

Canadian Nuclear
Safety Commission

Commission canadienne de
sûreté nucléaire

Public hearing

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Le 14 mai 2015

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

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

Commission Members present

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Dr. Sandy McEwan
Ms Rumina Velshi
Mr. André Harvey

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Mr. Marc Leblanc

M. Marc Leblanc

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Ms Lisa Thiele

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Pembroke, Ontario

--- Upon commencing on Thursday, May 14, 2015
at 9:03 a.m. / L'audience débute le jeudi
14 mai 2015 à 9 h 03

Opening remarks

M. LEBLANC : Good morning, ladies and gentlemen. Bonjour à tous. Welcome to the public hearing of the Canadian Nuclear Safety Commission.

The Canadian Nuclear Safety Commission is about to start the public hearing on the application by SRB Technologies (Canada) Inc. for the renewal of the nuclear substance processing facility operating licence for its facility located in Pembroke, Ontario.

During today's business, we have simultaneous translation in English and French.

Des appareils de traduction sont disponibles à la réception. La version française est au poste 2 and the English version is on channel 1.

We would ask that you please keep the pace of your speech relatively slow so that the translators have a chance to keep up.

L'audience est enregistrée et transcrite textuellement; la transcription se fait dans l'une ou

l'autre des langues officielles compte tenu de la langue utilisée par le participant à l'audience publique.

I'd also like to note that this hearing is being video webcast live and that the hearing is also archived on our web site for a three-month period after the closure of the hearing. The transcripts will be available on our web site in about 10 to 14 days.

To make the transcripts as meaningful as possible, we would ask everyone to identify themselves before speaking and, as a courtesy to others in the room, please silence your cell phones and other electronic devices.

Monsieur Binder, président et premier dirigeant de la CCSN, présidera l'audience publique d'aujourd'hui. Mr. President.

LE PRÉSIDENT : Merci, Marc. And good morning, and welcome to this particular hearing.

First of all, I'd like to tell you, on behalf of the Commissioners here, how delighted we are to be here today in Pembroke, outside of Ottawa. Any excuse to escape Ottawa is good, so we are really happy to be here and to give opportunity for intervenors to express their views about what is being discussed here today.

I'd also like to thank the hotel for the facilities that they provide us with.

As Marc said, this is -- I'd like to welcome all of you joining us through the webcast, and I think there will be some teleconferencing with some intervenors.

My name is Michael Binder, I am the President of the Canadian Nuclear Safety Commission.

And I'm going to introduce today the members of the Commission.

On my right is Mr. Dan Tolgyesi, and on my left is Dr. Sandy McEwan, Ms Rumina Velshi and Mr. André Harvey.

We have heard our Secretary, Secretary to the Commission, Marc Leblanc, and we also have with us here today Ms Lisa Thiele, Senior General Counsel to the Commission.

M. LEBLANC: The initial Notice of Public Hearing -- oh, still for you, I think. We have to adopt the agenda. Sorry.

THE PRESIDENT: Okay. So I'd like to call for the adoption of the agenda as described in CMD 15-H4.A.

Do we have concurrence? So for the record, the agenda is adopted.

CMD 15-H.A

Adoption of Agenda

THE PRESIDENT: Marc?

M. LEBLANC: Thank you.

The initial Notice of Public Hearing 2015-H-01 was published on November 14, 2014 to announce the opportunity for participant funding for intervenors, and revised notices were published on February 24th and April 23rd of this year to indicate the location and exact date for the hearing.

Submissions from SRBT and CNSC staff were due on March 13, 2015, and the public was invited to participate either by oral presentation or written submission.

April 13 was the deadline set for intervenors. The Commission received 46 requests for intervention. One request was received significantly after the deadline and was denied. Another one was denied as it was not specific to the SRBT renewal application.

May 6 was the deadline for filing of supplementary information. We note that presentations have been filed by CNSC staff, SRBT, as well as by intervenors.

Participant funding was available to intervenors to prepare for and participate in this public

hearing. Three groups or individuals participating today are receiving funding. The funding decision is available on the CNSC web site.

All documents are available at the reception, either on CDs or in paper format, as well as the Commission Members' biographies.

I would like to make other introductory remarks.

We are in Pembroke today to consider the written submissions and oral presentations from a large number of citizens and organizations who wish to express their opinions in the context of the SRBT renewal hearing.

I wish to emphasize that the Commission is a quasi-judicial administrative tribunal, and that, consequently, it is independent from any political, governmental or private sector influence. In fact, each Commission Member is independent of one another and also independent of the CNSC staff.

Interventions that are filed this -- for this hearing include recommendations to the Commission. CNSC staff also make recommendations to the Commission, but it is the Commission Members who will render a decision based on all the evidence presented in the context of the hearing process.

The Commission Members are appointed by

the Governor-in-Council on the basis of their achievements in their respective fields of endeavour as well as their excellent reputations among their peers.

Their mandate is simple: ensure that the use of nuclear is done in a manner that protects the environment as well as the health, safety and security of the workers and the public.

I would also like to emphasize that the CNSC has no economic mandate and will not base its decision on the economic impact of the facility.

Finally, as I stated earlier, the Commission is an administrative tribunal. It is willing to conduct this hearing in the affected community and to provide a forum where members of the public can express their views on the matter at hand.

As the Commission is a tribunal and wishes to hear all 10 verbal presentations and ask as many questions as it deems necessary on these and the 36 other written submissions, we ask that everyone respects the decorum of the tribunal setting and assists with the orderly, civil and respectful conduct of this proceeding.

The Commission will not tolerate inappropriate behaviour and will take measures necessary to ensure the orderly conduct of this proceeding in the same way it does for all other proceedings it conducts in Ottawa

and in the communities.

The way we will proceed today is that we will first hear the presentations by SRBT and CNSC staff, followed by the presentations from intervenors, in the order that is listed on the agenda.

I mentioned earlier that 10 intervenors are scheduled to present verbally today. And while the presentations are limited to 10 minutes, Commission Members will have the opportunity to ask questions after each presentation. And no time limit has been ascribed for the question period.

To help you in managing your time, a timer system is being used today. The light will turn yellow when there is one minute left and turn red and beep at the 10-minute mark. It, in fact, will also beep at the one-minute left to assist you in planning your time.

We will be addressing the written submissions after the oral presentations. Written submissions from people who choose not to make oral presentation are very important to this review. These written submissions are being carefully considered and we will address each of them before the close of the hearing.

There will be a final round of questions from the Commission Members at the end of the day.

The break for lunch will be at approximately 12:30 today for a period of one hour, and there will be short breaks in mid-morning and in the afternoon.

Your key contact persons will be Ms. Louise Levert and Ms. Johanne Villeneuve from the Secretariat staff and you will see them going around or at the back of the room, where they are at the moment, if you need information regarding the timing of presentations, documents, et cetera.

Mr. President.

THE PRESIDENT: Okay. Thank you, Marc.

I would like to start the hearing by calling on the presentation from SRB Technologies Inc., as outlined in Commission Member Documents 15-H5.1 and H5.1A and .B.

I understand Mr. Levesque will make the presentation. Over to you, sir.

CMD 15-H5.1/15-H5.1A/15-H5.1B

Oral presentation by SRB Technologies (Canada) Inc.

MR. LEVESQUE: Thank you very much, President Binder and other members of the Commission. My name is Stephane Levesque. I am the president for SRB

Technologies and I will be making the presentation today, and I am joined by our Vice President, Ross Fitzpatrick, who will help me answer some questions; our manager at Health Physics and Regulatory Affairs, Jamie MacDonald; our Project Engineering, Courtney Sinclair, and immediately behind me, Doug McNab, Independent consultant that we have retained.

SRB Technologies has been in operation since 1990 and currently employs 46 people. We are located in an industrial park on the outskirts of Pembroke and we lease 12,000 square feet of a building that's shared with two other tenants. The closest residence is approximately 250 metres from our facility.

SRB is licensed by the CNSC to process tritium for the manufacturing of gaseous tritium light sources, which are glass capsules coated with luminescent powder and filled with tritium. The interaction between the particles emitted by the tritium and the luminescent coating produces light on a continuous basis.

Our products ensure the safety and security of people all over the world. We are a supplier of aircraft science for many aerospace manufacturers, including Boeing, Canada Air, Beechcraft, and Learjet. We manufacture many vital products used by the Canadian and other NATO peace-keeping troops worldwide, including the

U.S. military, and as you can see from the picture in Figure C, the U.K. Ministry of defence, where you actually see Prince Harry using one of our products on deployment.

Other lighting technologies require wiring, power, or batteries. Our lighting products do not use electricity, thereby reducing energy consumption.

SRBT requests that the Commission renew our operating licence for a period of 10 years. We are requesting a licence with no new methods or processes and we will be operating our existing equipment with the same trained staff.

We request a licence with the same licence activities, the same release limits, the same action level, and the same possession limits.

Our renewal request is based upon our positive compliance history and safety record. Our facility was operated safely throughout the current licence. Our total air emissions were less than 18 percent of the licence limit. Our liquid emissions were less than 7 percent of the licence limit. The maximum dose to any of our workers in a given year was less than 2 milliSieverts. The maximum dose to a member of the public in any year was less than .007 milliSievert, which is less than 1 percent of the public dose limit. And we have only had one single lost time injury in the last licence period.

Our renewal request is based upon our stable and experienced workforce. Fourteen of the 15 staff that were employed in 2010 continue to work at the facility in the exact same positions. The other individual, the fifteenth one, has been appointed in a new position created called Compliance Manager that audits our processes and procedures on a continuous basis. Despite our growth, our workforce average is nearly nine years of experience at the facility and the average age of just over 40 years old.

Members of our Health Physics Team possess a combined of 107 person years working at SRB, which approximately averages 15 years per the seven members that we have in the Health Physics Team. Myself, the president, and vice president, Ross Fitzpatrick, now own the company, have a combined 42 years of experience managing and operating the facility.

Our renewal request is based upon our safety-related programs and processes. Programs and processes continue to undergo continuous review, improvement, and revision. Several new CNSC regulatory documents and CSA standards are being integrated in our management systems. Continuous improvement remains a key priority.

Our renewal request is based upon the success of our emission-reduction initiatives. Tritium

production has increased approximately four and a half times over the licence term, for releases to atmosphere have risen at less than half the rate of production. Therefore, the ratio of tritium release versus process continues to be driven down.

Our renewal request is also based upon public perception. We have had very little concerns expressed over the current licence period. Our public information program will ensure that regular public input is facilitated and considered in lieu of hearings. Regular meetings with all stakeholders would continue to take place as required and will continue an open flow of information between parties.

Our products are crucial to ensure the safety and security of people all over the world. Without our products, some companies would need to redesign their products at considerable cost. I would like to take this opportunity to ask you next time that you fly on a plane to look at the emergency doors and specifically at the door handle or latch on the door. Imagine aerospace companies having to redesign, test, and re-qualify their emergency doors to take in other products. It would force the use of inferior lighting technologies requiring wiring, power of batteries, resulting in lack of reliability, portability, in some cases safety. Military aerospace and commercial

organizations choose our products because they are safe, reliable and highly effective.

The sale of tritium light sources and products represent the sole source of revenue for SRB, including the after-sale service of taking back expired products. And contrary to comments from some of the interveners, the revenue associated with this practice in 2014 was 9 percent of our revenue and only 6 percent so far in 2015.

A 10 year licence term would allow resources to be focused on research to further reduce emissions, rather than to relicensing. You can imagine the resources involved in relicensing for a small company like us.

It will help us attract higher and retain highly qualified staff to support business growth and safety. Staff are more likely to join or stay at our facility when the future of the company is secure with our long-term licence.

It would assist us in securing long-term contracts with customers and suppliers. It would allow customers to design our products in their application for a long term. It would also allow suppliers to provide us beneficial terms for long-term supply contracts.

It would allow us to support planning of facility improvements and dedication of a fixed part of our revenue to emission reduction initiatives. It would also increase access to financing for equipment and training. You can also understand our banks are more likely to give loans when the future of the company is secure with a long-term licence, loans for emission reduction initiatives equipment or so on.

Our management system is comprised of programs, procedures, and associated documents that are in place with the purpose of meeting the *Nuclear Safety Control Act*, regulations and conditions of a licence.

SRB has analyzed several new or modernized standards in regulatory documents. Safety programs are continually improved to meet or exceed these evolving requirements, including CSA N292 on radioactive waste; CSA N393 on *Fire Protection*; Reg. Doc 2.2.2 on *Personnel Training*; Reg. Doc 2.10.1 on *Emergency Preparedness*; RD/GD-210 for *Maintenance Programs for Nuclear Power Plants*; RD/GD-99.3 on *Public Information and Disclosure*; CSA N294 on *Decommissioning*, and, lastly, CSA N286 on *Management system*. Regarding this last standard, SRB has analyzed its current management system and established an action plan to become compliant with CSA N286.

As an initial step, the SRBT Quality Manual, which governs and defines our key processes, management responsibilities and accountabilities, was revised in September 2014 to reflect organizational improvements and to provide greater clarity. SRBT fully expects to meet the requirements of N286 by the end of 2016 and we continue to keep CNSC staff informed of our progress towards this goal.

This is the organizational structure that's in place at the facility to meet the conditions of the licence, the *Nuclear Safety Control Act*, and the regulations:

Over the term of the current licence, a number of organizational improvements have been made. In 2012 we have added an Import and Export Specialist to support our Import and Export Manager. We have hired a Health and Safety Specialist with expertise in that specific area. We have hired a Project Engineer that worked in another CNSC-licensed facility for over two years. We, as I have discussed before, basically created a position of Compliance Manager, an individual that audits the facility over the course of the areas is their sole task, and they have worked at SRB in various capacities before that in management and in Health Physics for 16 years. In 2014 we also added a Manager of Health Physics

and Regulatory Affairs. This individual worked at SRBT for just over five years before moving to another CNSC-licensed facility for two years, and worked for the CNSC as an inspector conducting inspections for nearly six years in a wide variety of areas. In 2014 we also hired a full-time consultant that worked for the CNSC for over 30 years in various capacities. This individual was also intimately involved in the Decommissioning of Shield Source. And in 2015, in April, we recently added a Design Engineer.

Our organization includes committees which deal with specific areas affecting safety and that are instrumental in the development and refinement of programs and procedures. You can see in our written submission that we had as many as 91 committee meetings in 2014 and so far we have had 35 in 2015. In 2014 we also added two new committees, a Production Committee. And to help us implement Reg. Doc 2.2.2 on staff training, we have also instituted a new Training Committee.

Various performance assessment, improvements and management reviews take place at the facility. Throughout the term of our current licence, CNSC staff conducted several compliance inspections, facility visits, and promotional visits. And I'm proud to say that as of today all "action opens" have been addressed, so there's no open actions as a result of any of these

inspections.

We also have additional independent oversight. Annually we have audits by our ISO 9001 Registrar BSI management system. We've always had internal audits, but now with the addition of the compliance manager, we're having even more frequent internal audits, and actually 18 are planned in 2015, covering all safety control areas.

Over the licence term we've had three audits by Ontario Power Generation. We've had annual inspections by the Pembroke Fire Department. As required by our licence, we also had annual inspections by the fire protection consultants.

A number of our products are UL-approved -- or some would know as Underwriter Laboratories -- and as a result of that we have quarterly unannounced inspections by UL to make sure that the products are made to requirements.

You can also understand that with the many aerospace and military companies that we supply that we have had numerous customer audits as well.

All and any issues identified during these inspections, much like the CNSC inspections, and audits are promptly addressed.

We have always effectively trained our

employees in all key aspects of our licence activities and our operation.

As previously mentioned, REGDOC 2.2.2 on Personnel Training was published by the CNSC in August 2014. As a result, as briefly mentioned, we first appointed a new Training Committee to manage a transition to this new standard.

We've then undertaken a comprehensive analysis of all our processes to determine the activities that would require to be trained systematically. We then developed a Training Program Manual which was accepted by CNSC staff in March 2015. The inaugural cycle of the training program is scheduled for completion by the end of 2016.

We have other key training activities.

Radiation protection training is being given to all new staff that we hire at the facility. That's whether they work in an area that handles nuclear substances or in the office: any single member that works at SRB takes radiation protection training.

In addition to that, we have yearly radiation protection training that's mandatory for all staff -- again, whether you're handling nuclear substances or not. And that even includes myself, the president and owner of the company.

The Pembroke Fire Department performs yearly fire extinguisher training for all our staff. We do some first responder training. We have an external company that basically trains our staff that are involved with shipping and receiving packages and DGT. We receive health physics training and we do a lot of cross-training between the seven members of our health-physics team. We have fire protection committee member training. We have two committee members that are actually volunteers for two different communities and they receive extensive training as part of being volunteers. We've also received a lot of external training in health and safety.

