, First Nations, Inuit and Métis people.

I am here today to provide the NWMO's support for Canadian Nuclear Laboratories' (or CNL) application to construct a Near Surface Disposal Facility at the Chalk River site.

Next slide, please.

We are a not-for-profit organization implementing Canada's plan for the safe, long-term management of used nuclear fuel in a manner that protects people and the environment for generations to come. Canada's plan calls for the containment and isolation of Canada's used nuclear fuel in a deep geologic repository (or DGR) located in an informed and willing host community.

To arrive at this plan, the NWMO consulted with Canadians and Indigenous peoples to understand what was important to them. Through this consultation period, the public made one thing very clear: We need to do something now and not leave this legacy as a burden for future generations. They also wanted a flexible approach that would allow for improvements based on new technology and changing priority. Our expertise is based on 20 years of advancing technical solutions in ensuring societal interests are incorporated as we progress.

We are also proud of our work with Indigenous peoples. We are working to incorporate Indigenous knowledge into all that we do and are continuing to walk a path towards reconciliation. The NWMO recognizes that it takes time to establish relationships and build trust. This consent-based process is backed up by the international scientific consensus that DGRs will provide safe long-term solutions for managing used nuclear fuel. Similar projects are already moving forward in Finland, Sweden and France, and at the NWMO we are getting ready to take the next step.

Next slide, please.

In the fall of 2020, the Minister of Natural Resources Canada tasked the NWMO with leading an engagement process with Canadians and Indigenous peoples to inform the development of an integrated long-term management strategy for all of Canada's radioactive waste. This strategy is called the Integrated Strategy for Radioactive Waste (or ISRW).

The intent of the ISRW is to identify the next steps needed to address the gaps in Canada's current radioactive waste management strategy, in particular for low- and intermediate- level radioactive waste, and also to look further into the future.

It is important to note that this tasking by the Government of Canada specifically excludes projects currently in progress such as CNL's Near Surface Disposal Facility.

The ISRW is also distinct from our work that the NWMO is leading on the DGR reused nuclear fuel, which will continue as planned.

In 2021, the NWMO began engaging with Canadians and Indigenous peoples about the ISRW through a series of virtual sessions across Canada. Input from our engagement efforts will be considered when drafting the recommendations for the ISRW. This strategy will be based on public input, Indigenous knowledge, international scientific consensus and best practices from around the world.

Draft recommendations will be published for public comment later this summer. In the interim, we have been publishing our "What we Heard" reports based on our engagement sessions which can be found at our radwasteplanning.ca website.

The public supports the concept of Near Surface Disposal Facilities for the safe disposal of low-level waste such as the one proposed here by CNL. Close proximity to where the waste is currently stored was also preferred for low-level waste to minimize the need for transportation. It is critical that Canada have a safe, secure and scientifically sound approach for managing all of the country's radioactive waste over the long term, including low-level radioactive waste.

Next slide, please.

Through the NWMO's work advancing Canada's plan for the safe long-term management of used nuclear fuel, we have worked closely with CNL in the Chalk River site on their used fuel inventories.  We have also worked closely with CNL in the broader nuclear industry on best practices to manage waste and protect the environment. This includes the protection of water.  Based on our experience building public support for the management of used nuclear fuel, we know that protecting water resources is of key importance to many Canadians and Indigenous peoples.

We also understand the use of multiple barriers, defence-in-depth design principles and considerations for climate change as international best practices for safe and long-term management.  All of these have been considered and incorporated in the CNL proposal for this facility.

While the NWMO's work will address the need to manage used nuclear fuel, projects like CNL's will ensure we are prepared to deal with the full picture of the nuclear industry's waste.

Next slide, please.

So that is why I am here today, to support CNL's application to construct a Near Surface Disposal

Facility. The Chalk River site is a source of unique nuclear science in Canada, producing important research and health science in areas such as cancer and other diseases, and it is helping drive advances in clean, non-carbon energy that are critical to combating climate change. The Near Surface Disposal Facility will allow CNL to continue this important work and remain on the leading edge of tomorrow's groundbreaking science.

Given the necessarily long timelines for implementation of nuclear waste management projects, it is important that Canada act now and not leave it to future generations. As we heard in our initial engagement on used fuel in the early 2000s and continue to hear 20 years later in our engagement on the ISRW, Canadians want this generation to take responsible action.

We need a solution to manage Canada's low-level radioactive waste and ensure its safety in the long term. Regardless of the future of nuclear energy in Canada, the reality is that the sector has already produced waste that must be managed. As a country that values sustainability, safety and security, projects that present real solutions to the issues associated with radioactive waste management are necessary to protect people and the environment.

Last slide, please.

I want to thank you for providing the opportunity to intervene in this matter. Both myself and Laurie Swami, President and CEO of the NWMO, are available should the Commission have any questions. Thank you.

**THE PRESIDENT:** Thank you very much, Mr. Wilson, for that presentation.

Dr. Lacroix, we will start with you, please.

**MEMBER LACROIX:** Thank you very much, Mr. Wilson, for the presentation.

No, I do not have any questions.

**THE PRESIDENT:** Okay.

Ms. Maharaj...?

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you, Mr. Wilson, for your presentation.

I do have one question, really more about timing. If you have been following the hearing as it has gone along so far you have heard some of the intervenors say this hearing is too soon, there's a number of steps that they would like to see taken before this Panel makes a decision, and one of those intervenors referred to having your draft recommendations available prior to taking the next step forward in this particular decision process.

With respect to your draft recommendations that are going to be available this summer, has a preliminary draft been made available or would that be the first time people would be able to see your work?

**MR. WILSON:** So thank you for that question.

We have been going through our engagement process and, as I mentioned, we have been posting our "What we Heard" reports publicly that are really summarizing the engagement that we have had and summarizing the inputs that we have received. The draft recommendations themselves will be published later this summer. They have not been put out for public comment yet. We intend to put them out for a 90-day public comment period. They are in development, but again, it will probably be mid-summer before we are able to put the draft recommendations together for public input.

**MEMBER MAHARAJ:** Thank you.

**THE PRESIDENT:** Mr. Wilson, I have a couple of questions and maybe I will start off with one following up from Ms. Maharaj.

Based on what you have heard from the public so far on the ISRW, is there anything in there that would get you to question whether the Commission should be making a decision on the NSDF now or should we be waiting?

**MR. WILSON:** So thank you for that question. Derek Wilson, for the record.

No, we are not seeing anything and in fact what we are hearing from our engagement is supporting the concepts that are being proposed here by CNL, that being near surface disposal facility for low-level waste. There seems to be consensus that that is an appropriate means to manage low-level waste, and again, you know, considering the waste acceptance criteria and all the elements that have been discussed today have been comments that we have heard as well. You know, the close proximity to the facility to minimize the amount of transportation required to move the low-level waste to the permanent facility is again common with what we are hearing in our engagement.