We've continued to safely operate our Class 1B nuclear facility throughout the term of the licence period. We've added key expertise as I discussed in critical safety areas, and our programs and processes continue to evolve to meet regulatory requirements.

We continuously analyze, report, and trend our operating performance. We submit quarterly reports to CNSC staff in environmental monitoring. We submit monthly reports again to CNSC staff on groundwater monitoring. We submit annual reports under our dosimetry licence, and we meet all our reporting requirements on export and export licensing.

And we also have an Annual Compliance

Report that's also submitted to CNSC staff each year. This Annual Compliance Report is also posted on our website. The information used on this Annual Compliance Report and that of others in our section, other facilities, is used by the CNSC to produce the Annual Report on the Performance of Canadian Uranium Fuel Cycle and Processing Facilities. And it's important that people know that. Members of the public have and can provide written comments at these yearly meetings that present this data. SRB will continue to be in attendance and be available to answer questions of the Commission during these meetings.

In the future, we will also take the annual report and publish it on the SRB website. So not just our Annual Compliance Report, but also the report of the CNSC, well in advance of these meetings for the public to obtain.

The overall design basis of key structures, systems, and components relating to the facility and our licensed activities and relating to safety has not changed. Some component modifications have improved safety and reliability and reduced the environmental impact of our operations. The same modifications to key safety-related equipment have been implemented in a controlled fashion, including risk assessment, commissioning and testing plans, and

consideration of training.

Structures, systems, and components are maintained fit for service, and during the term of the current licence there were no significant equipment failures that presented a safety issue.

Ventilation systems were maintained fully operational. Stack flow performance was independently verified annually against design requirements. Liquid scintillation counters were maintained annually, and two new units were purchased, installed, and commissioned. We've added five new portable tritium and area monitors, one of which is kept at the Pembroke Fire Department. We've increased the number of stationary monitors by two, one in use and one that's kept as a spare. And the weather station was maintained as required.

SRBT took several actions as a result of the lessons learned at Shield Source Incorporated, formerly our competitor. This is where Shield Source was found to have issues monitoring their air emissions. As a result of these findings, SRB has elected to increase the frequency of stack monitoring verification from every two years to every year. We've invested a considerable amount of money upgrading and modernizing our equipment that had been purchased in 2005 and '06 that's associated with stack monitoring by purchasing and installing new "bubblers," new

tritium monitors for real-time emissions monitoring, and a new digital data recorder to complement the existing analogue paper chart recorder that we had.

The annual dose to our workers has been less than the regulatory limit of 50 millisieverts, and actually less than 1 millisievert in 2010 and '12. You can see the highest is in 2013 at 1.93, with the highest average as .25 -- and again, well below the limit of 50 millisieverts.

The maximum dose to a member of the public is also well below the regulatory limit of 1 millisievert. The highest over the licence period was in 2013 and stands at 0.0068 millisieverts, compared to the limit of 1 millisievert, which actually represents less than one per cent of the public dose limit.

Our lost time incidents over the licence period: we've only had one of them, as you can see, in 2011. And it was in an area where no radiological activities took place. We continue to implement improvements to ensure safety. Over 30 per cent of our employees are trained in emergency first aid and are trained to use the automatic electronic defibrillators.

The annual emissions of HTO, which is tritium oxide, and tritium gas were maintained at less than 18 per cent of the licence limit. And just let me remind

you that's despite increasing production over our licence term by four and a half times.

The annual emissions of HTO, which is the greatest contributor to public dose, were also maintained less than 27 per cent of the licence limit and again despite increasing production by four and a half times.

If you look at Table E briefly, you can see the numbers on the amount of tritium that we processed against what we released over the licence period. And when we actually look to see how well we're doing in reducing emissions, we looked at the released process ratio. And you can see that that, over the term of the licence, has gone down. And if I look at it specifically on Table F, you can see that where it stands at .23 in 2014, in 2010 and '11 it was .55 and .76.

SRB has been successful in reducing this ratio over the last several years. It was actually 1.7 per cent in 2008. So what that means in 2008 we were releasing 1.7 per cent of everything we were processing, down to now, .23, so less than a quarter of a per cent in 2014. And I'm happy to say that although the presentation says 16 weeks, now 17 weeks running in 2015 the ratio now stands at .15. So we're looking so far at another reduction this year.

This ratio is an excellent indicator of the overall effectiveness of our emission reduction

initiatives.

Throughout the term of the existing licence, our liquid emissions were also maintained well below the licence limit at less than seven per cent of the actual licence limit, the highest being actually 6.5 per cent.

We've had a groundwater monitoring program in place since 2006 that includes a sampling by a third party of 46 wells. The highest average concentration in one of the residential wells that we monitor in 2014 was 217 becquerels per litre and continues to trend downward. The concentration is well below the Ontario Drinking Water Guideline value of 7,000.

Of the 34 monitoring wells at the end of 2014, only two wells exceeded the Ontario Drinking Water Guideline value. Eight wells, as a comparison, exceeded this Guideline in 2007 compared to two now. Both of these wells are located on site within 50 metres of the stack. Actually, one is directly at the stack.

The concentrations are expected to gradually decrease with decay, hydrogeological processes, and dilution due to rain. And we will continue to not do any tritium processing operations during precipitation events as a means of further protecting groundwater.

An independent third party also collects

and analyzes samples as dictated by SRB's environmental monitoring program. We have 40 air monitoring stations that are located within two kilometres of the facility. We have eight precipitation monitors that are located between 250 and 500 metres from the facility.

A third party takes produce sampling from both local gardens and the local market. Local milk is sampled on a quarterly basis. Local wine is sampled at a brew-your-own place next to our facility. And the Muskrat River, which is located a few hundred metres from the facility, is sampled on a monthly basis unless frozen, and the concentrations are always near detection level.

All this data is used to calculate whatever quarter of the year the maximum dose to a member of the public as a result of the emissions from SRB. And when I relate to "maximum," is in calculating this dose we assume that an individual works right next door to our facility and breaths that air and lives right in the neighbourhood, right closest to SRB and breaths that air and doesn't go anywhere else between, other than work and home.

We assume that they consume only vegetables from the highest local garden that we've sampled and the local market and we assume, although Pembroke is on municipal city water, that they use a well that has the

concentrations that we've discussed.

So it's our worst case scenarios and it still gives you a dose of .0068 at maximum, so again, less than one per cent of the public dose limit.

On fire protection, our Fire Protection Committee meets at least every quarter. Our program was revised three times during the licence term and we performed a Gap Analysis against a new CSA N393 standard on fire protections, our facilities that process, handle, store nuclear substances and we've developed an action plan that was accepted by CNSC staff and the new program will be submitted in July, 2015.

We perform quarterly maintenance of the facility's sprinkler system and we perform monthly fire protection equipment inspections.

We've had at least five fire drills each year during the current licence term.

SRB has developed, implemented and maintained an Emergency Plan. The Emergency Plan was revised twice during the licence term and once as a result of the lessons learned from the disaster of Fukushima.

We then performed a Gap Analysis between our Emergency Plan and the new REGDOC 2.10.1 on nuclear emergency preparedness and response. We submitted an Action Plan which was accepted by CNSC staff with a

revision that the Emergency Plan which will be completed by September, 2015.

SRB also conducted a full-scale emergency training exercise on February 9th, 2015. It was conducted in concert with the Pembroke Fire Department, the City of Pembroke and was observed by several CNSC staff. During this exercise, we simulated an emergency situation in Zone 2 where tritium light sources are installed in and safety signs and devices. The response was deemed acceptable with all regulatory requirements being met. SRB identified only improvement opportunities, but no safety concern.

The latest revision of our Waste Management Program was accepted by CNSC staff on March 3rd, 2015. We've expanded the procedures that focus on processes outlined in CSA N292.

Between 2010 and 2014, SRB made 23 low-level waste consignments to licensed waste management facilities.

I'd like to clarify at this point some of the concerns voiced by intervenors. Any expired light source that we have is sent to a licensed waste facility and not to landfill. So that's any expired light source.

All waste shipments are also reported as part of our annual Compliance Report and, again, waste is not stored at SRB Technologies, waste is only temporarily

stored in our waste room which is a small room that's about seven feet by six and waste is shipped from it every couple of months.

Our Waste Management Committee is focused on reducing all type of facility waste generation.

We've had no security-related events throughout the current licence term. SRB continues to maintain the Security Program in accordance with the regulatory requirements and expectations. We've had several security enhancements and upgrades to improve the nuclear security that were made over licence period.

Maintenance of the security system is performed by an independent third party at least every six months and all and any minor issues that have been identified during physical security inspections by CNSC staff are promptly addressed.

In addition to tritium processing, SRB possesses, uses, stores and manages an extremely small quantity of depleted uranium. We presently have less than six kilograms on site, with approximately 3.3 kilograms in loose form, but the balance of it is being used in our containers that store and dispense tritium in our gas lights.

We're required to obtain import and export licences for international shipments. All requirements

relating to import and export licences continue to be met.

Regarding our import licences, we have to report at the end of each licence, except for the U.S.A. where we do it on a yearly basis, all the imports to the CNSC.

Regarding export, we're required also yearly, or depending on the licence, at the end of the licence to report all the exports associated.

In 2014, 1,122 shipments of product were made to 19 countries. Approximately 90 per cent of our shipments are destined for customers in Canada or the U.S. No transport incidents involving our packages have occurred over the licence term and SRB continues to comply with all requirements.

Due to the comments expressed by a number of intervenors in the submissions, we will include all import and export of tritium by country in future annual Compliance Reports and this information will be posted on our website. So again, any import that we do and export will be reported by country in future annual Compliance Reports on a yearly basis.

Plant tours have proven to be a useful tool to reach the public. Ninety-eight plant tours were conducted between 2011 when we started tracking them and the end of 2014 and so far we actually had 30 tours in

2015.

Up until the end of 2014, we only received two inquiries from members of the public during the current licence term. Information pamphlet and licence renewal information was sent to various stakeholders, including those living within 500 metres of the facility. As a result, we've had very little to no concerns expressed.

We've also sent the same information pamphlet, which I have here today and I can make available for the public or members of the Commission, to 10,000 residences --

Excuse me.

We sent the same information pamphlet later to 10,000 residences and businesses and establishments in Pembroke and neighbouring Laurentian Valley. As a result of sending these 10,000 pamphlets, we received one e-mail with questions which we responded to.

We've also performed a door-to-door campaign of 369 residences within four kilometres of our facility. Seven individuals that were at home expressed very little to no concern.

We can also provide any information to any members of the public, including the recent interventions that we received, even if they don't live in our local community. I just need to be provided their contact

details or they can request it and we can send it to them.

Our revised Public Information Program was made to address comments received by CNSC staff and to reflect requirements of RD/GD-99.3. In October, 2014, staff approved this Public Information Program and deemed it fully satisfactory.

We have a Public Information Committee that manages the program throughout the term of the current licence. Meetings are held quarterly to discuss public opinion, media coverage and discuss Public Information Program and Public Disclosure Protocol. The former Mayor of Pembroke, who served Pembroke for 18 years, including three terms as Mayor and two terms as Deputy Mayor, is now employed by SRB and is now a member of this Committee.

We also recently invited members of the Concerned Citizens of Renfrew County and the First Six Years Organization when they took part in a tour of our facility to be part of our Committee and I understand that Ms O'Grady from the First Six Years will take part.

Our website was frequently updated throughout the current licence term. We recently completely redesigned our site, and if I can draw your attention to Figure K on the screen now, you can see that there's a tab where public notifications, that's marked in red, where information's regularly posted. This includes

information like my presentation today, our written submissions, our licence application and actually we posted the CNSC submission.

We also have an area where we post the Licence and Licence Condition Handbook. We post all our annual Compliance Reports, our Addendums. We post our monitoring results, we provide details of presentations like I did to City Hall and we provide information on tritium and radiation. We also recently added an area to provide information on emergency preparedness. For example, the Report that was provided as a result of the exercise is now linkable and obtainable on the website.

We also have a number of public involvement initiatives and community support that we post on there.

You'll see at the bottom right of the picture that our Facebook page was recently developed and linked to the website. We first started using it to notify members of the public of the emergency exercise, but now we're using it for other things.

SRBT complied with the repayment schedule stipulated in our current licence regarding cost recovery. The final payment and cost adjustment was paid on September 25th, 2013. Regular payments are now made and SRB is in full compliance with the cost recovery fee regulations.

We have a CNSC approved financial guarantee which was approved on June 26, 2008. Based on the previous revision of our PDP, Preliminary Decommissioning Plan. The final instalment was made in April, 2014 which brought an account held in escrow to just over \$550,000 and continues to build interest. SRB has no access to these funds, it's only the escrow agent and the CNSC that would be able to get the money.

Following the closure of Shield Source and their decommissioning, SRB actually hired the contractors that were directly involved with decommissioning the Shield Source, RadSafe and Mr. McNab here today.

With the information, we revised our PDP, our plan, in late 2014 to make sure we have any activities that we haven't thought of in the original one based on what was found in the Shield Source and now requires us to increase our financial guarantee by just over \$102,000 for a total of just over \$652,000.

We propose as part of this licence to have six equal payments of \$17,000 to be made every six months to the existing escrow account beginning in October, 2015.

In our future outlook we're committed to product development in safety applications only where we use our products with a focus on contributing to the safety of people in situations where reliable illumination is

needed.

We're committed to no less than five per cent of our annual profit over our new licence term to researching and implementing emission reduction strategies and technologies.

We're committed to integration with the scientific and nuclear community to advance education, emission reduction and environmental monitoring initiatives. We are also committed to the reduction of occupational doses, strive to lower the dose to all our workers well below the public dose limit of 1 mSv.

In conclusion, throughout the term of the current licence, SRBT has operated the facility safely and in accordance with the provisions of the licence and *Nuclear Safety and Control Act and Regulations*. SRB has demonstrated its commitment and integrity by the work described in this submission.

SRB has demonstrated that it will continue to make improvements in the future by the various initiatives, goals and targets described in this submission and based on important concerns raised by the CNSC, members of the public, and our employees.

We therefore believe that under section 24(4) of the *Nuclear Safety Control and Act* SRBT is qualified to carry on the activity for which it has applied.

And will, in carrying on that activity, make adequate provisions for the protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Thank you very much.

MR. LEBLANC: Mr. Levesque, if you can provide a copy of the pamphlet to Madam Levert so it can be part of the record? Thank you.

MR. LEVESQUE: Stephane Levesque, for the record. Okay.

THE PRESIDENT: Thank you.

I would like now to move to a presentation by CNSC Staff as outlined in CMD 15-H5 and H5.A.

I understand that Dr. Newland will make the presentation. Over to you.

CMD 15-H5/15-H5.A

Oral presentation by CNSC staff

DR. NEWLAND: Thank you.

Good morning everyone, good morning, Mr. President, Members of the Commission. My name is David Newland and I am the Acting Director General of the Directorate of Nuclear Cycle and Facilities Regulation.

With me today is Mr. Michael Rinker, Director of the Nuclear Processing Facilities Division. We also have licensing and compliance staff as well as subject matter experts with us to help answer any questions that the Commission Members may have.

We are here today to present Commission Member Document CMD-15-H5 entitled, A Licence Renewal, SRB Technologies (Canada) Inc.

I will now pass the presentation to Mr. Michael Rinker, thank you.

MR. RINKER: Good morning, Mr. President and Members of the Commission. My name is Michael Rinker and I am the Director of the Nuclear Processing Facilities Division at the CNSC.

The purpose of this presentation is to provide CNSC Staff recommendations on the licence application from SRB Technologies (Canada) Inc., or SRB, for renewal of its nuclear processing facility operating licence.

To support the CNSC Staff recommendation I will present highlights of the CNSC regulatory oversight of this facility, the performance of the facility over its licence term, areas of regulatory focus and other matters of regulatory interest. And finally, I will present the CNSC Staff recommendations to the Commission on this

licensing matter.

SRB is a gaseous tritium light source manufacturing facility located in Pembroke, Ontario. SRB leases a space in an industrial building similar in size and appearance to a strip mall that is located on the outskirts of Pembroke.

As you have just heard, SRB manufactures several types of radiation devices for military and aerospace applications. SRB also manufactures emergency lighting devices such as exit signs, safety markers and safety signs that are found in public places.

The devices are commonly used for emergency lighting where the uses of conventional electrical lighting is unavailable or impractical. The current SRB nuclear substance processing facility operating licence expires on June 30th, 2015. SRB has requested a 10-year licence. No new activities are proposed that are not currently authorized under the current licence.

SRB has requested to increase the footprint of the facility by 180 square metres to accommodate the storage of non-radiological materials.

This slide provides a timeline of licensing actions related to the SRB facility. In 1990 Saunders-Roe (Canada) Inc., now SRB, was issued a radioisotope licence by the Atomic Energy Control Board to

produce tritium-filled glass tubes for use in self-luminous emergency exit signs.

As a result of the Nuclear Safety and Control Act coming into effect in 2000, SRB was issued a Class 1B nuclear substance processing facility operating licence for the same activities it had conducted in the 1990s.

This licensing action was accompanied by an environmental assessment that concluded the resulting dose to workers and members of the public would be minor on the environment and the health of Canadian citizens would be protected.

However, the report identified the requirement for an environmental monitoring program.

In 2005 SRB was issued a one-year licence with restricted conditions due to SRB's failure to control releases of tritium that resulted in groundwater contamination.

In 2006 SRB applied for the renewal of its operating licence, however the Commission was not satisfied that SRB could continue to operate due to its tritium releases and resultant groundwater contamination.

As such, SRB was not permitted to process tritium. From 2006 to 2008 SRB undertook several steps to mitigate its tritium emissions and protect the groundwater

resource.

These mitigation measures, including the replacement of oil pumps with pumps that did not use oil, changes to tritium handling practices, and retrofitting the filling rigs.

In 2007 this SRB licence was amended to allow SRB to assemble signs using light sources manufactured elsewhere. At that time, the Commission requested CNSC staff to initiate research studies on tritium releases in Canada.

In response, the CNSC Staff undertook several research projects under the banner of the tritium studies project.

In 2008 SRB applied to the CNSC to amend its licence to resume processing of Tritium for a period of two years. The Commission concluded that SRB had made major improvements to its qualifications and performance in the area of environmental protection.

Consequently, SRB was issued a two-year nuclear substance process facility operating licence. Between 2008 and 2010 CNSC Staff conducted tritium studies under the banner of the tritium studies project. The project resulted in seven CNSC publications that are now available on the CNSC website.

In 2010 SRB's operating licence was

renewed for a period of five years. At the time of renewal, CNSC staff provided additional information on groundwater detailing the trend in tritium concentrations in residential wells, CNSC Staff's assessment of the movement of tritium in groundwater, and CNSC Staff's conclusions

The graph on this slide shows the amount of tritium that was released from SRB since the year 2000. Releases in 2000 were near 18,000 terabecquerels per year and decreased to less than 100 TBq per year when operations ceased after CNSC regulatory action.

Improvements to facility design and operations, together with an improved safety culture at SRB, have kept releases below 100 TBq after operations recommenced in 2008.

The blue insert is an expanded view that better illustrates the low releases since 2008 and during the current licensing period.

Tritium releases from the SRB facility to the environment occur by way of stack releases. Tritium is not released directly to groundwater. Tritium, because of its association with water, is deposited on the ground surface as moisture or rainfall. Tritium then migrates through the soil to the underlying groundwater table.

While releases to the atmosphere and

deposition on the ground surface can occur relatively quickly, the migration of tritium from the ground surface to the underlying groundwater takes approximately five to eight years near the SRB facility.

This is an important distinction for impacts to groundwater. And this understanding of tritium behaviour in the environment is the basis for restriction on the SRB facility to stop operations during rainfall events.

This figure provides the most recent average annual groundwater monitoring data near the SRB facility. As expected, the highest tritium levels in groundwater occur adjacent to the stack at SRB.

The groundwater flow direction is towards Muskrat River. However, groundwater flows very slowly in this area, on the order of a few metres per year. And Muskrat River is approximately 400 m from the SRB facility.

The concentration pattern observed in this slide is reflective of the aerial deposition pattern and not the migration of a plume. That means the values in Muskrat River are not expected to increase from what is observed today. The river is protected and will remain protected.

Tritium values in wells located in the nearby residential area are near or below 200 Bq/L. These

values are well below the provincial drinking water standard of 7,000 Bq/L. Moreover, these residences are connected to the municipal water supply whose intake is from the Ottawa River. Monitoring data from the Ottawa River are near the detectable limit of tritium of 5 Bq/L.

During SRB's last licence renewal application in 2010 the Commission, as well as CNSC Staff, were concerned about the apparent increasing trend of tritium concentrations at monitoring well MW 6-10 under the SRB stacks.

CNSC Staff were paying serious attention to the matter and conducted groundwater modelling to gain some knowledge as to whether the increasing trend would continue. And, if yes, for how long?

CNSC Staff also wanted to independently verify the licensee's conclusion that the high tritium concentrations in the soil were due to historic practice and not related to current emissions.

CNSC Staff use modelling to help provide the Commission with information for the regulatory decision making.

The modelling results for tritium concentrations at groundwater monitoring wells at this SRB site predict the concentration trends and is based on average hydrological and hydro geological parameters using

soil moisture data obtained in 2006.

The modelling gave Staff confidence that at the time of the work in 2010 the tritium concentrations were caused by high tritium concentrations in the soil due to previous years' inventory, and that tritium concentrations in this monitoring well would continue to increase for a short period of time and then they would eventually start to decline.

In the plot, additional measured data from 2010 to 2014 were added to the 2010 prediction. From this plot, one can see that although there is high variation in the measured data, they do support the predicted trend to provide further evidence to confirm CNSC's understanding of the behaviour of tritium in the groundwater.

The data plotted on these graphs provide additional evidence that groundwater conditions near the SRB facility continue to recover after relatively high concentrations that were observed previously at this facility.

The figure on the left is a monitoring well that is located adjacent to the SRB facility. This well is for monitoring. It is capped and locked, and it is not accessible for drinking.

Concentrations in this monitoring well exceeded 100,000 becquerels per litre in 2007, but have

since declined to below the provincial drinking water standard of 7,000 Becquerels per litre.

The figure on the right is a well located at a business located adjacent to SRB. The tritium concentrations exhibited an increasing trend, followed by a long and steady declining trend. This observation is also reflective of high concentrations of tritium in the soil profile when emissions were high, followed by a period of recovery or improvement now that SRB has greatly reduced its releases to air.

In January 2007, the Commission directed CNSC staff to initiate research studies on tritium releases in Canada and to study and evaluate tritium processing facilities, exercising the best practices around the globe. In response, the CNSC has undertaken several research projects under the banner of the tritium studies project.

The purpose of this research was to enhance the information used in the regulatory oversight of tritium processing and tritium releases in Canada.

The research included a review of tritium in drinking water, the environmental fate of tritium in the atmosphere, soil and in vegetation and garden produce, and the studies included the environment around the SRB facility here in Pembroke.

Tritium from nuclear facilities is

released as HT, a gas, or HTO, which is tritiated water. The tritiated water is deposited on soil, a portion of which is converted to organically-bound tritium, or OBT.

The models used to predict tritium concentrations in local produce tend to over-predict total tritiated water, but have under-predicted the proportion of organically-bound tritium. This has been taken into account in the calculation of public dose resulting from the release of tritium by using directly locally-measured HTO and OBT in public dose calculations.

It was determined that the contribution of tritium to the public dose in Pembroke as well as near other nuclear facilities in Canada is very low.

The CNSC staff has also studied the health consequences of tritium near nuclear facilities in Canada. The results of laboratory studies demonstrate that detrimental health effects could only occur if doses were much higher, a million times higher, than doses the public would receive from Canada's nuclear facilities.

Epidemiological studies examined 42,000 Canadian nuclear workers and found no evidence of health risk from tritium exposure.

These same studies have shown that public doses resulting from Ontario nuclear facilities are 100 to 1,000 times lower than typical natural background

radiation.

And finally, this work also demonstrated that there was no evidence of childhood leukemia clusters near nuclear facilities in Canada.

In summary, the environment and the health of Canadians is protected through the CNSC's regulatory oversight from facilities that release tritium.

I would now like to focus this presentation on today's application for the renewal of the SRB operating licence.

Licensing considerations were based on CNSC staff's review of the licence application and the information submitted to support the application. In addition, CNSC staff assessed SRB's past performance and its compliance with the regulatory requirements of 13 safety and control areas and other matters of regulatory interest.

A summary of this assessment is provided in the following slides.

In general, SRB's compliance record over the past five years has demonstrated a commitment to safety and to transparency.

CNSC staff are recommending the removal of the safeguards licence condition from SRB's new licence because the existing licence condition is redundant with

Section 12(1)(1) of the General Nuclear Safety and Control Regulations, which states that:

"Every licensee shall take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement."

For licensees with small inventories of low significant materials, the General Nuclear Safety and Control Regulations alone is considered sufficient.

For SRB, this regulatory requirement applies to a quantity of depleted uranium that is used in SRB's process.

All shipments of tritium to international destinations or receipt of tritium for an international -- from an international destination must be authorized by the CNSC through the issuance of separate -- of a separate licence under the CNSC's nuclear non-proliferation import-export regulations.

The proposed removal of the safeguards licence condition will not alter in any way the non-proliferation obligations on SRB in regards to tritium, which are derived from the CNSC regulations.

Lastly, I wish to take this opportunity to clarify the status of tritium with respect to IAEA safeguards agreements.

As per the Treaty on the Non-Proliferation of Nuclear Weapons and the Canada IAEA safeguards agreement, IAEA safeguards cover uranium, thorium and plutonium-239, which are materials which could be directly or indirectly used to make a nuclear weapon.

While tritium can increase the yield of a nuclear explosion and is thus covered by the CNSC's nuclear non-proliferation import-export regulations, it cannot generate a nuclear explosion on its own and so is not under IAEA safeguards.

I would like to make a correction with regards to CNSC staff request for delegation of authority. In CMD 15-H5, we have requested that the Commission accept the delegation of authority to CNSC staff as outlined in the proposed Licence Condition Handbook.

Staff are rescinding this request, as there are no hold points in the proposed licence, and any changes to the facility outside of the licensing basis would require Commission approval.

The Licence Condition Handbook will be modified to reflect this change before it would be issued to the SRB should the Commission decide to renew the licence.

SRB is currently regulated by the CNSC with a Class 1B nuclear substance processing facility

operating licence that was issued pursuant to the *Nuclear Safety and Control Act*. In general, after the Commission grants a licence, the role of CNSC staff is to provide the regulatory oversight in order to ensure that SRB is operating its facility in a safe manner in compliance with the *Nuclear Safety and Control Act*, its Regulations, SRB's operating licence that authorizes its activities and SRB's programs that are used to meet the regulatory requirements.

To ensure the facility operates safely, CNSC staff apply a risk-informed approach to the compliance oversight of the SRB facility.

The level of risk at this facility is considered in the development of compliance verification program and the frequency at which safety and control areas are inspected.

As part of the compliance oversight, CNSC staff perform inspections, desktop reviews of SRB's programs and procedures, event reviews and reviews of annual compliance monitoring and operational performance report.

Performance at each safety and control area is continually assessed by CNSC staff and reported annually in CNSC staff annual reports to the Commission.

CNSC staff ensure that SRB staff are qualified to perform their work, that the facility and

equipment is maintained and updated if necessary to respond to lessons learned from operating experience.

CNSC staff track all identified non-compliance to resolution. Any risk significant issues are brought in front of the Commission as per the event initial report process.

SRB is responsible for ensuring the safe operation of its facility, whereas CNSC staff independently verify SRB's performance.

CNSC staff conducted several site visits with SRB during this licensing period. Typically, CNSC staff conduct these visits to observe the conditions at the facility, to introduce updated standards or clarify expectations with licence's management and staff.

For example, in 2014, staff visited SRB to discuss topics such as the 2015 relicensing activities, implementation of updated personal training regulatory requirements and Canadian Standards Association management system requirements for nuclear facilities.

In addition, using a risk reformed regulatory approach, staff performed a minimum of one inspection per year at SRB. Because of the low level of complexity of the SRB facility, it is possible to inspect several safety and control areas during a single inspection.

The compliance verification activities, therefore, include standard checks of SRB's program in all 13 safety and control areas.

Licenseses are required to submit a report within 20 days of a reportable event. CNSC staff perform desktop reviews of these reports and ensure adequate corrective measures have been implemented to prevent the recurrence of a similar event.

SRB had no reportable events during this licensing period.

Enforcement actions are a part of the normal ongoing compliance processes used by CNSC staff. The enforcement tools available to CNSC staff include orders, directives, action notices and administrative monetary penalties.

During the current licensing period, staff issued 12 action notices to SRB. There are no open enforcement actions with SRB at this time. All were closed to the satisfaction of CNSC staff.

To date, SRB has addressed all CNSC staff requests requiring no escalation of enforcement actions during the licensing period.

Finding of these inspections identified areas for improvement as opposed to regulatory non-compliances. None of the identified inspection

findings during the licensing period pose an immediate or unreasonable risk to the health and safety of persons or the environment. Rather, the findings were required to address -- to be addressed for better alignment to SRB's own programs and for continual improvement.

Performance in all safety and control areas has remained satisfactory to fully satisfactory during the current licensing period. SRB staff have the expertise and qualifications to safely carry on the activities authorized by the licence.

No worker or member of the public received a dose in excess of the regulatory dose limits, and all radiological releases were well below regulatory limits.

An environmental assessment under the *Nuclear Safety and Control Act* and its Regulations was conducted for this application. CNSC staff conclude that SRB will make adequate provision for the protection of the environment.

Only one lost-time incident occurred during the licensing period. SRB's programs were implemented and maintained effectively in accordance with its own operational requirements and licence requirements.

This slide provides a summary of SRB's ratings over the current five-year licensing period for 13 safety and control areas. Overall, the safety and control

areas range from satisfactory to fully satisfactory.

The safety and control area convention on health and safety was rated fully satisfactory in 2013 and 2014 as a result of its consistent record of worker protection.

In 2014, CNSC staff rated SRB's fitness for service program as fully satisfactory as a result of several improvements to its manufacturing process, equipment and revision of its maintenance program in 2014.

These improvements proactively incorporated best industry practice.

SRB has implemented and maintained an effective radiation protection program as required by the radiation protection regulations. All workers at SRB have been designated as nuclear energy workers in accordance with the radiation protection regulations.

Radiation exposures are monitored to ensure compliance with the CNSC's regulatory dose limits and with keeping doses as low as reasonably achievable.

Throughout the current licensing period, no worker's radiation exposures reported by SRB exceeded the CNSC regulatory dose limits. The maximum effective dose by a worker in the current licensing period was 1.93 millisieverts, or approximately four percent of the regulatory limit of 50 millisieverts in a one-year

dosimetry period.

The yearly variation of SRB staff's radiation exposure is directly correlated with three primary factors; the level of tritium processing, the types of light sources being manufactured and the results of ALARA-driven improvements to manufacturing processes, equipment and programs.

CNSC staff are satisfied that doses to workers are being controlled well below the regulatory limits and are maintained as low as reasonably achievable.

Public dose resulting from the SRB facility is based on environmental monitoring results. The maximum dose to a member of the public as a result of the emissions from SRB over the term of the licence have been less than 0.007 millisieverts. This is 0.7 percent of the annual public dose limit.

The increase in calculated maximum annual effective dose to a member of the public from 0.004 millisieverts to 0.007 millisieverts observed in 2013 and '13 is attributed to approximately threefold increase in tritium processing during the same period, from approximately 10,000 terabecquerels in 2012 to 30,000 becquerels in 2013.

Based on the review of the dose data, CNSC staff are satisfied that SRB is adequately controlling

radiation doses to members of the public to levels well below regulatory limits.

A key performance measure of the conventional health and safety is the number of lost time injuries that occur per year. And a lost time injury is an injury that takes place at work and results in the worker being unable to work -- to return to work, carry out their duties for a period of time.

During the licensing period, SRB continues to demonstrate its ability to keep workers safe from occupational injuries while tritium processing increased and, as a result, SRB increased its staff from 15 to 43 employees to meet their production demands.

Only a single lost time injury occurred during the current licensing term as a result of an injury that occurred during the machining process in a zone where no tritium is handled or processed.

As seen in this table, SRB's releases to the atmosphere continue to be effectively controlled and are consistently well below the release limits prescribed in its operating licence. The release limits are based on environmental protection and ensure sustainability use of -- sustainable use of groundwater resources as well as consideration of public dose implications.

The release limits for SRB are much lower

than would be required to protect the public so the groundwater as a resource can also be protected.

There were no licence limit exceedances during the current licensing period. However, during the period of October 28th to November 4th, 2014, there was a gaseous tritium action level exceedance of the weekly action level for tritium.

The release represented 3.7 percent of the annual release limit for total tritium.

SRB conducted an investigation into this exceedance to identify the contributing cause and root cause. SRB's investigation concluded that the higher tritium emissions were related to a leak in a gaseous tritium light source and a second leak in a manifold gauge.

CNSC staff reviewed SRB's investigation report and corrective actions, and found both to be acceptable.

SRB continues to effectively control tritium releases to air from the facility and are well below licence limits.

The monitoring data for releases to the sewer system from 2010 through 2014 are shown in this table. The data shows that liquid effluent from the facility continues to be effectively controlled and that tritium releases are well below the licence limit.