So there is nothing that we are anticipating from CNL's proposal from that that we are hearing from Canadians and the key contributors to the ISRW that would suggest any concern.

**THE PRESIDENT:** Thank you.

And my last question -- and I don't know whether you can comment on that but I will ask you anyway. In your submission you do talk about public support, water resources being key, and one of the biggest concerns we have been hearing of course is the proximity of the proposed facility to the Ottawa River. But the other one == and we won't be talking about this in detail until Thursday -- is around Indigenous engagement and consultation, and as you may know, the Commission has received a number of requests that this hearing be deferred until adequate consultation has happened.

I don't know if in your discussions on your collaborative efforts with CNL you learn and share best practices around consultation and engagement and whether you can make any comments around from where you are what would you suggest be done differently?

**MR. WILSON:** So Derek Wilson, for the record, and thank you for that question.

I'm not sure it would be my place to make a comment on the level of consultation and engagement that CNL or the CNSC have done in regards to this particular project. Personally, I have not followed that as closely. We do have collaboration with CNL and AECL on a number of matters, and public engagement and Indigenous engagement are areas that we discuss, but I have not myself done a comparative of what the NWMO's practices are as compared to that of CNL's or the CNSC's specific to this particular proposal.

**THE PRESIDENT:** Okay. Thank you very much. And thank you for your intervention and your presentation today.

Our next presentation is by the Canadian Nuclear Association, as outlined in CMD 22-H7.88.

We have Mr. Gorman and Mr. Coupland with us to make the presentation. Thank you for being flexible enough and changing your slot on the agenda. Much appreciated.

So, over to you.

**CMD 22-H7.88**

**Oral presentation by the**

**Canadian Nuclear Association**

**MR. GORMAN:** Thank you, Madam Chair and Commissioners, for allowing us to present this evening.

My name is John Gorman, I am the President and CEO of the Canadian Nuclear Association, and as Madam Chair pointed out, with me today is Steve Coupland, Director of Regulatory and Environmental Affairs at the Canadian Nuclear Association.

The CNA is a national trade association that has been in existence for over 60 years, representing over 100 organizations within the Canadian nuclear ecosystem. That includes Canadian Nuclear Laboratories, which have done such foundational work over the decades in terms of setting up Canada as a leading provider of both civil power solutions and clean energy solutions that are so needed in this day to confront the climate crisis, including associated work with other clean energy sources like hydrogen, but of course also in medical science.

I appreciate this opportunity to say a few words in support of the CNL's application to amend its Chalk River Laboratories site application to allow for the construction of a near surface disposal facility.

I would like to begin by acknowledging that we are on the unceded and unsurrendered territory of the Algonquin Anishinabeg people.

Canada, and indeed the world, is at a critical time. Climate change is one of the greatest challenges facing the world today and there is a growing consensus that greater electrification is going to need to play a leading role in reducing emissions. That means that there is going to be a dramatic increase in the production of non-emitting electricity. Estimates of Canada's need range between two and four times of current generation. And I say that because nuclear generation is going to be a very significant proportion or portion of that new generation.

And as a side note here, if I may just flag for the Commission that in October of last year the Canadian Nuclear Association formed a formal coalition with the Renewables Association, so wind, water, solar, storage and other clean energy solutions, in recognition of the fact that we are going to need all of these solutions, including nuclear, if we are going to be able to create that much electricity in future.

I would also like to take this opportunity to point out that it is not just the electricity generation that is going to be required. Nuclear has a very unique role to play in producing high temperature heat that is going to be used to replace carbon emissions in our heavy industry and natural resource sector.

And if I might, I would also point out that aside from the growing recognition of the application of the high temperature heat that is needed from nuclear, we have now of course entered a world where global energy security and global food security has catapulted Canada, this natural resource rich country, to the front of the line as a world that needs to be helping other parts of the world with critical minerals, including uranium, which is going to help with energy security, as well as things like potash and food items for food security.

We really have the complete offering of these natural resources which we are going to have to increase over the coming years because of this dynamics since Russia's invasion of Ukraine and it is going to be essential that while we are increasing the output of all of these vital natural resources that we are able to keep emissions down, and so the pressure on nuclear and small modular reactors in particular for high temperature heat is only growing. I will come back to why I mention that later.

Like all other forms of electricity, nuclear energy creates byproducts which in our industry are often referred to as nuclear waste. The nuclear industry takes its responsibility to safely manage and permanently dispose of these byproducts very seriously. In fact, we are the only energy source that not only tracks all our byproducts but has a segregated fund dedicated to pay for decommissioning, storage and disposal of those byproducts.

As the Commission knows, the Chalk River Laboratories site was one of the world's earliest nuclear facilities and has been home to Canada's nuclear industry since the 1940s. The site has been responsibly managing nuclear waste since then, but managing nuclear waste through the creation of additional temporary storage facilities is not consistent with the best modern waste management process, nor is it an acceptable long-term approach.

Our industry strongly believes that as the generators and beneficiaries of nuclear energy, our generation has the moral responsibility to provide a long-term solution for those byproducts. The NSDF is a part of that long-term solution, as we have heard from many intervenors, and it is important that we move forward with this project.

So I wanted again here to just diverge for a moment to say, you know, we're recognizing this growing role for nuclear both to address the climate crisis, but also to help with energy security through the unique ways that nuclear can do that.

We're fortunate that CNL has over the decades been able to help deliver the sort of solutions that are so critically needed at this point.

As the industry spokesperson, I would like to underline the commitment that our industry has and the understanding that we have about ensuring that we treat all of our past, present and future waste appropriately.

And I say this from the position of somebody who understands very deeply that our correct management of nuclear by products and waste that come from our industry past, present and future, as I said, is directly tied to our ability to be able to solve this climate crisis and enable energy security, global energy security, and food security for future generations.

And I think you had a strong sense when you heard Joe McBrearty speak yesterday about how deeply committed we are as individuals in this industry to ensuring that the solutions we bring forward, the way that we manage all of the existing and future waste is completely tied to our ability to help future generations, and we recognize that importance.

And if I can say on a personal note, Joe McBrearty as a board member, as an industry leader and as the head of the CNL has consistently been the leader of promoting that industry-wide responsible management of waste far beyond just the CNL projects.

So the CNA recognizes that a near-surface disposal facility is a new approach to waste disposal in Canada and, as such, can cause concern among stakeholders and the public.  But it’s important to recognize that this is an internationally-recognized best practice for low-level radioactive waste disposal, and that this technique has been used successfully in other parts of the world, as has been noted earlier.

Canada is a vast and beautiful land and we’ve been blessed with an abundance of freshwater, and looking after that resource is central to our nation.

The CNA has noted the concerns raised by many intervenors over the proximity of the proposed facility to the Ottawa River.  And although it’s been mentioned several times already, I believe it bears repeating.  The NSDF has been specifically designed to protect the Ottawa River.

The location of the NSDF accounts for physical site characteristics to protect human health and the environment. The chosen site is a watershed that is well-understood and it has well-understood hydrological properties that have been studied for over 60 years. The site is on a bedrock ridge that is far above the flood plain and naturally forces water away from the river.

It's also important to note that the actual facility is engineered to ensure safety to humans, wildlife, and the environment.

The CNA believes that the combination of physical site characteristics and engineered borders will continue to ensure the protection of the Ottawa River.

I also think it's important to point out that it's not only the CNL and CNSC Staff that assert the Ottawa River will be protected as a key drinking water source. But as we've heard yesterday, other important regulatory bodies such as the Environment and Climate Change Canada and both the Quebec and Ontario Ministries of Environment agree.

The CNA would make the argument to the Commission that this is in the best interest of the environment that the NSDF proceed and that, in fact, the NSDF offers a far greater protection to the Ottawa River and that delaying or stopping the project, as some intervenors have suggested, would in fact put the Ottawa River at greater risk.

Another area of concern for intervenors is the characterization of the waste to be stored at the NSDF. As we've heard, the NSDF will contain only low-level radioactive waste.

The engineered containment mound design life is 550 years, and by that point the radioactivity concentration begins to approach natural background concentration of local soils.  By the time the engineered barriers no longer provide significant physical containment, over 99 per cent of the disposed inventory will have decayed and less than 1 per cent is available for release.

Any releases at this stage would be well below the release limits and have a negligible impact on health and the environment.

The final area of concern mentioned by the intervenors that I would like to touch on is the public and Indigenous consultation.

CNL is committed to continuing its comprehensive public information program to ensure local communities and stakeholders are kept fully aware of developments as the project proceeds in a transparent and timely manner.

CNL recognizes the importance of meaningful engagement and building strong working relationships with Indigenous communities and is committed to increased engagement with First Nations as the project proceeds.

CNL not only recognizes the duty to consult, the rights of the First Nations, but also the long-standing and special relationship First Nations have with the land and the water.

CNL knows that this is a new type of project and is committed to ensuring that First Nations are fully informed and engaged as the project proceeds.

In concluding, I'd like to emphasize the importance that Canada's nuclear industry attaches to the management of nuclear waste and to this project.

Our nation is going to need more nuclear power, but with that comes a moral obligation for our generation to find permanent disposal for nuclear waste, not only for existing waste, but for future waste as well.

The NSDF is an important first step in that process and the Canadian Nuclear Association and its members strongly encourage the CNSC to grant the authorization to construct a near-surface disposal facility.

Thank you for the opportunity to provide our views on this licence application, and I'd be happy to answer questions.

**THE PRESIDENT:** Thank you very much, Mr. Gorman, for the presentation.

We'll start with Dr. Lacroix please.

**MEMBER LACROIX:** Thank you very much, Mr. Gorman, for your presentation.

As a national trade association, do you have any safety concerns for your members that will be involved in the construction and the operation of the NSDF?

**MR. GORMAN:** I do not have any safety concerns, having visited the CNL site multiple times now and been involved in my understanding of how this project was going to be completed and the waste that it is dealing with.

**MR. COUPLAND:** Steve Coupland, for the record. I'll just add that, you know, safety is the number one job in the nuclear industry. It's the number one focus of all our sites, including CNL, and we take great pride in that.

And I would be happy to place our track record on any safety measure you would like; lost-time accidents, Workers' Compensation claims, environmental spills, anything you would like to take a look at, I'd happily compare our industry to any other industry in this country, and I think you'd come out on top. So, no, we have no concerns.

**MEMBER LACROIX:** Okay, thank you.

**THE PRESIDENT:** Okay, Ms. Maharaj.

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you for your presentation, Mr. Gorman.

I do have a question for you. Given your position in the industry where part of your role is to forecast Canada's needs for electrification and power in general, you indicated that your organization sees a straight line to needing two to four times as much power generation, electricity generation, as we have today.

Bearing in mind the role that nuclear generation will play in that power profile, that power mix, are you concerned in any way or do you have any comment about the sizing of this particular NSDF?

And the context that I will give you for that is that we've been told, and it isn't disputed, that this facility will accept 90 per cent of its load from the existing site, 90 or 95 -- 5 per cent from additional sources or additional locations.

So essentially, this NSDF sized as it is is good for today's load at that site. But if we're looking at nuclear playing a large part in the future, a substantial part, waste will continue to be generated from those new facilities and waste will continue to be generated -- low-level waste will continue to be generated from alternative uses like medical isotopes and the PPE that we've heard would be going into this facility.

So can you comment on whether this facility, in your view, is right sized or whether it's under-sized for Canada?

**MR. GORMAN:** John Gorman, for the record. Thank you very much for that question.

So let me say, first of all, that I do believe we are going to have a very expanded role for nuclear power in this country. And, similarly, our role in providing nuclear isotopes is going to increase and is increasing very dramatically.

My understanding of this particular project is that it is primarily designed to be dealing with legacy waste that has been part of the operations of the CNL and CNL's important work over the decades that have enabled Canada to be in this position to be helping itself and the world in the face of climate crisis, along with the pioneering work that it did with isotopes.

So I am not looking at this particular site as one that's going to be relied upon for projects that are being done across Canada, for example, as the role for nuclear increases.

And I think, instead, it speaks to the NWMO’s integrated strategy for radioactive waste that we’ll have to be looking at considering what additional projects in other parts of the country are going to -- how those are going to be treated from a waste perspective as we go forward.

**MR. McBREARTY:** Commissioner Maharaj, I’d like to add onto Mr. Gorman’s comments --

**MEMBER MAHARAJ:** Sure.

**MR. McBREARTY:** -- since I think I'm kind of responsible for the site.

First off, I’d like to thank Mr. Gorman for all his comments. So let’s just lay the landscape out here. As Mr. Gorman commented on, the NSDF is really designed for past waste, legacy waste with some, you know, production into the future. But the vast majority will be legacy waste.

And let’s just kind of lay the landscape out here. What occurred in the 1940s through the 1960s and 1970s, how waste and how radioactive material was handled, were not handled back then, and how it’s handled today.