The IAEA has published IAEA Tecdoc-000 titled "Clearance of Materials Resulting from the Use of Radionuclides in Medicine, Industry and Research".

This document provides a method for calculating permissible releases to sewer systems that would ensure that municipal workers are protected if all the tritium remains in the sewage sludge and if all the tritium is released to a small river system.

The CNSC has selected 20 percent of the level that is determined from this international approach as the licence limit, and SRB has been releasing tritium at much lower values relative to the licence limit.

SRB continues to effectively control both releases to air and releases to the sewer system, and all releases remain well below licence limits.

SRB has a very good safety record. There are currently no safety concerns and, from CNSC staff perspective, no impediments to renew the operating licence.

Nevertheless, CNSC staff have regulatory focus areas which stem from Commission's direction, from operational experience and/or new research findings. The two main focus areas for this licence renewal are, first, the implementation of updated standards in Regulatory Documents and, second, environmental monitoring.

These are described in more detail in the

following slides.

SRB is working in these areas for continuous safety improvement, which is an integral part of the CNSC regulatory framework.

This table shows eight updated CSA standards and Regulatory Documents that are proposed for inclusion in the Licence Condition Handbook. The implementation dates are listed on this slide.

SRB submitted to CNSC staff revised training program in January 2015 that meets the requirements of the personal training Regulatory Document 2.2.2. CNSC staff will continue to monitor the implementation and effectiveness of this updated program.

In addition, CNSC staff will continue to update the Commission on the progress of these continuing improvement activities by the annual regulatory oversight report on uranium in nuclear processing facilities.

During the licensing period, tritium processing at SRB ranged from 6,644 terabecquerels in 2010 to a maximum of 30,543 terabecquerels in 2013. However, releases of tritium to air relative to the amount of tritium processed reached their lowest point in 2014 after three consecutive annual reductions.

CNSC staff attribute this decrease in relative emissions to the tritium reduction initiatives

undertaken by SRB during the licensing period.

Despite the production increase, SRB's environmental limits found in the proposed Licence Condition Handbook will remain the same as in the current licence.

CNSC staff have verified through their compliance activities that SRB has adequate operational controls to provide assurance that the release limits stipulated in the operation licence would not be exceeded.

SRB monitors 46 groundwater wells around the SRB facility. Since renewal of the licence in 2010, SRB has conducted a groundwater study which confirmed that the residential wells with the highest tritium concentration of 226 becquerels per litre in 2013 and the Muskrat River with tritium concentrations for the last two years in the range of three to 22 becquerels per litre are not at risk of exceeding the Ontario drinking water quality standard of 7,000 becquerels per litre.

The highest tritium concentration in a potential drinking water well was found in business well B2, averaging 1,238 becquerels per litre in 2014.

SRB continues to provide bottled drinking water to the business, even though the tritium concentrations are well below the Ontario drinking water standard.

CNSC staff independently -- independent analysis of SRB's groundwater monitoring results are further discussed in the environmental assessment information report found in Addendum E of CMD 15-H5.

Overall, CNSC staff conclude that the tritium inventory in the groundwater system around the facility has been stabilizing and improving as expected.

The Canadian Nuclear Safety Commission conducts environmental assessments under the *Nuclear Safety and Control Act* for all projects in accordance with its mandate to ensure the protection of the environment and the health of people. As found in Appendix E of CMD 15-H5, CNSC staff prepared an information report based on the environmental assessment review completed for the licence renewal application submitted by SRB.

As a result of the environmental assessment review, CNSC staff conclude that SRB has and will continue to make adequate provision for the protection of the environment and the health and safety of persons.

CNSC staff launched an environmental monitoring program for SRB. CNSC staff independently monitored results to confirm that the public and the environment around the SRB are safe. These results -- the results of the independent environment monitoring program are consistent with the results submitted by SRB,

confirming that the licensee's environmental protection program protects the health and safety of people and the environment in the vicinity of the SRB facility and that there are no health impacts. These results are published on CNSC's website and demonstrate continuous improvement efforts of both SRB and the CNSC's ability to communicate its regulatory oversight.

In 2013, as requested by the Commission, CNSC staff measured the concentrations of tritium in sewage sludge in various municipalities in Ontario, 11 in total. This request was in response to concerns raised in 2011 by members of the public during the Commission's meeting for SRB's Annual Status Report on the safety performance of the facility.

The tritium concentrations in sewage sludge and liquid effluent were below the analytical detection limit for all wastewater treatment plants sampled except for those in Peterborough and in Pembroke.

Using the finding from Pembroke Wastewater Treatment Plant, the doses of radiation from the measured concentration of tritium in sewage sludge were calculated for two representative persons: a worker in the wastewater treatment plant involved in sewage sludge loading, and a worker at a municipal landfill who was involved in applying landfill cover to waste. The estimated annual effective

doses were 10,000 to 5 million times below the regulatory annual public dose limit of 1 milliSievert. Well below doses is known to cause health effects. The dose from tritium in sewage sludge also represents a small fraction of the natural background radiation. As a result, the report concludes that there was no impact on public health and supports the licence limit for SRB's releases to the sewer as being very protective.

The CNSC ensures that all of its licence decisions under the *Nuclear Safety and Control Act* uphold the honour of the Crown and consider Aboriginal people's potential or established Aboriginal and/or treaty rights pursuant to section 35 of *Constitution Act, 1982*.

Aboriginal groups who previously expressed interest in being kept informed of CNSC licence activities occurring in their traditional territories were sent letters in December of 2014 providing them with information regarding the licence renewal application, the opportunity to apply for participant funding, and details regarding the Commission's public hearing. Follow-up phone calls were conducted to ensure that they had received the letters and to answer any questions. To date CNSC staff have not been made aware of any concerns related to the licence renewal from the identified First Nation and Métis groups.

At renewal in 2010, the Commission

exempted SRB from the *Cost Recovery Fees Regulations*. The exempt was temporary and conditional upon the payment of the fees as per the schedule stipulated under licence condition 16.1 of the current operating licence. SRB complied with the prepayment schedule stipulated in the current licence. The final payment and total cost adjustments were paid September 25th, 2013. SRB is now in good standing with respect to *Cost Recovery Fees Regulations* requirements.

As a financial guarantee instrument, SRB proposes to continue to use a revised escrow agreement and a revised security and access agreement providing CNSC access to the funds. SRB proposes to fund the increase of \$102,012.00 from the previous cost estimate of \$550,476.00 by making six equal installments of \$17,002.00 to the escrow account over a three year period. CNSC staff conclude that SRB's financial guarantee meets the applicable regulatory requirements under the *Nuclear Safety and Control Act*.

SRB's Public Information and Disclosure Program meets all requirements and intentions outlined in the regulatory document 99.3, *Public Information and Disclosure*. SRB has taken several improvements to its program, demonstrating a commitment to establish an atmosphere of openness and transparency regarding the

health and safety of the public and the environment as it relates to its licence activities.

The CNSC made funds available through its Participant Fund Program to assist members of the public, Aboriginal groups, and other stakeholders, providing value-added information to the Commission through informed and topic-specific interventions. Based on recommendations from a Funding Review Committee, the CNSC awarded a total of \$20,770 in participant funding to representatives who are required to submit a written order intervention and make an oral intervention at today's hearing.

The proposed licence includes standard licence conditions that make reference to licensee programs. Compliance verification criteria, such as specific CNSC regulatory documents and CSA standards, have been incorporated into the Licence Conditions Handbook. The proposed operating licence and associated Licence Conditions Handbook reflects the continuous nature of safety improvements for the Canadian nuclear substance processing facilities.

This concludes my portion of the CNSC staff presentation. I will now pass the presentation back to Dr. Newland.

MR. NEWLAND: Thank you, Mr. Rinker.

Based on the assessment of SRB's safety

performance, CNSC staff conclude that as per section 24(4) of the *Nuclear Safety and Control Act*, SRB is qualified to carry on the activities authorized by the licence, and in carrying out those activities SRB has made and will continue to make adequate provision for the protection of the environment, the health, and the safety of persons and the maintenance of national security, and measures required to implement international obligations to which Canada has agreed.

Therefore, CNSC's staff recommend that the Commission accept CNSC staff's assessment and conclusions pursuant to section 24 of the *Nuclear Safety and Control Act*, the Commission renews the nuclear substance processing facility operating licence NSPFOL-13.00/2025 for a 10 year period. And pursuant to section 24 of the *NSCA*, the Commission accepts the revised financial guarantee set out in Part 2, section 1.3 of the Licence Conditions Handbook.

Thank you. That completes the staff's presentation.

THE PRESIDENT: Thank you. I think it's a good time to take a 15 minute break and on return we will start directly with the interventions. Thank you.

--- Upon recessing at 10:32 a.m. /

Suspension à 10 h 32

--- Upon resuming at 10:52 a.m. /

Reprise à 10 h 52

THE PRESIDENT: We are back, and we are going to start with the intervention. Before we start, I'd like to remind everybody we allotted 10 minutes for the oral presentation because we have read all the documents and we would like to engage in discussion rather than, you know, having a long speech. So -- and we have a long, long day, a lot of interveners, so please help us on this one.

So with that comment I'd like to start with the presentation by the Lake Ontario Waterkeeper and Ottawa Riverkeeper as outlined in CMD 15-H5.2. I understand that Ms. Pippa will make the presentation.

UNIDENTIFIED SPEAKER: It's Feinstein.

THE PRESIDENT: Oh, sorry, Ms. Pippa Feinstein. I am sorry about that. The floor is yours.

CMD 15-H5.2

Oral presentation by

Lake Ontario Waterkeeper and Ottawa Riverkeeper

MS FEINSTEIN: Good morning, President Binder and Commission Members. Thank you for the opportunity to address you all today.

For the record my name is Pippa Feinstein and I am representing Lake Ontario Waterkeeper and Ottawa Riverkeeper. Both organizations were founded in 2001 and are members of the International Waterkeeper Alliance. They both tirelessly advocate for local swimmable, drinkable, and fishable water, and they seek to empower people in order to stop pollution, protect human health, and restore habitat. They have significant expertise concerning the development of public information sharing programs and building meaningful industry stakeholder relationships.

Over the course of the next 10 minutes I would like to make two broad submissions to you all. The first is that the Commission should not renew SRB's licence for a period longer than five years. And the second is that regardless of the length of any licence renewal, SRB's Public Information Program should be improved. We have made several suggestions for how this could be done and we request that the Commission include our recommendations as conditions on SRB's licence.

On the first point, we submit that 10 years is simply too long to go without a public hearing for the SRB facility. If the Commission decides to renew the facility's license, a five year term would be better for SRB, the local community, and the environment. This is

because: 1. more frequent hearings can increase SRB's financial security; 2. more frequent hearings are necessary because of SRB's rapid growth; 3. hearings every five years are not an unreasonable burden on SRB, and 4. more regular hearings could better assist the Commission to assess SRB's impact on fish and fish habitat. I will briefly discuss the rationale for each of these in turn.

First, hearings every five years can increase SRB's financial security. This is because they can help the facility comply with its licence conditions. They can also help SRB maintain its social licence to operate in Pembroke. Hearings include avenues for more meaningful public inclusion, which can improve the relationship between the facility and local community, which can have economic implications. Hearings can also include opportunities for SRB to receive diverse expert information, perhaps more diverse than SRB might be able to retain on its own, and these can also help SRB ensure that its operations are as efficient and safe as possible. Ultimately it's SRB's conduct and not hearings that determine the financial security of the facility. As long as the facility complies with requisite licence conditions and regulatory standards, hearings should not threaten its ability to operate or its ability to enter into beneficial contractual agreements. In reality, hearings every five

years, not every 10 years, should help manage SRB's economic insecurity.

Second, more frequent hearings are necessary because of SRB's recent growth. Over the last licence period, as we heard from a CNSC presentation earlier, SRB's tritium production has increased almost fivefold. SRB also expects that the amount of tritium processed -- sorry, over the -- it's increased fivefold over the last licence period. SRB also expects the amount of tritium processed at the facility to increase by an additional 15 percent over the course of 2015 alone. Emissions over the course of the previous licence term have more than doubled and radioactive waste generated at the site has also doubled. Ten years of continued growth like this without public hearings would not be in the public interest. If emissions increase by a factor of 5 to 8 and production volumes increase twice as much, as has been the trend so far, the facility could still arguably meet its licence limits, and yet were this to happen the character of the facility and its environmental impacts would change significantly. Such growth should not be allowed to occur without meaningful input from members of the public who would be most impacted by these changes.

Third, hearings every five years would be appropriate in the circumstances and not unreasonably

burden SRB. The facility has a long history of environmental non-compliance and associated contamination of local groundwater. As we have seen over the last several years, regulatory vigilance is necessary in order to ensure SRB mitigates its adverse environmental impacts.

As the Commission will hear from submissions from other interveners later today, actual groundwater contamination levels are persisting longer and in greater concentrations than CNSC modelling had predicted. As such, SRB should not be afforded any benefit of doubt. Regulatory vigilance is required and more regular hearings would be an important aspect of this vigilance. SRB argues that money saved through less frequent hearings would help fund advances in tritium emissions reductions or provide more funds for their safety program or decommissioning fund. However, we submit that if SRB can't afford to adequately fund these initiatives, it should simply not be permitted to operate. It would be unreasonable to sacrifice opportunities for meaningful public participation in order to ensure that SRB fulfills other licence conditions.

Fourth, more frequent hearings can be helpful for the Commission's new authority of a fish fisheries and species at risk. This current licence decision is the first for the SRB facility that is being

conducted under a new memorandum of understanding between the Commission and the Department of Fisheries and Oceans. The memorandum increases the scope of the Commission's responsibilities in this regard; however, CNSC staff's commission member documents have failed to include any mention of fish, fish habitat or species at risk and perhaps this is something that staff can address or clarify once I finish this presentation.

More frequent public hearings could better ensure that these matters receive adequate consideration in the future and hopefully this could include the opportunity for members of the public to retain third party experts to examine this issue as well. Having provided our arguments in favour of more frequent licence renewal hearings, I will now outline our recommendations for improving SRB's Public Information Program.

Given SRB's environmental track record and in during public concerns, its Public Information Program should really be gold standard. In order to better realize this goal, we recommend the following improvements: First, that all environmental sampling results should be clear, accessible, machine readable, and made public in real time; 2. that SRB should warn the public in advance of any planned releases at the facility; 3. that more information should be collected to inform SRB's internal reviews of its

Public Information Program, and 4. that SRB should continue to update its website regularly.

All of these recommendations will ultimately help SRB better meet the purposes of its Public Information Program and these are articulated in the Commission's *Public Information and Disclosure* guideline, Regulatory Document 99.3. Perhaps most importantly, the guideline requires that SRB's Public Information Program be proportional with the public's perception of risk and their level of interest in the facility. Since the public's concern and interest in the facility is significant, SRB's program should reflect this fact.

Our first recommendation is that all monitoring results should be reported clearly, in real time, and as machine-readable data. Sampling results should be posted to the SRB website within five days of being received. Once this data is posted to the SRB website, it should remain posted indefinitely so that it can be compared with subsequent sampling results. This requirement is not too onerous, as SRB would merely have to post test results to the website the same week as they are received. This would also be consistent with 2.1 -- section 2.1 of the Commission's guideline which requires the timely communication of information.

SRB's environmental sampling results should also be made in 100 percent machine-readable formats. This could be as simple as changing these documents from PDFs, as they currently are, to formats such as RDF or XML. The software required to do this is relatively inexpensive and easy to navigate, but providing sampling data in these machine-readable formats can be extremely useful to the public, SRB, and the Commission. This is because these formats basically allow data sets to be more portable and extractable, allowing the values to be input into other analytical software which can help identify trends and data over time.

It is also important that the data be made more accessible to the public in other ways. For example, every chart containing sampling data should clearly indicate the relevant action levels and release limits on that same chart. Doing so would allow a layperson to glance over the values in a particular data set and immediately determine whether SRB is, in fact, complying with the relevant limits. This isn't always done in SRB's annual compliance reports.

Our second general recommendation for improvement is that the public should be warned in advance of any planned effluent release event at the facility. SRB's Public Information Program and Public Disclosure

Protocol are silent on this issue, so they should be changed in order to require SRB to issue a notice on their website at least 24 hours before a planned release at the facility. The notice should state when the release is scheduled to occur, the amount of tritium or other substances that will be released, and the purpose for the release.

Third, more information should be collected to inform routine evaluations of the efficacy of SRB's Public Information Program. The Commission guidelines require SRB to periodically revise and improve its program and SRB does have a Public Information Committee that reviews the program quarterly; however, it seems that these reviews may be based on little evidence.

I've got one more paragraph.