There have been a bunch of discussions and some of it has to do with some of the other, you know, waste repositories that exist overseas with respect to nuclear propulsion -- I’m sorry, nuclear power waste. In the wrong lifetime there, with nuclear power waste.

Nuclear power waste with the exception of -- even including high-level waste, is fairly discreet, it’s very well defined. And the contamination that comes out of nuclear power plant operations is fairly well defined and discreet. Talk about being able to put stuff into barrels or 55-gallon drums or cans. That is in contrast to what we are cleaning up today.

So cleaning up today, you know, the legacy is we are cleaning up fields of soil, we are cleaning up buildings, large vast spots of soil and buildings.

Going into the future, and I think I touched on this way back in January or February when we talked either about the future of Chalk River or the first part of this hearing. You know, we do expect to continue nuclear science and technology missions at Chalk River. We are looking at potentially getting back into radioisotope business. But it’s going to be a completely different approach than existed in the past.

And a bit of the irony here where I find that people are very upset about the waste, virtually all that waste came from the production of life-saving isotopes. That’s sometimes forgotten by people. These reactors weren’t producing power, they were producing isotopes to provide either diagnostic or therapeutic treatments to save people’s lives, and that is a big point sometimes forgotten.

But in the future -- and to do that, you know, we used reactor technology and we used the technology and the practices that existed for decades, and they were not what they are today.

Today, and going into the future, every plant -- everything that’s designed from a reactor plant for a nuclear perspective has to have the entire lifecycle taken into account. So that’s not only from where the fuel comes from, if it's a power plant, or source, whether it’s an accelerator or another isotope source, all the way through operations and all the way into waste and decommissioning and waste handling. So that is already taken into account.

One thing, and I’ll ask Ms. Vickerd, or I’m sure she’ll correct me if I get this wrong, is we look at how we do planning preparation and we use this -- really this hierarchy to prevent it, eliminate it, recycle it if possible, repatriate it if we can, and minimize it.

So the actual volume of waste that we would see for future operations would be just, you know, orders of magnitude less than what was produced in the past. We wouldn’t expect to be contaminating entire buildings that we’ve seen in the past, entire fields and swaths of land. We would expect, you know, waste in a can or in a drum, and that’s the size.

So from my perspective when I look at, you know, what Mr. Gorman has been talking about, I see the nuclear industry as growing, I do not see that -- personally, I do not see that there is an alternative to that, I just do not think that hydro electric -- or hydro, solar and wind can carry the load that we need. There has to be a solution. And part of that solution is the NSDF for us from a legacy perspective, because our waste is different than the nuclear power plant waste, it just is.

But there will have to be a solution, and this ties into the NWMO’s presentation, with the need to be able to have a viable solution for high-level waste. The power plants that are being designed and going to be put into production are going to be very efficient and very, you know, from a waste perspective, very clean. That’s the design. We have 70 years of reactor operation, we know how to do that.

So when I look at the need for huge swaths of new legacy waste or waste disposal techniques, I don’t think you’re going to need them, because the planning and the design is there today to prevent that.

But Mr. Gorman points out just a very key point in advancement of nuclear power, and Canada really has the opportunity to lead the way I think here. We have the opportunity to show the world not only from a nuclear power production standpoint that we can do it and we can do it domestically, but we can also show the world how to think ahead from an integrated waste strategy.

That's why I think it's going to be important to make sure that the Nuclear Waste Management Organization, that integrated waste strategy when it comes out, which will deal with intermediate-level waste as well, is going to be extremely important.

So thank you.

**MEMBER MAHARAJ:** Thank you.

**MS. VICKERD:** Megan Vickerd, for the record. A couple points I just want to reiterate in closing.

That the NSDF is for AECL-owned waste, not all waste that's generated within Canada, low-level waste.

The facility has been sized for existing legacy waste, the waste will be generated from clean-up mission, facility-commissioned environmental remediation, plus ongoing waste that will be generated from CNL carrying out AECL's mission as a nuclear research site for Canada.

With respect to new facilities coming online, there's an expectation that the waste, the end is kept in mind when you're designing the facility. So the types of waste will be optimized and the volume will be optimized for new facilities being built. So you won't see the volumes of waste that we're seeing from our legacy facilities being decommissioned.

And lastly, the important application of waste hierarchy, to ensure that we're always diverting waste from disposal, and that disposal's always the last resort.

**THE PRESIDENT:** Mr. Gorman, a question for you.

In your presentation you made reference to CNL's public information program. I wondered if you could comment on what the CNA is doing or planning on doing in informing Canadians about nuclear waste management and addressing some of these ubiquitous concerns around radioactive waste and the risks that they pose?

**MR. GORMAN:** Thank you, Madam Chair, for the question. John Gorman, for the record, responding.

The Association, as directed by the board, management of the Association, has three priorities.

Waste management and ensuring that the industry is coordinating its activities, sharing best practices, and ensuring that we are delivering the best solutions possible for the future of the nuclear industry, as I pointed out during my remarks.

We recognize how integral it is to ensure that we've dealt with past and future waste properly so that we can deliver our utmost -- deliver at our maximum potential, both for nuclear medicine and power going forward. That's a very deeply-held belief in the industry. So that's our first priority.

And second priority is Indigenous relations. And thirdly, it's an exercise around connecting nuclear to our net-zero future and the role that nuclear can play.

For waste and for Indigenous relations we have established secretariats, separate secretariats, which are bringing together the broadest swath of industry that is involved in those issues to collaborate, share information, and best practices and coordinate our activities.

**THE PRESIDENT:** Very good. Thank you very much. Thank you for your intervention and for your presentation and appearing in front of us today. Thank you.

**MR. GORMAN:** Thank you.

**THE PRESIDENT:** Our next presentation is by Bruce Power, as outlined in CMD 22-H7.108. And we've got Ms. Danielle Lacroix presenting remotely.

Ms. Lacroix, over to you please.

**CMD 22-H7.108**

**Oral presentation by Bruce Power**

**MS. LACROIX:** Thank you, Madam President. Thank you everyone. For the record, I am Danielle Lacroix, Senior Director of Environment, Sustainability and Net-Zero at Bruce Power.

I do hope you can hear me well.

Today I'm please to offer Bruce Power's support for CNL's application to amend its operating licence to add a near-surface disposal facility to the Chalk River Laboratories licensing basis.

You have our detailed formal letter supporting among the other interventions, so I just wanted to touch quickly on three key points I believe are important to your considerations.

First of all, the Chalk River site has been extensively studied, including long-term monitoring risk assessments, the results of which demonstrate that the site is entirely suitable for this type of disposal facility. Over many decades it's been part of numerous environmental assessments. And as an environmental engineer with more than 15 years experience in environmental protection efforts, I'm familiar with how much scientific rigour goes into these reviews.

I also know the level of detail from these assessments, coupled with nearly 70 years of operating on that site, giving CNL a vast amount of information on the surfaced and groundwater flow and the potential for contaminant migration.

That deep-seated understanding strengthens their ability to accurately predict the environmental effects of this project and to develop the appropriate mitigation strategies to avoid any potential adverse effects.

Drawing upon this experience, expertise and data, CNL has determined that a permanent disposal decision is the preferred way to protect the environment and environmental features like the Ottawa River. They have proposed to use an Engineered Containment Mound that will be well above the floodplain and away from the river. Its multi-layered design will physically isolate the waste from the surrounding environment and make sure that any liquid that comes into contact with the waste will be collected and treated and monitored to ensure that it meets acceptable criteria prior to discharge

This leads me to my second point: The containment design that is multi-layered and robust. The multi-layered base liner includes a compact clay layer that is thousands of years old and expected to last thousands more years. So will the natural materials that make up the perimeter berm. With a capacity of a million cubic metres, the mound will be able to meet the current and future disposal needs for the next 50 years and CNL will only accept waste appropriate for this facility.

As engineered, the facility will have a design life of more than 550 years. After that we expect any short-lived radionuclides would have decayed to natural background levels.

CNL has not only looked at this as a need for a permanent disposal solution as an engineering puzzle to be solved. They have considered the social aspects as well and the potential impacts it will have on people who live within the region, which is my final point. CNL has conducted scientific evaluations of a number of different scenarios to determine the potential effects on workers, Indigenous people and the public and to demonstrate that the NSDF project will not pose a risk to human health and safety during the life cycle of the facility. These safety assessments show that there is no unacceptable risk during construction, operation, closure or post-closure. They have maintained a high degree of transparency, making the public aware of site activities and have undertaken numerous engagement activities related to the NSDF project, ranging from information sessions to site visits and virtual events.

The conclusions from these rigorous assessments and engagements is that the permanent disposal solution for low-level radioactive waste is the preferred means of protecting the environment.

Given all these points I have shared above, it is Bruce Power's opinion and my professional opinion that the construction and operation of the NSDF for the disposal of solid low-level radioactive waste will provide a safe, reliable means to protect the environment and to ensure the waste does not pose a risk to workers and to the public.

Thank you.

**THE PRESIDENT:** Thank you. Ms. Maharaj, please. Any questions?

**MEMBER MAHARAJ:** Thank you, Madam Velshi.

Thank you for your presentation. I don't have any additional questions.

**THE PRESIDENT:** Thank you. Dr. Lacroix?

**MEMBER LACROIX:** Thank you very much for your presentation. No, I do not have any questions.

**THE PRESIDENT:** Ms. Lacroix -- and I hope you're not related to Dr. Lacroix but if you are it's a family effort --

**MS. LACROIX:** Far reaching.

**THE PRESIDENT:** But thank you for you intervention -- you should have recused yourself then.

But thank you for your intervention. We very much appreciate that. Thank you.

**MS. LACROIX:** Thank you very much.

**THE PRESIDENT:** We move to our next presentation which is by the CANDU Owners Group Inc. as outlined in CMD H7.96, and we have got Ms. Liette Lemieux presenting remotely this intervention. Ms. Lemieux, over to you, please.

**CMD 22-H7.96**

**Oral Presentation by CANDU Owners Group Inc.**

**MS. LEMIEUX:** Thank you very much, Madam President, and thank you to the Commission for allowing us to intervene on behalf of CNL.

Good afternoon. For the record, my name is Liette Lemieux and I am the Interim President and CEO of the CANDU Owners Group. I'm here today on behalf of COG in support of CNL's application to amend its Chalk River licence to authorize the construction of a Near Surface Disposal Facility. We support their application because the NSDF is a safe, secure, and internationally recognized solution to take care of people and the environment over the long term while enabling Canada to continue to be a leader in clean energy and life-saving medical isotopes.

I would like to start by introducing our organization because I think a couple of people weren't present for the last time that I was presenting on behalf of a licensee, just to provide context on a relationship to CNL and why we're here today.

CNL is a world leader in developing nuclear technology for peaceful and innovative applications. COG is a not-for-profit organization with membership from nuclear operators in Canada and around the world. CNL has been an active member as an entity in COG since 2015. Through COG our members work together to share information, best practices and operating experience, and they invest collectively approximately $70 million annually in joint projects, research, development -- all to strengthen the safety, environmental and cost performance of each individual plant as well as the industry as a whole. This research and associated engineering activity is undertaken mostly in Canada by organizations such as Canadian Nuclear Laboratories, and that leads me to why I'm here today.

For more than 75 years, Canada has been a world leader in nuclear research and technology, and this has resulted in numerous benefits for Canada and around the world, and we've certainly heard from some today. For example, Canada has an ongoing plan to achieve net zero by 2050, and nuclear is an essential component of this plan as it's the only source of emissions-free base load reliable power. Currently, nuclear supplies approximately 60 percent of the power used in Ontario, just as an example.

Technological innovations such as those achieved by the COG members through CNL have enabled improvements in safety, environmental, and operational performance as well as the refurbishment of Canada's nuclear fleet. This has resulted in the plants' ability to operate well past their original design life spans, playing an essential role in helping Canada to reach its net zero goals.

And it has enabled other significant benefits to the health and well-being of Canadians and people around the world as Canada produces a high proportion of the world's supply of radioisotopes used in medical diagnoses and cancer therapies, amongst other industries.

And CNL's Chalk River Laboratories is a unique source of nuclear science in Canada. Revitalization of the site will enable CNL to continue making these important advancements. The benefits are immeasurable and ongoing and they result in the creation of some waste. This is entirely contained and managed by the industry. This full life cycle industry approach has led to CNL's development of the NSDF, a permanent world class solution to reduce environmental risk and isolate low-level radioactive waste in accordance with international guidance and regulatory requirements.

The Engineered Containment Mound is internationally recognized as best practice for radioactive waste disposal. It's safe, it's secure, and it's designed to withstand extreme weather events such as earthquakes, tornadoes, forest fires, major storms, and sabotage. We have confidence in the sustainability and safety of this solution because CNL is an established leader in safety, environmental protection, quality and accountability. They have a demonstrated track record of working with and learning from the supporting stakeholders across the industry, and this can be seen in the research and projects undertaken by CNL through COG.