So we know that SRB maintains regular records concerning discussions with local elected officials, meetings with local special interest groups, presentations before Pembroke City Council, general public meetings, and other public presentations. Perhaps SRB staff can clarify whether records of those types of events are consulted by the committee in their quarterly reviews. Regardless, SRB should amend their program to explicitly require the committee to consider these types of records.

And our final recommendation is that the SRB website should be updated with information about public outreach activities. Currently the website has not been updated to include Pembroke City Council presentations between 2010 and 2013, or any public presentations since 2011. As SRB documents and retains records of these public presentations, it shouldn't be too difficult to update its web page and ensure that these significant lapses don't occur in the future.

So, that concludes my oral presentation. I look forward to questions and discussion. Thank you.

THE PRESIDENT: Thank you.

Questions. Mr. Tolgyesi.

MEMBER TOLGYESI: If SRB's processing -- process tritium is about -- increased from 6,643 terabecquerels to over 28,000 terabecquerels, according to the Licence -- Licence Handbook on page 9, licence condition is that authorized possession up to limit of 6,000 terabecquerels of tritium in any form [indiscernible]. Considering that -- considering this 6,000 terabecquerels limit, how far the volume of processed tritium may grow? You know, you increase from 6,600 to 28-, and licensing limit is 6,000 terabecquerels possessed any time, how far you could go? You could go to 50,000 or, I don't know, 32,000 only?

MR. LEVESQUE: Stephane Levesque for the record. Thank you for the question. The 6,000 obviously refers to, as you know, a possession limit and has in no way any affiliation with what we're processing. There is no limit on how much we process at the facility. The limit that we have is to ensure that we meet obviously our -- our release limits and the possession limits of our licence, but they're not affiliated at all with how much is processed at the facility.

MEMBER TOLGYESI: So you could grow your processed tritium, your production, in a sense, up to it's no limit there? It is -- I understand that right?

MR. LEVESQUE: Stephane Levesque for the record. There -- again, there's no limit on how much we can process in our licence. So, yes, you could increase tritium considerably as long as you stay within all your other limits, the possession limit and your release limits.

MEMBER TOLGYESI: Staff, do you have any comments?

MR. RINKER: Mike Rinker for the record. So I think maybe what your question was getting at is how much could they physically process, so is there a maximum for which the plant could feasibly process in a year, what -- what would be their operational maximum rather than

a regulatory limit. So, I think SRB could -- could best answer that question.

In terms of how they're regulated in terms of how much they can process, there's two metrics. One is for the case of worker protection or in the case of accidents or malfunctions or -- you know, or beyond design based events. We want to make sure there is a regulated amount that can be in the facility at any one time.

In addition, regardless of how efficient they become at processing, there's a maximum of which we would want to see that gets released to the environment, so we have set very tight limits. So they could increase the amount that they process annually without ever holding on more than 6,000 terabecquerels as long as they are held very tightly in terms of what they would release to the environment. So, they have to work within those bounds.

MEMBER TOLGYESI: So as long as the emissions are not reaching, I'm sorry, I tried to find your limit, it was 448 -becquerels, terabecquerels, you could -- as long as you don't reach that limit, you could increase your production as far as you wish?

MR. LEVESQUE: Stephane Levesque for the record. Yes, right now we're at -- within the -- at the licence period we were releasing at less than 18 percent of our -- of our release limit. And not to say that we would

increase production at that limited amount, you've got to realize that the production increases that we have made have been in steps. We -- obviously it would be associated with hiring new staff, commissioning possibly equipment that would require obviously CNSC input. So, it's not as simple as just increasing production. It -- there's a lot of things that would have to happen.

To try and answer your question, with the current equipment that we have and by adding a few staff members, we -- we can see that we could increase the production maybe by another 50 percent reasonably. If we were to go above that 50 percent, there would need to be some significant steps that have to take place that may require consultation with CNSC staff regarding commissioning and new equipment and so on and so forth because that's not part of our Safety Analysis Report as they are right now. So, you know, with the existing equipment, adding a few staff members, in steps we could increase it by another 50 percent if that's kind of what your question is.

MEMBER TOLGYESI: Yes. It's unusual that a licence is given in function of -- of emissions, not in function of volume processed. Usually when you look there is a volume processed which is governing what you could do.

MR. RINKER: Mike Rinker for the record.

That's a good question and it's one that we've -- we've considered over the licensing review. What we've looked at, however, though, is SRB has maintained their ability to reduce emissions relative to production increase. So, the amount -- if we regulate it in terms of production increase, we would have to determine what does that mean in terms of health effects. So the decision that we made in proposing a licence as we did was to regulate worker safety in terms of possession limit and to regulate environmental protection in terms of release limits, and that would allow SRB the flexibility -- provided they're within their licensing -- licensing bases, using the same equipment and the same process and so on, to have the flexibility to increase efficiencies, improve on emissions and perhaps increase the amount of tritium they could process, provided that their environmental protection and worker health and safety remains the same.

THE PRESIDENT: Okay.

Ms. Velshi.

MEMBER VELSHI: Thank you, Mr. President.

The question is for SRBT. The intervener makes some fairly specific recommendations around additional disclosure on your environmental results. And I know in your opening statement you -- you had said you are

already going to be addressing some of these, but perhaps you can turn to page 13 of the intervention and comment on the four specific recommendations around additional disclosure and what your thoughts are on those. So, over to you.

MR. LEVESQUE: Stephane Levesque for the record. We feel that right now, I would say approximately 90 percent of our monitoring results are reported clearly in both our Annual Compliance Report, which is posted on the website and separately on our website in an area in -- regarding our emissions reporting and environmental monitoring.

Of all the surveys that we've done of the public, conversations that we've had -- just at the local community, mind you -- we've never had a comment or anything of the sort of an individual that had an issue with the way that we were reporting the information on our website. The only comment I've received prior to this intervention was some people weren't really computer-savvy, wanted a hard copy of the information, which we've done.

I personally don't have any experience with machine-readable data. I've been doing some research since I've seen this intervention. I know that we had a lot of members of the public that wanted us to save the information, have it in PDF format, because we used to do

it in Excel in the raw form that people could extract the data. But people didn't always have the up-to-date latest software, so it created a problem for them. So we found that since we've done it in PDF in one of the older formats, we didn't really have an issue.

There's a number of members of the public as part of these interventions in terms of Dr. Hendrickson and Ms O'Grady that have asked us for information supplementary to what's on our website, and we've always provided it to them in whatever format they wanted. They've asked us to give it in Excel or in Word so they could manipulate the data, and we've always done that.

So we're open to taking those requests on the one-on-one basis and changing it in whatever format we can. And in the meantime, we can investigate what this machine-readable data is.

MEMBER VELSHI: So there are four recommendations. But that first one that you have been addressing, it also talks about in real time as opposed to waiting for the Annual Compliance Report. So right now do you update the information on your website fairly soon after the results are in?

MR. LEVESQUE: Stephane Levesque for the record.

We also do quarterly reports to the CNSC,

and as soon as a quarterly report is completed and compiled and sent to CNSC staff, we post it within a few days. I think it's always within actually five days of compiling the report.

On a monthly basis, we also post groundwater monitoring data a few days after we receive the data from our third party. So on those we do right away.

Some of the other data, like the 10 per cent I was talking about, that only gets found once a year in our Annual Compliance Report. But again, if somebody wanted it more frequently we would put it in. That's something we're looking at reviewing, to put more data on a quarterly basis with the report.

MEMBER VELSHI: Thank you. And what about the second recommendation, about advance warning of any unusual emissions?

MR. LEVESQUE: Stephane Levesque for the record.

People have to really understand maybe our facility and the way it operates a little more.

We don't typically have planned releases. The releases happen with each process. And there's releases made continuously throughout the day as we process tritium, small releases.

We've had one, I can say, planned release

over this and the previous licence period of liquid effluent, because we wanted to look at the effect into the sewer system.

So definitely, if we were to make in the future another planned release we would definitely put it on our website. And that's one of the inputs we'll put in our Public Information Program Committee.

MEMBER VELSHI: And I believe it was that specific incident that you talked about that the public should get a heads-up on, that that's going to be happening.

Over to you, if you have any comments.

MS FEINSTEIN: I'm just wondering if I can respond to things maybe when you're finished, Member Velshi.

Thank you.

MEMBER VELSHI: And the third one was around the efficacy of your Public Information Program. And maybe you can spend a few minutes and talk about how do you measure on how well that program is working.

MR. LEVESQUE: Stephane Levesque for the record.

As a prelude to starting to talk about that, I really have to say that before this licence renewal process, over the entire licence period we have only

received two enquiries from members of the public. So you can understand that when we look at assessing how well our Public Information Program works and we only have received two enquiries, that doesn't give us a lot of set data to do that.

While we strive to do better, obviously, based on the number of interventions that we had mostly from people outside the community, it's going to allow us to revise the Public Information Program and use that input. Now we have a lot more data that people outside the community have concerns and we can address those.

But that's our intent is to review the data that we gather over that quarter with any information that we have and adjust our public information.

I think the program that we have is good. It was deemed fully satisfactory by CNSC staff and had a target audience that was very specific, obviously, with people located in our area. But now we understand from the intervenors that outside of the Pembroke and community that we have to include that as part of our Public Information Program.

MEMBER VELSHI: Does your Public Information Program consider doing opinion surveys of any kind?

MR. LEVESQUE: Stephane Levesque for the record.

Yes, and we actually performed one very recently of, again, the focus group of our Public Information Program, which is the individuals that live within 500 metres of the facility. We send surveys to these individuals and ask them if they were happy with the program, have they heard of our facility, did they want to get data more often, less often, in what format.

So yes, we've done that and we'll continue to do that. And if we're given the contact information for all the intervenors here today, we'll include them in our next one as well.

MEMBER VELSHI: Thank you.

Ms Feinstein, over to you.

MS FEINSTEIN: Thank you. Pippa Feinstein for the record.

There are three broad points that I'd like to make, if possible.

The first concerns the issue of formatting that Mr. Levesque raised. I would propose that if PDF is helpful for some members of the public, that this shouldn't stop information from being released in both PDF formats and potentially machine-readable data. So the fact that PDFs have been useful to some people in the past shouldn't

preclude the ability for SRB to also provide machine-readable formats.

The second issue, regarding real-time release of data: I understand that much environmental monitoring happens on a monthly basis, and to my knowledge monthly sampling data is not posted on the website. So that's more the type of real-time data that I'm asking about in the circumstance. While the Annual Compliance Reports are useful for seeing sort of yearly, overall data sets, having them in real time allows members of the public to see what changes are like month by month, to understand what's happening at the facility at the time.

The third broad issue is something that keeps coming up in the Commission Member Documents by SRB as well as their presentations today, which is that because only two members of the public had concerns over the licence period, that public concern is quite low.

And I think this sort of comes back to the point that I was trying to make in my written submissions in that public hearings are the main place where members of the public can vent their concerns and make suggestions and really engage with what's happening at the facility and the types of regulations that they feel are appropriate or helpful.

And what we see when we do look at these

public hearings is that the public has been very active. There have been up to 60 or 70 interventions in public hearings. Interventions from the community tend to be very detailed and outline a series of serious concerns to the public.

So when we talk about the public engagement with the facility or their concerns with the facility, it's important to remember how hearings are an important venue for the public to express themselves. And this is another argument for why public hearings are so important.

In addition, it's important to remind ourselves that the Public Information Program is really designed in such a way that it facilitates one-way communication, and that's really the communication of information from the facility to the public. But there are no mechanisms within the Public Information Program that allow for or that require the considerations of concerns that are brought forward or that require SRB to act on the concerns that members of the public may raise.

So in that way it's really exclusively hearings that allow for that two-way communication that can be so important.

Thank you.

MR. LEVESQUE: Stephane Levesque for the

record.

I assure you, as president and part-owner of the company, that hearings aren't what makes SRB Technologies provide the public information. I think that -- especially increasing in this licence term and the one before that, the two-year licence -- we've always been very open with the public, always given them all the information that they requested, and been open to requests for reviewing our operations in any way.

I think that's testified in some of the things that we did. Despite having only logged two enquiries over that licence period, that we've mailed out 10,000 pamphlets to members of the public. We've done door-to-door activities and the individuals that we've spoken to that are in the local community. We wrote to the Aboriginal groups, to a number of stakeholders. We've had little to no concern.

But despite that, we're open throughout any licence, whether it was a ten-year or five-year licence, to answering the concerns of the public regardless.

THE PRESIDENT: Monsieur Harvey.

MEMBER HARVEY: Merci, Monsieur le Président.

My question is addressed to you. I'm

trying to understand the difference between your interpretation of the data and on the general situation. Because hearing you in your presentation and reading here, just an example, when you say "given the poor environmental performance of SRB facility."

So could you explain why it is so different, your appreciation from the appreciation coming from the staff from the company and our own appreciation of data, real data. So could you explain why it's different.

MS FEINSTEIN: Pippa Feinstein for the record.

Perhaps it would be helpful if I just describe our impressions of the environmental performance of the facility. Am I understanding your question correctly?

MEMBER HARVEY: Well, I mean, with all the data that are provided by the company, by the staff, so how do you manage to get and say that it's a poor performance?

MS FEINSTEIN: Okay. So our references to the poor environmental compliance of the facility is in many ways historical, so understanding that there has historically been considerable groundwater contamination due to operations at the facility, and that these adverse environmental impacts have continued to the present. So that's really what we mean when we're talking about the

historically poor environmental performance of the facility and how this can still raise concerns, because there are still levels of tritium in groundwater wells that are still very elevated to this day.

MEMBER HARVEY: Okay, I agree with you that, well, eight years ago it was quite different than today, and there has been some damages in the groundwater and things like that. But my idea was thinking in the last five years, in the current licence. So your appreciation is much larger than only there.

But I will turn to Mr. Levesque.

And my question would be: What is so different in SRBT now that could assure the Commission and the public that the future will be quite different, will at minimum be as it has been during the last five years, and that in the future, despite the fact that you could increase the production and things like that, that the result would be at least the same or better than it is today? What is so different in your structure, in your culture?

MR. LEVESQUE: Thank you very much for the question.

I think that over not just the last licence term but the one previous to that, seven years, we completely changed our attitude. I think we went from a

company that was looking at, like most companies out there, at increasing the bottom line by just meeting your emissions to what we are today, as continuously trying to lower what our emissions are.

And I think our record over the past seven years and in this licence term is well documented here, where you can see that, despite increasing production four-and-a-half-fold, our emissions have gone down at less than half that rate. And obviously the release limit, we're still well within, but yet we're not satisfied with that. We want to keep lowering it.

If we could ever reach zero emission, it would be our goal, and that's what we're striving to do. That's why we said in our presentation that no less than five per cent of our net profit would be basically dedicated solely to reducing emissions. And in not just the attitude in trying to reduce the emissions from the facility and the impact on the public, like we also want to make sure that I think we inform the public as much as possible.

I think a number of years ago we were a lot more closed to the public. And again, more from a private company's point of view, not public, to basically keep your business to yourself as long as you met the regulations and the limits.

Well, now it's totally different. We see a huge advantage to basically share all our data with members of the public as they ask, to instill the confidence in them. And you know, I think we've done that and we'll continue to do that over the licence term. We've demonstrated that.

MEMBER HARVEY: How many employees or equivalent employees are working on environmental protection and all of those reports you have to do to make to the CNSC staff and with all the consideration with health protection and public protection and things like that? How many people over all your staff are specifically dedicated to that?

MR. LEVESQUE: Thank you very much for the question.

And as my staff right now at the facility is looking back at this and watching me, I better say that all staff members are ...

--- Laughter / Rires

MEMBER HARVEY: I thought you would mention that.

MR. LEVESQUE: ... are involved in reducing emissions. But I can say specifically when I discussed the Health Physics Team is made up of seven members, including all the people that you see here today.

Myself and the vice-president, Ross Fitzpatrick, who own the facility, we have seven employees who are dedicated at reducing the impact on the environment and the public and our staff from the operations.

And I think that's something that's changed quite considerably. I remember going to a hearing in 2005, and there was one person doing that.

MEMBER HARVEY: You?

MR. LEVESQUE: You know, and I'd like to take credit, but no, there was one individual that was hired and that was reviewing the information. So you could say it was just over one. But we've changed quite a bit from 2005 to seven people now.

We've also retained some external expertise. That's also something I think that's helped improve our facility, where we used to just be left with our own thoughts and the things that we gained from our operational experience and what we could research. But now we brought in some experts from other facilities, from CNSC staff, people that had other experiences in the world, other licensed facilities that could maybe apply things to our facility.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Thank you for your presentation.

On page 9 of your written submission you discuss what you perceive to be the limitations of the funding model for the Participant Funding Program. Perhaps staff could just for the record identify how that process works, I know it's an independent process, and how you would like to see changes to it so that we could perhaps help you a little more.

MR. RINKER: We have Adam Levine in Ottawa. If Adam could respond, please, and set out the steps of the process by which we go through setting the amounts of funding for the Participant Funding Program, please.

MR. LEVINE: All right, thank you.

This is Adam Levine for the record. I'm the Participant Funding Program administrator here in Ottawa.

So the Participant Funding Program is a program set up in order to help Aboriginal groups, organizations, and individuals participate and bring valuable information to the Commission. And funding amounts are set up typically, and they're commensurate with the type of facility, the type of renewal or licence application before the Commission, and also looking at the potential interest from the public, Aboriginal groups, and

also location of the facility, and also the complexity of the project that's before the Commission as well.

And then once we receive all the applications from the public, then we provide the applications to an independent Funding Review Committee. And the Funding Review Committee is made up of experts that have expertise in both the nuclear sector as well as environmental assessments and environmental matters. And they're independent from the Commission.

And they review all of the applications, and they look at the applications with a number of criteria. In terms of eligibility, they have to meet the eligibility criteria. So they have to be a member of the public, a not-for-profit organization, or an Aboriginal group, et cetera. And they also have to be within the mandate, so their application and their specific proposal has to be within the mandate of the Commission and also be relevant to the proposal or the application before the Commission. So considering that criteria as well as the potential to bring value to the Commission to help in making its decision. Those are all criteria the Funding Review Committee uses.

And then they look at also costs of hiring professionals and what typically that would cost in terms of engineers or consultants and then provide

recommendations to CNSC staff in order to make a funding recommendation.

THE PRESIDENT: Thank you.

MEMBER MCEWAN: So how could you see that process could be improved, given the comments that you've made about your inability to hire a consultant?

MS FEINSTEIN: Thank you. This is Pippa Feinstein for the record.

So it might be helpful to maybe outline the experiences that we had in making the application and ultimately getting partial funding for our intervention.

And I should mention that we are very grateful for the funding that we have received, and it's allowed us to participate to some extent in this proceeding.

But we initially, Lake Ontario Waterkeeper and Ottawa Riverkeeper, applied for funding to comment on the public information aspect of the current application as well as water quality in the current application.

We received a little less than two-thirds of our funding and were told that we could only comment on the public information program aspect. It was problematic that no reasons were given for this decision.

And additionally, we found out after the fact that several intervenors didn't get the full amounts

that they requested, which was fine, but ultimately a little over 25,000 was given to intervenors when we had been told that 35,000 would be made available. And so when I enquired about this discrepancy as well, that many intervenors didn't get the funding that they required to do the interventions that they had planned to provide, I didn't get any answers about that issue either.

So something that would be quite helpful, I think, for intervenors would be that reasons for decisions would be provided. And I understand that there may be some limitations with regards to the level of detail of some of the deliberations that may have occurred, but some kind of reasons would be helpful. It would also allow us in the future if we wanted to intervene to understand better how applications were received so that we can potentially make them more successful in the future.

MEMBER MCEWAN: So was the application process for you as a group onerous, difficult, complex or was it relatively straightforward?

MS FEINSTEIN: Pippa Feinstein for the record.

I have to say that Adam Levine was very helpful and helped us along the process. There were some aspects of the process that were difficult to understand, but there was quite a lot of support in the application

stage of the process. It was just receiving the decisions that some improvements I think could be made.

THE PRESIDENT: Mr. Tolgyesi?

MEMBER TOLGYESI: One more. On intervenor's page 11 they are saying that, "More frequent hearings are necessary due to recent regulatory changes."

Is the licence renewal one of the only times when the new regulations or regulatory changes may be integrated in the licence conditions?

MR. RINKER: Excuse me. Can I clarify when new regulations are incorporated? Was that your...?

MEMBER TOLGYESI: During the licence period it's a new regulation or it is regulatory changes. So have you integrated that in an existing running licence? You should wait until the licence renewal or you do something to integrate that?

MR. RINKER: Thank you for question. It is Mike Rinker for the record.

So during a licence period there may be new CSA standards, there may be updated regulatory documents and there may be revised or new regulations that could come about.

So if it is in law a new regulation that would apply on it coming into force, an updated or clarified standards and regulatory documents would be

implemented by issuing a letter to the licensee saying we have an updated requirement, you know, and there would be a transition period and it would be implemented by way of the licence condition handbook.

So as they come available, they would be implemented. We would not wait until the end of the licence term to implement those.

MEMBER TOLGYESI: My understanding what that you were saying that you should wait until the next licence to make sure that the new regulations or regulatory reviews are integrated. So my understanding is not -- it is applied right away or it is a transition period.

THE PRESIDENT: Dr. Thompson, I see you want to raise your hand?

DR. THOMPSON: Patsy Thompson, for the record.

The intervention on page 11 actually refers to the recent MOU with the Department of Fisheries and Oceans. And I just want to clarify that the MOU with the Department of Fisheries and Oceans gives the CNSC added role in terms of the provisions of the *Fisheries Act* that are related to fish and fish habitat.

And since the SRBT facility has no direct interactions with surface waters or waters inhabited by fish, there is no trigger to call upon that new agreement

with that new MOU with the Department of Fisheries and Oceans. So it's not relevant for this licensed activity.

THE PRESIDENT: Do you want to respond to this? Go ahead.

MS FEINSTEIN: Thank you. Pippa Feinstein, for the record.

So just to clarify, that is what we were referring to was this memorandum of understanding. And it is quite new, so we are trying to understand how it impacts the Commission's activities as well.

My understanding of the facility is that it's very close to the Muskrat River and that runoff for groundwater contamination can impact local aquatic biota and or organically bound can accumulate in ecosystems around the SRB facility.

So it would be helpful if I could maybe just hear why that wasn't a concern to staff or why, in the Staff's Commission Member Documents, which are about 175 pages, why they couldn't just have one sentence saying, we didn't look into fisheries issues because we found that they were irrelevant. And then at least we can know that they had been considered by Staff.

Thank you.

THE PRESIDENT: Okay. Staff, do you want to respond why fish wasn't mentioned in the submission?

DR. THOMPSON: Patsy Thompson, for the record.

So just to add another element. There is a section in the *Fisheries Act* that deals with deleterious substances. And we do consider discharges of substances, either radiological or chemical, to water with fish as a consideration for our assessments and recommendations to the Commission.

And I will ask Mr. McAllister to speak to the assessment that staff did in relation to the Muskrat River.

MR. MCALLISTER: Thank you, Dr. Thompson. Andrew McAllister, Acting Director for the Environmental Risk Assessment Division.

As reported by SRB, the Muskrat River is monitored on a regular basis. Generally the values observed are near the detectable levels on the order of 3 to 5 Bq/L.

When we look at that level or that concentration in the river and we look at what is known for the experimental data with respect to effective tritium exposure on aquatic biota, really for aquatic biota we are looking on the order of millions of becquerels per kilograms of tissue to have an absorbable effect.

We are looking at, as we say, a few

becquerels per litre is what has been observed in the Muskrat River. And in the future we don't anticipate that to change. So as such, we didn't predict any impacts on aquatic biota in the Muskrat River at all from the operations of the SRB facility.

THE PRESIDENT: Thank you.

Ms Velshi?

MEMBER VELSHI: I have two parts to the question, the first one is to Staff and then the second part is to the SRBT, and it is to do with the term of the licence. And the intervenor has raised some concerns that going to 10 years would result in diminishing the level of public engagement with the facility and its operations.

And I know, Staff, in your submission part of the rationale is that there is the annual performance report review where members of the public can send written submissions.

But perhaps you can expand on that and talk about how can we make sure that there isn't any reduction in the level of opportunities for engagement available to members of the public, whether it is via participant funding, whether it is by communities being able to be present at hearings. And how do you measure are we reducing the level of engagement by going with a longer licence term?

MR. RINKER: Mike Rinker, for the record.

So during our licensing process and in the middle of a licensing term and trying to inform the public from a compliance perspective are both important things for CNSC Staff.

We conduct -- in preparation for this hearing, we were in the community doing what we call CNSC 101 to try to engage the community and let them know about the facility, about our process, and how to get involved.

If we want to get into some detail, we have a communication specialist, we will see her today.

But I would say if we looked back five years ago where licence terms were every two years or five years for this facility, we were not in front of the Commission annually like we are no. So I think the opportunities for the public to engage the decision makers, the Commission, has increased since, even with 10-year licences.

So if there was a 10-year licence period, we would be in front of the Commission reporting about what is happening at SRB from a compliance perspective, how they have been performing, SRB would be required to be there to answer questions, and the public can intervene and have any concerns raised.

If there is any changes to the facility

outside what is being licensed today, there would be a new application to the Commission for decision. This is not a decision that staff would make.

So if the facility were to change in any way outside the licensing basis, there would be a hearing to consider that application.

MEMBER VELSHI: But as we heard earlier that it may not change from a licensing basis, but it could significantly change its footprint as we heard just in the last five years that emissions and the waste generated has doubled, though well within limits, but it really has changed its profile.

And it is really only during a licensing hearing that the public really gets to hear about it and talk about it, and then get engaged. Correct?

MR. RINKER: Mike Rinker, for the record.

So two things in that. First of all, it is our view, and we have looked at a lot of the data, that in fact the environmental footprint of this facility is recovering from previous emissions. So I expect that in almost all wells the level of tritium is going down, not going up.

Well, there has been an increase relative, you know, going from 30 to near 70 from 2012 to 2017. This is still 95-98 percent lower than what it was 10 years ago.

And the licence limits are not changing over the next licensing period compared to the last licensing period. And those licence limits are set to narrow the environmental footprint.

Secondly, these results about the environmental footprint and about the things that affect the public; public does, what are the release limits, what are the behaviour of groundwater, are things that we do put in our annual compliance report and SRB does put on their website. So the public will be informed and can bring those forward.

And if there are issues, some things that we didn't expect, the Commission will be informed, the Staff will be informed, and enforcement action can be taken.

MS VELSHI: And if the public wants to see this information and wants help with their written submission by hiring third-party experts, is there funding available for them to do that or should funding be available to them for that?

DR. NEWLAND: Dave Newland, for the record.

Yes, funding is available for those kinds of activities.

MEMBER VELSHI: Thank you. And so the

second part of the question, which is to you, maybe you can start off by giving us some indication of the level of effort that is required in preparing for a licence hearing.

And also certainly from your addendum submission, you seemed to do a whole lot of activity in preparation for this hearing as far as engaging the public. And how do you make sure you don't lose that momentum if you were granted a longer term licence?

MR. LEVESQUE: Thank you very much for the question. Stephane Levesque, for the record.

If I can just -- I will answer your question, but I will add a little bit to it.

For us, we have continued to report; the data on our website, the groundwater monitoring on a monthly basis since we got our licence five years ago.

We have continued to put in the quarterly reports. We have continued to do the yearly reports, we have submitted it to staff and included the amount of tritium that we processed. That was reported to the CNSC and in our annual report, and the CNSC made the report to yourselves once a year.

So it is nothing that stopped or that has increased, that has always happened. I think that where there has been a disconnect with our public information program is you can understand where we received two

inquiries over the four and a half years. And suddenly once we apply for our licence, we hear -- I think there has been expressing concerns, 23 interventions.

I would like to point out that it is important to note that only three of those were from people from the community, the other 20 from groups or individuals that live outside of the Pembroke or Laurentian Valley area.

So that was the first time that we really realized that other than these three people, that these other 20 individuals or groups that have concerns regarding our facility, how can we reach those people better?

And, believe me, once we are hopefully issued a licence that is something that we are going to focus on, to do that so that we can hopefully come back here after the term of the licence and tell you that not only did we answer what we I think have done is addressed the concerns of the local community, but of those 20 individuals at large that we just found out have concerns over the last couple months really. And I want to meet everybody's concerns and I want to answer all their questions.

And having a licence for five years or 10 years doesn't make a difference because we are going to report those activities as well in the annual compliance

report that is submitted to staff. We have a large section on public information initiatives and all our annual compliance reports that they can see on our website.

And again, we are ready for any questions from the public. I think I was actually a little surprised that during our annual reports I have seen interventions and concerns written for other licensees who haven't received any.

And maybe what we can do as a better job, and that is why I said that we would post on our website the annual report to the Staff, is to basically invite the public to make comments.

So we are going to put it on our website and send all our stakeholders a notice to say the annual report from the Staff will be presented on that day, if you want to make any comments, you can do so using this. And we will not just do the local community as we had done, but these other 20 new interventions that we received.

THE PRESIDENT: So I would like to follow-up on this for the intervenor.

So the annual report is relatively new. And inviting the public to make comments on the annual report is relatively new. Would you find it a useful vehicle?

MS FEINSTEIN: Pippa Feinstein, for the

record.

I think it is worth briefly mentioning a point that I make in the written submissions that addresses this fact as well. And in our written submissions we did do a literature review of a series of academic articles and articles by practitioners looking at what makes public participating meaningful.

And it was quite clear in their literature that there were two aspects of public engagement programs that could allow them to be classified as meaningful to the public. One was that these programs allowed for the public to have some kind of influence over the process of the engagement program. The second was to allow members of the public some kind of influence over the outcome and the final decision.

Obviously a hearing allows for a greater amount of public engagement in that we can present our submissions orally and engage in discussion, which isn't as available if it is just written submissions.

And my understanding of the meetings or the annual reports is that we would be limited to written feedback, and so there would be less opportunity to engage in these types of discussions that we are having now.

THE PRESIDENT: Okay, thank you.

We need to move on. You have a final

word?

MS FEINSTEIN: Pippa Feinstein, for the record.

Thank you very much for listening to our submissions, and I hope that they have been informative and that you will consider them as you deliberate.

Thank you.

THE PRESIDENT: Thank you very much.

So the next intervention is an oral presentation from Dr. Ulsh --

DR. ULSH: Ulsh, yes.

THE PRESIDENT: -- as outlined in CMD-15-H5.3.

Dr. Ulsh, the floor is yours.

CMD 15-H5.3

Oral presentation by Brant Ulsh

DR. ULSH: Thank you, Mr. Binder. Good morning. For the record, my name is Dr. Brant Ulsh.

I would first like to thank the Commissioners for allowing me the opportunity to participate in this important hearing. Commissioners, you may recall that I spoke to you last month at your hearings up at Bruce. And I was very interested to hear the

discussion after the previous presenter about the importance of the effects of tritium on fish, because that is one of the topics that I am going to be covering again.

It will sound familiar to you, but since the audience is a bit different I will cover those points again.

I came here today to offer my perspective as a radiation safety professional, an independent person. I have no affiliation with SRB. And I have over 30 years of experience in training in the radiation health sciences. I am a certified health physicist and I hold a PhD in radiological health sciences.

I also completed a post-doc appointment at the McMaster Institute of Applied Radiation Sciences in Hamilton. The focus of my research has been on the effects of low doses of radiation both on humans and on non-human species exposed in the environment.

And based on this experience, I believe I can offer you an informed scientific opinion on some of the matters that you are going to be talking about today.

So we all know that the substance of concern here is tritium. And the question that we are discussing is whether or not SRB has taken reasonable precautions to ensure that its operations present no significant threat to public health and to the environment.

And I think that the answer to that question today is very different than the answer I would have come up with 10 years ago.

According to the latest independent environmental monitoring data available from the CNSC, the maximum concentration of Tritium in surface water near SRB is within the range of background, and these are concentrations that are almost 1,000 times less than the Canadian tritium drinking water limit designed to ensure public health, protect human health.

But what about non-human organisms like fish? Is the tritium from SRB causing any negative impacts in these species?

Well, I have been collaborating with researchers from the Canadian Nuclear Laboratory just a half an hour up the road, up Highway #17 from here, and we were investigating exactly that question. What are the effects of low doses of tritium on fish species?

CNL researchers exposed fish cells to concentrations ranging from natural background, which is similar to the levels in water near SRB, that is the low end of the range that we looked at. And on the high end we looked all the way up to 10,000 times higher than that.

We performed eight different biological tests of biological effects. And each test that we used

with the fish cells that we exposed to tritium was designed to tell us something different about the health of those cells.

The tests were very sensitive and they are designed to detect effects that would occur at much lower tritium concentrations than effects on whole fish or populations of fish. In order for a biomarker to be useful, you have to see an effect well ahead of the time that trouble happens. So that is why we picked these eight different tests.

Well, what did we find? We found that tritium concentrations up to 115 times higher than those in fish near SRB actually protected fish cells from dying. They didn't kill fish cells, they actually protected them from dying. We saw no evidence that tritium concentrations, even 11,500 times higher than those in fish near SRB, had any negative effects on the cells' ability to reproduce.