For example, CNL is the most active participant in Canada with regard to research and development in waste management and decommissioning activities. CNL has been the driving force in research and development in a number of areas, including radiation protection, waste characterization, monitoring and modelling of environmental contaminants, and the development of new technologies to decontaminate structures.  I think you heard about that from the previous Intervenor.

Along with the industry, CNL has co-authored a number of influential position papers on waste definitions, processing, storage, and disposal and they participate in a number of COG peer groups so that they can share their lessons learned with other members and so that they can hear lessons from the other members that they can learn from as well.

In summary, CNL's leadership and commitment to collaboration has really enabled tremendous accomplishments in nuclear science, and I think we all as Canadians need to be really proud of that.  Further, it's resulted in a modern, permanent engineered approach to managing waste that leverages international best practices and protects people and the environment.  By properly disposing of the existing and the potential future nuclear waste in a safe and highly engineered facility built to stand the test of time, they are taking accountability today in order to enable continued benefits long into the future.  COG is therefore pleased to provide our support for their application.

Thank you for your time today.

**THE PRESIDENT:** Thank you very much, Ms. Lemieux, for the presentation.

And I will turn to Dr. Lacroix for questions, please.

**MEMBER LACROIX:** Thank you very much for your presentation. No, I have no questions.

**THE PRESIDENT:** Okay. Ms. Maharaj, please?

**MEMBER MAHARAJ:** Thank you as well, but I have no questions.

**THE PRESIDENT:** Ms. Lemieux, any direct support provided by COG to CNL for the NSDF project?

**MS. LACROIX:** Liette Lemieux for the record.

A lot of the support that we provide to our members, including CNL, is making sure that they're sitting in a room developing those nuclear synergies and sharing lessons learnt and then that we get the right focus on projects that we do on our members' behalf so they have a voice at the table and they also have the expertise to provide us with advice. So that's intended to be ongoing, and in fact they've invested in the long-term strategic portfolio within COG, which includes research on long-term decommissioning and waste management.

**THE PRESIDENT:** Thank you very much for that, and again, thank you for your intervention and your appearance today.

**MS. LACROIX:** Thank you.

**THE PRESIDENT:** Thank you.

We have one more intervention, but before we get to that, I understand Staff have a few updates they'd like to give. If we can move to that, please. Ms. Murthy?

**MS. MURTHY:** Thank you. Kavita Murthy for the record.

Earlier an Intervenor had brought up the question of landfills regulations in Québec and that there being a distance that was specified in Québec, and the Commission asked the question about whether there is something like that, equivalent to that, in Ontario. So Nicole Frigault has information that we would like to read into the record today.

Go ahead, Nicole.

**MS. FRIGAULT:** Thank you. Nicole Frigault for the record.

So CNSC staff have additional clarity to address the Commission's request seeking clarity regarding restriction on the sitings of landfills in both Ontario and

Québec.

There are no specific requirements on the distance of a landfill site in Ontario. In Québec there are some restrictions in provincial legislation. As such, the information provided by the Intervenor is partially correct. Chapter Q2 R19 of Québec regulation entitled, "Regulation Respecting the Landfilling and Incineration of Residual Materials" provides requirements and guidance for landfills in Québec. Disposal areas must comply with general siting conditions outlined in clauses 13 to 16 of the regulation. Of particular note is clause 13, which may be what the previous Intervenor was referring to. It provides a minimum distance of 1 kilometre from any surface water or groundwater collection facility if it is used for the production of bottled water.

The following provides further details regarding the regulations in Ontario.

In Ontario, Regulation 232-98 entitled "Landfilling Sites" provides requirements and guidance for new landfilling sites in Ontario. The provincial regulation does not provide any specific requirements on distance of the landfilling site from a surface water body. However, it does specify that landfilling operation must not have any unacceptable impact outside the site where unacceptable impact means interference with existing or potential reasonable uses of land, groundwater, or surface water.

In addition, section 6(2)(c)11 of Ontario regulation 232-98 requires that an assessment of the potential impacts on surface water features that may be caused by the site or operation at the site be provided in a written report.

**MS. MURTHY:** Thank you, Nicole.

In addition to that, we would like to share with the Panel the exact wording the CNSC received from the IRRS's report in 2019. It goes as follows:

> "The IRRS team acknowledged the outstanding efforts of the participating authorities to engage in this extensive international peer review. The participation by the above organizations enabled the team to develop a broad understanding of the regulatory framework, resulting in recommendations and suggestions that should benefit nuclear and radiation safety for all in Canada. Canada has a comprehensive and robust framework for nuclear and radiation safety covering current facilities

> and activities. The CNSC strives to continuously upgrade its regulatory framework to address new challenges and upcoming technologies."

Thank you very much for your attention.

**THE PRESIDENT:** Thank you, Ms. Murthy.

So our next Intervenor is not available until 6 p.m. because we are running a little ahead of schedule.

CNL, you had a few take-aways? Do you have any updates to give? No pressure.

--- Laughter / Rires

**MS. VICKERD:** Meggan Vickerd for the record.

Not yet, but certainly we'll have some for the morning session.

**THE PRESIDENT:** Okay. Why don't we just stretch for 10 minutes and resume, please. I mean, the person is going to be joining us and I wouldn't want to disappoint her or us. So we'll resume at six o'clock. Thank you.

--- Upon recessing at 5:51 p.m. /
Suspension à 17 h 51

--- Upon resuming at 5:56 p.m. /
Reprise à 17 h 56

**LA PRÉSIDENTE :** Ah, Thank you. La prochaine présentation est par madame Isabelle Sawyer, tel qu'indiqué dans le document CMD 22-H7.167. Madame Sawyer, vous avez la parole dans la langue de votre choix.

**CMD 22-H7.167**

**Oral Presentation by Isabelle Sawyer**

**MME SAWYER :** Je vais faire ma présentation en anglais. Ça va être plus facile pour les membres de la Commission.

**LA PRÉSIDENTE :** Merci.

**MS. SAWYER:** Do you drink water? Do you live east of the proposed project examined today?

My name is Isabelle and I am a francophone living in Montréal. All my life I have lived in the lands fed by water by the source of the Ottawa River, on Anishnabeg territory and Kanehsatà:kes.

I was surprised to learn the audience would take place so far away west from the Chalk River site when the people who are at risk of contaminated water for the next five centuries onwards are located east. But why not, my People have not even been made aware of your consultation. Surely there was no need to accommodate many travellers from the east wishing to attend this consultation, for lowly people who have flown under the radar.

Certain experts are present from my people too, and I am grateful, but the Quebecers, as well as Indigenous Nations People close to, are downstream from the Chalk River site and Ottawa River, have not been treated like whole political subjects with an opinion and a voice and descendents.

Public consultation means consulting the public, in this case, water usage. You have been given an end date related to the disposal of low-level radioactive waste throughout the country and some toxic heavy metal waste, too. But the federally managed agency cannot decide about the future of water quality for our nation's east.

The Constitution Act of 1867 states: "Non-Renewable Natural Resources 92A In each province, the legislature may exclusively make laws in relation to development, conservation and management of non-renewable natural resources..."

And yet your project could trash access to safe water for 1.8 million people in Montreal alone.

Our political debates in this province

include giving intrinsic actionable rights to the St. Lawrence River. The proposed disposal site is not even in the same universe. Quebec has stopped all nuclear-based energy production more than ten years ago, and it was a fraction of what we used.

All activism in so civil society goes towards fossil remains of planets. We think we're done with nuclear, but no, because federally managed agencies of Canada want to put it in our water.

The dump mound has risk that cannot be downplayed. Saying new technology, perfect. I say expertise and provisional plans have their limits. Asbestos, Fukushima, Chalk River's NRS Reactor, EPAs and BPCs in baby bottles, micro-plastics everywhere, even in beaches sea spread, missiles of the future.

We are not Gods, we make mistakes. We do not live very long. Rogue author Guy K.

You say no roof for 50 years of filling the mound through rain or snow. You say to filter the water after it’s simmered in juice is responsible. Why then do the French leaders in nuclear management take so many precautions to keep nuclear waste dry and have such a hard time decontaminating landscapes affected by radionuclides?

I learned last year that in 1952 the core of the NRX Chalk River reactor was buried in its surrounding nature because of a nuclear accident, level 5. Chernobyl was a 7.

And the government was thinking of compensating the workers who were on the front line. The Canadian government didn't make that accident public, not to alarm. But this alone might have already caused deaths and suffering downstream. Core, far from being a Low-level radioactive waste. Plutonium having a lifeline of 82 million years, since on site, would also be put in the mound.

I watched a Quebec Radio-Canada renowned *Découverte* journalist show that it is land that the mound will eventually pour into la rivière des Outaouais in some hundreds years. That half-life calculations predict that the city won't be notable by then. I heard certain waste needed to be packaged in thick lead exteriors to become suitable to become Low-level radioactive waste. Do you believe the toxicity of heavy metals will also have eroded by the time the infiltration pours out, or are the municipal agencies supposed to take over ensuring filtration after filtration just to maintain the health of its citizens by then?

I've heard it's very hard to measure radioactivity in water, that tritium could not be contained by any known material. Municipal agencies have different degrees of water filtrating infrastructures related to their budget and populations. Is it not better to have non-contaminated water everywhere and filtering as a plus for standard than pollution as a base and filtration an added service needed to be provided as health becomes a luxury in a profit-based and human centred world.

Speculation is putting people to the streets while buildings abound. Cement is the number one greenhouse gas emitter. Landscapes and waterscapes are being treated as disposable in a world of rentabilité where money doesn’t relate to anything real anymore.

There is expertise knowledge. There are many forms of other knowledges and there are also values. When Samuel de Champlain visited as a European the waters of the St. Lawrence and the Great Lakes upstream, he was valuing fertility of the land above many other concerns because settlers were starving. When you look for disposal solutions, what are your criteria? Are you thinking in a fluid manner? Solutions are often far from permanent and that maybe a landfill-based solution is not very adaptable in time in regards to challenges and miscalculations unknown.

What are you thinking about for locations, this infringement on Anishinabeg territory with the Chalk

River Military Base constructed to contribute to nuclear weapons research during the Cold War. Maybe we don't want that in the future. Maybe we aim for Indigenous sovereignty. Maybe choosing a site that is actually not where a mature forest is, and the most precious non-renewable resource we have, could also be put as a possibility? Maybe even stable geological formations impervious to water instead of sedimentary rock?

We have instances to make collective and participative decisions because then we can combine all our brains and make win-win choices. The proposed project is not a win-win solution. It is imposed on collectivities who doesn't want it and belongs to the old way of doing things, the one of the last 500 years, not of the next five centuries, at least I hope so.

I wrote in my memoire: do you have hope for the future? And I meant it. Do you?

I was a child at the time of the second Millennium celebrations but I remember well the feeling at the time. We had hope in regards to Millennium objectives. We were trying to apprehend complexity with a sustainable development framework and the tentative loss that followed it. We felt the world could be about equality, happiness, abundance and positive results.

This project is about disparity, Russian roulette risk of cancers and public investments to keep sorting the messes made by private, for-profit, non responsible after a time groups. We could use water as our new highways inside the land, just as was done many million years before the last centuries. We could achieve non-impact and be integral parts of the world just like trees and animals who contribute so much to this world. We can be a positive force, not only in the sense of more problems to be expelled, but really as a different world. It is not about efficiency and transport. This is about the future of life and the eastern Quebec land and waters if your calculations are human instead of exact. I do not want this. And if this project is pressured on the people of our land, you can guess what the next results of our political disputes will be.

I am asking you to build metaphorical bridges and to revise this draft with any interested person and students as a best project win approach, instead of the "foie gras" approach imposed to the people downstream.

Thank you.

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

I will start with Madam Maharaj with questions, please.

**MEMBER MAHARAJ:** Thank you, Madam Velshi, and thank you, Madam Sawyer, for your presentation.

I do have a question arising out of your intervention, and I would like to pose it to CNL, please.

Could CNL describe the consultation radius? How far downstream was consultation done and how far upstream was consultation done with respect to potential impacts of this project?

**MR. BOYLE:** Phil Boyle, for the record.

I would like to have Pat Quinn, our Director of Communications, comment on that. Thank you.

**MR. QUINN:** Pat Quinn, for the record.

With respect to the radius, initially with the engagement with communities and Indigenous First Nations, it began in close proximity to the site, our normal routine. As we continued to engage, we determined that we wanted to expand the engagement size and the scope of our engagement.

We publicly went as far as the City of Gatineau and participated in proceedings with the Municipality of the City of Ottawa. But we continued to work alongside the western shore of the Ottawa River nearest Chalk River, so MRC Pontiac.

Our engagements also included, though, several Members of Parliament, Federal Members of Parliament. We also had the opportunity to meet with the

City of Montreal in the spring of 2018. This was actually in conjunction with some Gatineau engagements, and we attended meetings there with representatives from the city and we had the opportunity to discuss the project.

**MEMBER MAHARAJ:** Just as a follow-up question, did you give any thought to specifically reaching out to young people? And I say that because we've had a very impressive presentation from Ms. Psotka. Ms. Sawyer, a young person, is clearly very articulate and engaged.