So in sort, to wrap a whole lot of research up into very few words, these tritium exposures do not appear to be having any negative health effects that we could see on these cells. And our results are consistent with a very large body of past research and shows that the levels of tritium in the water and in fish near SRB is far below those that we would expect to cause negative effects

in fish. So that is tritium in fish.

We know that very high doses of radiation, thousands of times higher than those associated with tritium releases from SRB, they do cause negative environmental effects. But our data, our fish data, suggests that very low doses have the opposite effect.

Now, if this pattern of negative consequences at high doses and no negative consequences or even protection caused by low doses was only seen in fish exposed to tritium, it would not be compelling.

But it is not just fish. Research conducted at CNL has shown that, for example, frogs from ponds that contain low levels of tritium contamination were actually more resistant to a large stress than frogs from ponds where only background levels of tritium existed.

But it doesn't stop there. We have seen the same pattern in a variety of organisms ranging from bacteria, yeast and algae to several species of plants, frogs as I mentioned, mice, hamsters, rats, fish, rabbits, deer, cows and, yes, even in human cells. The resistance to environmental stresses has been produced not only by tritium, but other forms of radiation as well.

And we have observed the general pattern, that moderate stresses, low to moderate stresses, anything, from low levels of metals that are toxic in high

concentrations, ultraviolet light, heat, even exercise, make living organisms more resistant to more serious stressors as long as we are talking about low to moderate doses.

I even recently found an article that I haven't yet had time to read reporting that moderate consumption of beer produces a radioprotective effect. And I am really kicking myself for not thinking of that research idea when I was in graduate school. As I said, I haven't read the article yet, but it is an intriguing proposition.

My point is that radiation, which is after all a natural part of the environment, and has been since the formation of the planet, it behaves like every other stressor in the environment, it is no different. Living organisms respond to low and moderate stressors by ramping up their defences and becoming resistant to more significant challenges. Evolution demands it, it is a condition of living on planet earth.

So what does all this mean for SRB's neighbours? Well, you might hear claims that there is no safe dose of radiation or that even very small doses or radiation increase the risk of negative health effects.

Well, those claims are not supported by the scientific evidence and they go against the advice of

scientific experts.

What does the evidence say? Well, you heard in the CNSC staff presentation earlier that several epidemiology studies have been conducted looking at workers and the public near Canadian nuclear facilities and they have failed to show increases in risks associated with tritium specifically, or with low doses of radiation generally.

Again, our research shows that low doses are protective or, at the very least, don't cause negative effects. There is simply no evidence that radiation doses comparable to those resulting from tritium from SRB carry any detectable human health risk.

Well, that's the evidence, but what do the scientific experts say? Well, scientists from around the world have warned against claiming that there are human health effects caused by radiation exposures as low as natural background and as low as those resulting from SRB's tritium emissions.

These include expert advisory bodies like the International Commission on Radiation Protection and the United Nations Scientific Committee on the Effects of Atomic Radiation. It also includes radiation protection professional societies; for example, the Australasian Radiation Protection Society, the Health Physics Society,

the International Organization of Medical Physics, the Society for Paediatric Radiology and the American Association of Physicists in Medicine.

There is a clear scientific consensus that claims of negative health effects from even the smallest doses of radiation are not supported by scientific evidence and they are not credible.

The practice of radiation protection is guided by the ALARA Principle, A-L-A-R-A, as low as reasonably achievable, and the CNSC defines ALARA as a tool in radiation protection used to keep individual, workplace and public doses as low as reasonably achievable, and this next part is very important, social and economic factors being taken into account.

Now, the ALARA Principle does not dictate that the CNSC must lead a march to zero radiation dose and drive out of business any enterprise that could result in even a trivial radiation dose.

That is not ALARA, and I'm concerned that some people have forgotten that there is an 'R' in ALARA and that 'R' stands for reasonable.

The ALARA Principle is based on the idea that at some point below regulatory limits there will come a point where social and economic considerations tell you that it is no longer reasonable to continue to demand that

doses be reduced.

Now, given that the releases from SRB were 150 times lower than the public dose limit in Canada and about 15,000 times less than the lowest dose known to be associated with negative effects in humans, on that basis it's my conclusion as a radiation protection professional that ALARA requirements have been satisfied and I agree with CNSC staff's recommendation that SRB, their request for a licence extension be granted.

In closing, I think it's -- in one paragraph -- I think it's appropriate for the community of Pembroke to have a discussion about what businesses operate here and the opinions and concerns of SRB's neighbours have to be a large part of that discussion, and that discussion should also be informed by an accurate presentation of scientific evidence on the effects of low doses of radiation.

My purpose in coming here today was to provide the Commission and the members of the public with that information that they will need as they go through this discussion.

I wish you all success in this discussion, and thank you for allowing me to speak today. And I also want to thank the Commission for the support that was provided through the CNSC's participant funding program.

Thank you very much.

THE PRESIDENT: Thank you. Question? Dr. McEwan...?

MEMBER MCEWAN: Thank you for the submission.

As I read through the intervenors' documents, many of them started off by, again, as you did, by a description of tritium in the environment, and then there was a discussion of what effectively were described as three forms of tritium in the environment, tritium, tritiated water and organic bound tritium.

Could you provide us with an overview of each of those elements, their relative importance and just what they mean, please?

DR. ULSH: Yes, I would be happy to. I think the three forms that you're talking about are HT, tritiated water and OBT.

Tritiated gas -- tritium gas I think does not last very long in the environment, it rapidly changes to other forms. HTO or tritiated water is just like normal water, two atoms of hydrogen linked to an atom of oxygen, it just so happens that one of those hydrogen atoms is tritium or two, but usually one.

So tritiated water goes anywhere that normal water goes and that means that tritium in HTO is

very rapidly diluted in the environment.

And the third form is organically bound tritium and that has received a lot more attention recently. Because tritium is simply an isotope of hydrogen, it goes anywhere in the body that hydrogen goes, and organically bound tritium is thought to be more tightly located with sensitive parts of the cells and, therefore, it's thought that it has a higher biological effect per unit dose, so one Sv, for instance, or one mSv of organically bound tritium would have a higher effect than one mSv of HTO and, you know, non-organically bound tritium.

But the main difference, I believe, is that organically bound tritium is cleared from the body at a much slower rate than HTO. It's held onto in the body and it clears more slowly, so it delivers a larger dose.

MEMBER MCEWAN: So if you take that delivery of a larger dose because of the binding within the cell, would that increase in dose create a significant difference to the calculations that you would do or, more importantly, would it invalidate some of the experiments that you've done which must involve some organic bound tritium?

DR. ULSH: Yeah, they must involve some organically bound tritium. I mean, we started with a cell

culture medium to which HTO had been incorporated, but of course, the cells are going to take that tritium up and bind it organically. We didn't add organically bound tritium from the beginning.

But to answer your question, yes, I would expect that organically bound tritium would deliver a higher dose, but we're talking about hundreds or even thousands of times below the levels where we see adverse effects.

So I don't believe that if it had been all organically bound tritium, I don't think that would be enough to show a negative effect.

MEMBER MCEWAN: But the experiments that you've described in your submission would really combine the effects of water -- tritiated water plus, or HTO plus organically bound tritium in the output, so the results -- the data that you report would include biological effects of organically bound tritium?

DR. ULSH: To the extent that the cells that we expose to tritium incorporated that and bound it organically, yes, it would. The output that we saw would include that factor.

MEMBER MCEWAN: Is there any way of measuring that?

DR. ULSH: Yes. Yes, and we might even

have that data, I would have to look. I haven't been asked that specifically, but I think we might have data on both HTO and organically bound tritium. I would just have to look.

MEMBER MCEWAN: So the other description that was in a couple of the intervenors' submissions related to the concept of radiobiological effect and I think you alluded to it, the description of a higher effect because it's bound and because it hangs around in the cell longer.

So again, maybe you could just explain radiobiological effect for the record in lay terms and say whether or not you think that that is a valid idea or a valid concept or not.

DR. ULSH: Okay. No, no, no, it's okay.

When tritium gets into a cell it goes to a lot of different places, and if you think of a cell as a bag of water, because that's really what it is, and there are some very discrete targets inside that cell where the DNA damage happens and the effects of radiation occur, historically it's been thought that DNA is that target, and I don't think there's any reason to doubt that, but if the tritium is organically bound and it becomes -- it's brought into very close contact with the DNA, it's even incorporated into the DNA, then you can imagine when that

tritium molecule falls apart and emits radiation, it has a much higher probability of interacting with the sensitive part of the cell which is the DNA.

So I think it's a reasonable thing to look at whether or not organically bound tritium has a different effect per unit dose than tritiated water. I think the evidence to date is -- it kind of depends on what end point you're looking at.

Epidemiology studies, I think that the results have such a great uncertainty it would be hard to tease out that effect.

We do have the potential to do that with biological studies where we have much greater control. The trick to that area is interpreting your results in terms of parameters that we really care about, like human cancer risk or, you know, population level effects.

MEMBER MCEWAN: So I guess a final part of that question, are there any data in the literature that you're aware of that would actually validate or invalidate the hypothesis of an increased RBE?

DR. ULSH: Yes, there are both. There are some that show that the RBE is, in fact, very similar, but there are some that suggest that the RBE of -- I guess we should define what RBE is. Relative biological effectiveness is an acronym that we radiation biologists

tend to throw around, and it's a measure of effect of say, for instance, organically bound tritium compared to a similar dose of a reference radiation, so say, for instance, x-rays or gamma rays.

And when you say that the RBE of some type of radiation like OBT is higher, that means it's more effective at causing a bad biological effect.

I've seen evidence that suggest both. I think the prevailing attitude, certainly in regulatory circles, is that OBT is more effective, but I've seen some evidence that suggests that there's really not a lot of difference.

I don't think it's a settled question yet.

THE PRESIDENT: But just to bring it to the SRBT, at the level of tritium that you see in the ground, in the water, in the air and given all the uncertainty in the calculation or dosage, in your opinion, is there any concern here?

DR. ULSH: Is there any concern? Of course. Of course there is because the public is concerned about tritium, and I think that's entirely reasonable.

If it was in my community, I would be concerned. And I think that the public has a right to expect that SRB control their emissions.

Regardless of whether the resulting

tritium concentrations even approach the levels where we see negative effects, it's reasonable to expect any industry to control their emissions. The question is, has SRB done that to the extent that protects public health, and my opinion is that they have.

Ten (10) years ago, I might have had a different number. When the CNSC shut them down, I think that was probably an appropriate -- it's always easy to be an armchair quarterback, but when I see the levels of groundwater contamination that existed 10 years ago, that would concern me as a radiation protection professional just from the standpoint that I wouldn't have confidence that the tritium emissions were being controlled.

Today, I think it's a different situation, and SRB has demonstrated not just through their commitment to increased staff, but when you layer on top the CNSC's independent environmental monitoring program, that gives me some confidence that SRB has turned a corner and is now doing things a little differently.

THE PRESIDENT: Thank you.

Questions?

Mr. Harvey?

MEMBER HARVEY: One question.

I would like to have the staff comment on the assertion that those low radiation doses could be of

some benefits to the human health.

Is that a scientific evidence, or...?

DR. THOMPSON: So Patsy Thompson, for the record.

So the answer is yes and no, and I -- so yes, there is evidence that low doses of radiation like low doses of metals and low doses of other stressors have a protective or beneficial effect on cells. And a lot of the scientific studies -- and Dr. Ulsh talked about the ATP measurements.

In a previous life, I looked at cadmium exposures and ATP-ADP ratios, and it's essentially, you know, organisms' reactions to stress and a way to compensate.

And we normally see increases -- physiological responses to stress that essentially bring a benefit, so it's a well-known phenomenon. It's well established in the scientific literature.

The no part is, given the information how cells and organisms respond to stress and that response to stress where there is a benefit, there's a fine line between having a benefit and then getting to a dose where you're starting to see negative effects. And that line varies among organism and among cell types, and it's -- right now, the scientific evidence and the positions taken

by regulatory agency is that the science doesn't allow us to use that information very well to make regulatory decisions, but the limits that are set are protective and take into consideration all of the information that is available, recognizing that we likely over-estimate levels of effects and risks at very low doses.

MEMBER HARVEY: And this is true for kids, for babies, for -- is there a big difference between an adult and a baby?

DR. THOMPSON: Patsy Thompson, for the record.

Cells react similarly because we -- you know, the physiological responses and processes are the same in cells and individuals. There is a difference in the resistance and adaptability, and there is some work that has been done by the United Nations Scientific Committee on the Effects of Atomic Radiation where they have recently compiled all the literature on relative sensitivities to various concerns of adults and concern, for example.

And there are for certain types of cancers where children are more susceptible to -- and other types. But we do take that information and that scientific evidence into consideration when setting limits and doing our risk assessments.

THE PRESIDENT: Ms Velshi.

MEMBER VELSHI: Thank you.

I have a question for you on your Figure 3 on page 5 of your submission. This is on drinking water standards and guidelines.

And it just -- I'm just so taken aback that there could be orders of magnitude differences from one jurisdiction to another when everyone's trying to manage the same risk.

And I know in your description, you talk about maybe public dose limits being different, but is there a move -- a movement to try to bring more convergence?

As a layperson, this can just add to the concern that people really don't know what they're talking about if there's this much differences on what's acceptable. I'll ask any comment on that.

DR. ULSH: Yes. The figure that you're referring to shows international drinking water standards around the world, and they range from a high in Australia, which I believe is 77,000 becquerels per litre. It goes through a number of other countries.

Canada's limit is 7,000 becquerels per litre.

The U.S.A.'s standard is 740 becquerels

per litre, but that's based on an arithmetic mistake that has never been corrected.

And yes, I think there is some effort afoot to bring these regulations all into closer alignment. It's kind of difficult because even the Australian standard is at a level that is far below the dose where we see negative effects, so of what benefit is it to lower it by a factor of 10 or 100 or 1,000 or -- but there is some -- it is somewhat compelling.

You know, if I live in, you know, Australia, why is my limit so much higher?

I can't really explain why it's so much higher. Perhaps Dr. Thompson has some more insights into that than I do. But I do note that all of these are far below the level where we see negative effects.

DR. THOMPSON: Patsy Thompson, for the record.

I'd ask my colleague, Dr. Mihok, to come to the table. Essentially, the data that is presented is data that CNSC staff compiled a few years ago during the tritium studies project.

The WHO essentially has made recommendations based on the dose of 0.1 millisievert per year, whereas the Australian guideline is based on one millisievert per year.

They're all more or less an approach that's based on the public dose limit and some provisions for other sources of exposure, but I'll ask Dr. Mihok to provide a better -- a more complete response.

DR. MIHOK: Yes, good morning. Dr. Steve Mihok, environmental risk assessment specialist with the CNSC.

Dr. Thompson has almost given you all the answers you need.

Essentially, for 100 different reasons, countries have taken the concept which is sort of in the World Health Organization's standard of a dose of .1 millisievert, and how you translate that into a drinking water standard or a guideline in becquerels per litre, somewhere around 7,000, sometimes rounding it up, sometimes rounding it down. And even the EU, which is one of those very small slivers, actually uses that number.

The number on the graph is sort of an environmental monitoring indicator to react to situations in the environment.

Australia really stands out as being different, and when we asked them when we did the review of drinking water standards why, it was essentially because they have no issues with tritium and the health protection agency which sets the standard just set it at one

millisievert instead of .1 millisievert since they had no issues.

And the nuclear regulator in Australia said that, "Oh, we would never allow any facility to actually, you know, approach that standard in the way that it released tritium into the environment".

THE PRESIDENT: Can I -- I've just been informed that in Japan now there's a tritium issue in trying to get rid some of the contamination, and they're using, if I understand correctly, 10,000 becquerel.

Anybody knows what the Japanese limit is? Because they are now -- really are concerned with tritium clean-up.

DR. THOMPSON: Patsy Thompson, for the record.

I believe the number is 10,000, but we could do some verification perhaps over lunch and see if we can confirm that number.

One of the -- I'll use the word "problem" loosely. One of the problems in Japan is that there were a lot of commitments made during the actual emergency when the Fukushima Daiichi reactors -- the accident happened. And because of those commitments, there's essentially a lot of work that is being done to try to manage contaminated waters because of the likely unreasonable commitments that

were made to try to provide public reassurance at the time of the accident.

And so there's a lot of work that's being invested in terms of trying to find technology to remove some of the removable radioactivity, and there's also some work going on in terms of engaging the communities to get permission, essentially, to discharge tritium at the higher levels than the commitments that had been originally made.

CNSC staff was consulted by the Japanese authorities about a year and a half ago to assess, essentially, the document they were putting together to serve as a basis for -- for moving forward on those issues.

So it's complicated. Not just scientific, but also a lot of social and public considerations.

THE PRESIDENT: Mr. Levesque, you wanted to add something?

MR. LEVESQUE: Thank you very much for the opportunity. Stephane Levesque, for the record.