Realistically speaking, I mean I'm a lot older than these young people are, and they are the ones who are going to have to bear the longer lifespan with this project and with its impacts.

Did you target any youth groups or younger people, or were you geographically focused in your consultation plan?

**MR. QUINN:** Pat Quinn, for the record.

That's a very good question. Before I pass it over to Mr. Mitch MacKay to talk a little bit about how we did some targeted engagement, I would like to point out that engaging with, for example, the next generation community was very important for us. So we made the efforts that way.

I should have also pointed out in my earlier response, I would like to indicate that we were very engaged with media, in particular media based out of Montreal and Quebec. So, we had opportunity to respond through participation in interviews, hosting media to site at Chalk River. That was also a channel in which we were able to get part of the message out.

**MEMBER MAHARAJ:** What do you mean when you say media?

**MR. QUINN:** Radio --

**MEMBER MAHARAJ:** My children tell me my concept of media is very different from theirs, and they are university students.

**MR. QUINN:** Definitely. Pat Quinn, for the record.

Radio, newspaper, television media.

**MEMBER MAHARAJ:** Social media or not?

**MR. QUINN:** We actually were using social media, Facebook, Twitter, for example, extensively throughout the duration of the campaign.

At this time I will turn it over to Mr. MacKay.

**MEMBER MAHARAJ:** Thank you.

**MR. MacKAY:** Yes. Mitch MacKay, for the record.

So, yes, specific to the project, we did make concerted effort to reach out to the youth. That meant visits to universities, to high school classrooms. We also included some of the work that we do regularly to reach out to the youth, like we have a newly established CONTACT newsletter that is designed actually for youth. That goes I think to approximately 12,000 households across Renfrew County and Pontiac County. And we included content related actually to the NSDF in that newsletter.

As Pat said, we also used different media sources that perhaps, you know, the youth are more engaged in: YouTube, different social media platforms. We tried to expand into different things as well, trying to get more sort of demographically younger people involved in some of our stuff. So certainly tracked that and some of the data that we had in terms of some of the engagements we've had.

I think that's what I will add to Pat's comment.

**MS. VICKERD:** Meggan Vickerd, for the record.

If I could, I want to just add another example that's actually in your slide deck, on slide 2 of Mr. McBearty's opening presentation. It is a picture of an event that we have regularly, which is Take Your Kids to Work Day through I believe it's grade 9 kids. We regularly include an offer of a tour and discussion of NSDF at that event.

**MEMBER MAHARAJ:** I appreciate that, but I think there’s a difference between junior high and high school students and young adults. Ms. Sawyer is a young adult.

I think the question I really have is: These young people who are making decisions for their lives and who are at the point where they can vote, they can do a lot of things, did you have a plan specifically to try to engage them?

I think we’ve had an answer from the back row. So, thank you.

**THE PRESIDENT:** Thank you.

Dr. Lacroix?

**MEMBRE LACROIX :** Merci pour votre intrevention. No, I do not have a question.

**THE PRESIDENT:** Thank you.

Ms. Sawyer, how did you hear about this hearing or even the project?

**MS. SAWYER:** I was co-President of the Sierra Club in Quebec, so the Quebec Chapter, for a year where I had the pleasure of hearing multiple people, some from Montreal very locally, some from the Ralliement contre la pollution radioactive and other experts, and I was very, very concerned. I tried to myself engage people. I don’t think they could believe me, that they could seize the impact of what was proposed, because it's inconceivable for us and nobody has ever heard about it.

There was a lot of media attention in 2018, a world ago before Covid and everything. But since then, nobody knew it was brought again back on the table.

**THE PRESIDENT:** Thank you.

Maybe the same question to CNSC around targeting engagement on this project with the youth.

I don't know. We should have asked Mr. Mairinger what role, if any, the North American Young Generation of Nuclear have played.

**MS. MURTHY:** Kavita Murthy, for the record.

Certainly we can say that Covid did influence how we did our outreach, but we did make an effort to do some webinars and post the webinars on our public website.

I think I will pass this to Kim Campbell to give you an answer.

**MS. CAMPBELL:** Kim Campbell, for the record.

Like Ms. Murthy did say, we did some open houses in 2017 and 2019 targeting in around the Chalk River area, so Pembroke, Renfrew and on the Quebec side, Sheenboro.

When Covid hit, we had to pivot. So, we pivoted to sort of an on-line virtual platform, which included several technical sessions, so with technical experts. And that invitee list went out to our info account, so people could participate virtually.

We also did several webinars, same info account, to gain some participation. Those webinars were videoed and put up on our page, YouTube page, because we know that is more of an agile approach for younger Canadians to access.

Also, an interesting note is that on the CNSC website there is an NSDF Landing page that was created that provides easily accessible information that's easily to be understood to the public.

Other than that, I would say that we could take away an improvement here to do a little bit more targeted outreach and engagement with the youth in Canada.

**THE PRESIDENT:** And specifically the youth in Quebec. As you see from this intervention, some very unique issues and concerns and objectives as well. I think that would be well worthwhile.

Ms. Sawyer, anything you wish to add before we conclude the presentation?

**MS. SAWYER:** I would like to clarify what are the different possibilities of what is going to happen.

This is the water that I drink, and this is the water that my family is drinking. I'm concerned, too, about the reactor that is just leaking for more than 50 years.

I do want to see nuclear disposal of waste taken into action, but I want to know if it's still open to make something that's going to work for everyone or if it's a yes or no, or what's going to happen.

**THE PRESIDENT:** That is exactly the matter that is in front of us as the Commission. You know, there's the environmental assessment and there is a request to amend Chalk River's licence to allow them to construct a Near Surface Disposal Facility. And really, it's up to the Panel here to make that decision, and are we going to approve the EA and allow the licence to be amended.

That's what this week's hearing is about, where we hear from intervenors. Then we will deliberate and decide whether we need more information or whether we are ready to make a decision.

But that is exactly the decision that we've been requested to make.

So, thank you very much for your intervention, for your presentation, for being flexible enough to re-arrange your schedule for this evening to make an earlier appearance. We greatly appreciate that. Thank you.

This brings us to the close of the hearing for today. The hearing will resume tomorrow morning at 9:00 a.m.

Thank you all for your participation, and I wish you a very pleasant evening. Thank you.

--- Whereupon the hearing adjourned at 6:19 p.m., to resume on Wednesday, June 1, 2022 at 9:00 a.m. / L’audience est ajournée à 18 h 19, pour reprendre le mercredi 1 juin 2022 à 09 h 00