I just want to add -- there was mention of SRB 10 years ago, and I just want to put it in perspective for the Members of the Commission and the public is that, first, SRB technology since its inception in 1990 always operated within its licence limit. Always.

What's different is that, initially, SRB was operating to a percent of its DRL. That's how the

limit for most facility is set, by a percent of DRL. Were operating within five to 10 percent of their DRL limit, so we were within the licence.

But that limit had no regard for groundwater protection whatsoever, so unbeknownst to us, yes, we didn't do enough of our homework.

We didn't realize operating to within that limit would result in the groundwater problem that we had.

Since then, though, the limit and release limit, percent of DLR that we're working to, is entirely protective of groundwater, and I think that's the difference between then and now because we understand the mechanisms in groundwater.

The other thing that was mentioned is that OBT -- I just want to make it clear to the Commission and members of the public, and this is in our annual compliance report, that when we calculate the public dose, we actually calculate the OBT as a result of consumption of vegetable. And it represents, from our dose -- I think you were told by staff and ourselves that our dose has been less than .007 millisieverts, so seven microsieverts, and the percentage OBT of that is 3.13 percent in 2014.

So just so you can put that in perspective, of our dose, three percent of it is associated with OBT.

Thank you very much for allowing me to make that comment.

THE PRESIDENT: Thank you.

Question?

Okay. I have a last question. On page 6, you make a statement that I'm just curious about because it's really contrary to what we hear often.

Nowhere in the BEIR VII report does it state that there is no safe dose of radiation. I hear quotes the reverse of that.

DR. ULSH: If you have a PDF copy of BEIR VII, go into it and search for the words -- the phrase "no safe dose". I got zero hits.

And that's why I say that nowhere does it state that there is no safe dose.

Now, BEIR VII -- maybe I should explain what BEIR VII is. It's a report from the U.S. National Academy of Sciences. It was completed in 2005. And it examined the evidence on the effects of low doses of radiation.

The conclusion of that report was that the linear no threshold model, which assumes that there is an increase in cancer risk at doses all the way down to zero, that that was still an adequate basis to base radiation protection standards on.

The thing that no one really talks about is that there was another report issued about that time by the French National Academy of Sciences and Medicine that came to the exact opposite conclusion of that, that it was no -- it was not justified to stick with the LNT.

So certainly there are some differences of opinion about that. It's also worth noting that since the U.S. National Academy of Sciences issued the BEIR VII report, two of the major sources -- major studies that they based their conclusions on have changed.

The first is the 15 -- it's known as the 15 country study. And you all may be very familiar -- you may have heard of that because it was an epidemiological study looking at nuclear workers in 15 different countries, hence the name. Canada was one of those 15 countries.

And ironically, when they started looking at the results from the different countries, one country stood out as suggesting very, very high risk compared to the rest, and it was Canada.

So that initiated an effort to go back and find out why in the world this was the case, and I believe that they found some problem with the way that the dose records from the early time period were incorporated into the National Dose Registry.

I'm hesitant to go further than that

because I wasn't involved in that study, but I think that that was what they found.

And without the Canadian data, there was -- it was quite different results. It suggested a much lower risk at lower doses to the point where it wasn't statistically significant.

The second piece of data that the BEIR VII report relied on very heavily was the Japanese atomic bomb survivors. And periodically, the Radiation Effects Research Foundation issues updates of the A-bomb survivor data.

The latest, I think, happened in 2013 by a fellow named Ozasa, O-z-a-s-a. I assume it's a man. I can't always tell with Japanese names.

But that report looked at the latest mortality data, and you have to read past the abstract. You have to get down into the paper to see what the data really say. And basically, it showed that there is no significant risk all the way up to 200 milligray.

Now, you have -- like I said, you can't just stop at the abstract to find that, but when you go in and you look at the dose -- response at different doses, it's not statistically significant until you get above 200 milligray. And that means that less than 200 milligray, you can't say that there's a statistically significant dose

based on the Japanese atomic bomb survivors.

So there's been -- this trend has been appearing over the years, but it's now to the point where it's statistically significant.

So it would not surprise me -- I'm not a member of the National Academy of Sciences, but I know that they are preparing to revisit this issue, the risks of low doses of radiation. And it would not surprise me if they're more cautious this time around in their conclusions.

THE PRESIDENT: Okay. Thank you.

Any final words? You have the final word there.

DR. ULSH: Oh, to me. No.

Well, I would like to, again, thank the participant funding program. I know that you had some questions about how that program worked with the previous speaker.

I also did not get all the funds that I requested, but I got all that I needed. And my interactions with the CNSC staff on the participant funding program were uniformly positive.

The staff was very courteous, very prompt, very professional, and I certainly support -- I certainly appreciate the support that was provided.

Thank you.

THE PRESIDENT: Thank you.

Okay. We need to break for lunch and resume at 1:30. Thank you.

--- Upon recessing at 12:30 p.m. /

Suspension à 14 h 30

--- Upon resuming at 1:33 p.m. /

Reprise à 13 h 33

THE PRESIDENT: Okay. I'd like to move now to the next submission, which is an oral presentation by the Concerned Citizens of Renfrew County as outlined in CMD 15-H5.4 and H4.A, H5.4B.

I understand that Dr. Hendrickson will make the presentation. Please proceed.

CMD 15-H5.4/15-H5.4A/15-H5.4B

Oral presentation by

Concerned Citizens of Renfrew County

MR. HENDRICKSON: Mr. President, Commission Members, ladies and gentlemen, I am Ole Hendrickson, representing Concerned Citizens of Renfrew County. We have intervened at hearings on SRB and ACL for

more than 25 years. We were probably the first to take environmental monitoring samples in this area in 1998.

As Dr. Harvey asked, why is our impression so different from the staff impression of SRB? Well, we expect that SRB will put its best foot forward and really do a good job presenting its application, but we want the CNSC to be independent, objective, unbiased and technically credible. And there are some problems, in our view, about the Environmental Assessment Information Report and the Independent Environmental Monitoring Program, such as the statement that "'radioactivity measured in water, air, soil, vegetation, milk, wine, fruits and vegetables ... are within natural background levels'". That sort of statement raises red flags for a group like ours. In CCRC's view, there really isn't enough information yet about activities in the material prepared by CNSC staff to accept that recommendation that SRB will make adequate provision for protection of the environment.

The rig stack, which is on the left, amidst waste tritium gasses from filling rigs, the bulk stack on the right from the bulk splitter laser cutter, and formerly the reclamation unit, but you can see a lot of air handling units also. Could there be unmonitored radiation emissions from air handling units other than the stacks? That's a concern of ours.

The blue line is SRB's reported radiation emissions over its entire 25 year operations, and we've seen other graphs that have only started at the year 2000 and show that decline.

In 1994 the AECEB granted an increase in SRB's emissions to allow tritium reclamation and for the next 10 years imported tritium light sources were crushed in the reclamation unit and some of the tritium captured on a uranium getter bed and the rest emitted through the bulk stack. This came up at the 2010 hearing, can we tell exactly how much of the reduction was due to cessation of reclamation, and I think we could if we were to look separately at the bulk and rig stack data for the period 1995 to 2005. And I believe that in future the annual compliance reports, or ACRs, could provide data separately for the rig and bulk stack, and that might help us understand more what's going on.

After the 2006 hearings, the Commission decided not to renew the tritium processing licence, saying that the operation of SRB had resulted in unreasonable risk to the environment, mostly due to groundwater contamination. As Mr. Rinker noted, in 2007 CNSC initiated the Tritium Studies Project and the Synthesis Report from that project, and there's a quote from that report, talks about a value of 100 becquerels per litre of tritium which

can be -- represent a balanced consideration of science, public health policy, and societal expectations. The report also says that for existing facilities there may have to be higher levels, but those should be addressed by the CNSC at the policy level in consultation with the provinces.

Our concern is: Is the current release limit of roughly 448 terabecquerels low enough? Is it really low enough to protect groundwater or are we still hiding behind the old 7,000 becquerel per litre limit, which a lot of -- which at least two Ontario government reports have said should be lowered to a hundred becquerels per litre or 20 becquerels per liters. And as was discussed earlier, why these orders of magnitude difference in protecting the public.

The orange lines are the predictions made by CNSC staff in 2010 of what groundwater tritium levels would be in four monitoring wells in 2014. The blue lines are monitoring data from the 2014 ACR. And I think our concern is that there does not appear to be good agreement between the orange and blue lines, and this to us says that the statement in the Environmental Assessment Information Report by the staff that, "The relatively good match between the modeling results and measurements provides validation to [the prediction of] behaviors [in] tritium

[and] demonstrates that releases of tritium ... are under control," may not be true. We may not yet know what all the sources of tritium are or how it's behaving in the environment.

SRB's ACR show that between 2001 and 2006 drums of crushed glass were shipped to ACL Chalk River. There was a five year hiatus in shipments of glass, as far as I can tell, and then in 2012 shipments of expired gaseous tritium light sources began. And we assume that these are mostly imported wastes from mostly the U.S. and that they are being taken out of exit sign frames and presumably shipped intact in as compact a form as possible to Chalk River, where there is a licensed waste facility. And we just think that this is an important activity which has not been adequately addressed in the Environmental Assessment Report and indeed in the whole CNSC staff CMD.

So, is our interpretation correct? We have found online Nuclear Regulatory Commission permits allowing SRB's affiliate in Winston-Salem, North Carolina, to ship waste exit signs to Pembroke. So, is tritium disposal a main part of SRB's business model? There's -- you look on the website and you see disposal and recycling of tritium. And to my knowledge, tritium disposal is not currently allowed. Radioactive waste disposal is not allowed by the CNSC. We only store waste. Even the Chalk

River facility stores waste.

And then this also raises the question of how do we know how much of these expired tritium light sources are coming in? Can we accurately estimate the quantities of tritium contained in these? It's not easy to do. And this gets us back to some discussion earlier about the possession limit for the facility and how much processing you can increase and stay within that 6,000 terabecquerel possession limit. If we -- if SRB wants to increase the number of shipments, as -- and they seem to have gone up in the past three years, it's going to be difficult to maintain operations within that possession limit. And it's -- or there could be the incentive to have more rapid throughput of tritium through the facility. So, there could be a fair limit on how much tritium can be processed and it makes us wonder whether this strip mall in Pembroke is really the right place to do this when the eventual destination of these waste will be Chalk River.

Now, without going into details, the same tritium gas used by SRB to make self-luminous devices plays a key role in nuclear weapons arsenal. And I want to skip through this pretty quickly, but I would perhaps like to have an opportunity to discuss this privately with Commission Members because I do have concerns about safety and security associated with large-scale imports and

exports of tritium, knowing that only a few exit signs or perhaps a single Amersham container is enough to create a real security risk if a terrorist group may have gotten its hands on enriched uranium or plutonium. And this is something that has been raised by Kenneth Bergeron, who is -- was a senior Department of Energy official with the U.S., and he wrote a book in 2002, published by MIT Press, where he warns that recent developments call for enhanced vigilance about the availability of tritium and the technology for producing it.

And just to show, that is taken from the CNSC publication on Tritium handling that was part of the Tritium Studies Project. And that little metal -- the larger metal container is the Amersham container and the ones on the side would be the pyrophoric uranium tritium traps that would be used.

And this -- a final, here, one further concern, SRB does not own the building that it shares with other businesses, such as Med-Ed(ph). So if you look at the back side of the building, here is -- here is an expanded footprint of the building that SRB is in, and we're concerned also about how that might influence release of stacked gases, downwash, is there a possibility those tritium gases could get into other facilities near SRB.

And also, you can see the construction on

the right side appears to us to have perhaps impacted four of SRB's monitoring wells, including Well 24, which is one of the few wells that's actually showing increases in tritium and very significant increases. Well 24 has gone up from around a hundred becquerels per litre to 2500 becquerels per litre in 2014.

So I'll just leave that. There are some things that -- I know I've covered an awful lot of material and really did my best to present that to you. Thank you.

THE PRESIDENT: Thank you.

Question. Mr. Tolgeysi.

MEMBER TOLGYESI: In your average groundwater tritium concentration, and this is CMD from SRB page 48, or I think it was in the -- this last intervener's presentation also, the average groundwater tritium concentration on the whole -- on Well MW06 decreased from 140,000 to about 27,000 in 2008. Since it seems that it's reaching a kind of plateau. Now, I think the decrease was one part due to production interruption, 2006 to 2008, but since this plateau is still there and it doesn't move. Does it mean that we reached a point where the emissions and the -- where we reached a point where it's not further decrease, or, according to predictions of the Commission, it was a gradual decrease to very low levels? Now, we have for last six, seven, eight years a kind of plateau. Could

we expect further decrease or how it fits with your predictions? It's a kind of revision of your predictions?

MR. RINKER: Mike Rinker for the record. I guess I first want to talk about the model and its predictions and then I am going to pass the question over to the Director of the Environmental Risk Assessment Division.

But the modeling that was done to help us understand tritium behaviour in groundwater, particularly -- focused on this particular well but also was applied to other wells, was trying to understand how we expect -- there was an increasing trend, you can see it around 2008 and 2009 in the figure you referenced - we were trying to understand was that an increasing trend that was real or is there something, other mechanism going on. And our assumption was -- or our -- the thing that we were trying to test -- or answer was is the inventory of tritium that's in the soil profile, the column of soil above the groundwater, having sort of a latent effect on groundwater. So, are we seeing tritium -- high values of tritium in the soil overlying the groundwater slowly sleeping down into that groundwater so we get that legacy effect? And that's really what we modeled. We didn't -- although the model was applied over longer years, I would say it's -- the purpose or the question it was trying to answer was, you

know, are we seeing a latency effect of tritium stored in the groundwater from previous emissions that would explain the next few years of rising trends? I think the model would be weaker to say that it could predict, you know, in a decade or five -- or into the future. It was based on a 2006 soil profile to look over at a five or eight year period as it trickles down.

So -- so I don't that we tried to model going that far into the future, although we did play a line to see how it looked, but I would say the model gets weaker with time.

MEMBER TOLGYESI: Did you look some improvements in the models, you know, to revise the model based on the data which you were collecting since the last seven years?

MR. RINKER: Mike Rinker for the record. The model is -- is based on the coring of soil -- so of the concentrations above the groundwater table, and we have the data from 2006. We don't have extra -- more recent data to try to remodel into the -- into the future again.

MEMBER TOLGYESI: You were saying that when -- I'm sorry, I will stick to my question.

THE PRESIDENT: Okay. On this same question, so the model shows that eventually it goes into a steady state synthetically, let me use those words. Is

there a value -- I guess what I'm concerned with, at the end of the day you want to make sure that whatever reach the river, the Muskrat River, is protected, right? So is the model eventually can be extended all the way down to the river so you can actually figure out what's the long-term synthetic value?

MR. RINKER: I'll ask Andrew McAllister, Director of Environmental Risk Assessment Division, to answer that question.

MR. McALLISTER: Thank you, Mr. Rinker.

That particular model, no, is not meant -- was not meant to model out to the Muskrat River. What CNSC staff did as part of its assessment, as part of the CMD looked at really very much a bounding scenario. So if we look at the well in question that Dr. Hendrickson and others have mentioned, we took the highest tritium value observed, which is around 156,000-and-so becquerels per litre, and then took some very conservative assumptions to have that essentially move downgradient into the Muskrat River. So we looked at a -- we conservatively looked at 100 x 100 metre area. We took the -- I'll say the highest groundwater gradient velocity that we could find based on very localized conditions of 14 meters per year and moved that downgradient, without the natural hydrological processes that do happen, like dispersion and others, we

only accounted for radioactive decay, and had that basically discharge into the Muskrat River, and the resulting -- the result of that was less than 1 becquerel per litre increase. And we have been seeing the range of values of Muskrat River through the monitoring being around 3 to 6. And so, that's -- that's the basis for which we conclude with confidence that we don't foresee any impacts on the Muskrat River from the groundwater.

THE PRESIDENT: So -- but you're starting to have more and more data, so will you be able to then project or fake the model so that you can actually keep tracking as to how the plume --

MR. RINKER: Mike Rinker for the record. So it is possible to improve the model with taking more core samples, or probably more straightforward is looking at air emissions and trying to find correlations and making predictions. However, it's very difficult to be so precise, and to suggest that the model would be -- would be -- would solve the question that's being asked is less certain. And I think the monitoring data itself, rather than modeling and predicting, measuring and seeing the data on a quarterly basis and watching it trending lower and lower, and having a good understanding of the hydrogeology to know that Muskrat River has been receiving tritium by air deposition for many years and it hasn't shown

concentrations beyond a few becquerels per litre, the model is not going to necessarily provide us with more confidence. It may just provide us with some answers to some more theoretical questions.

THE PRESIDENT: Mr. Levesque.

MR. LEVESQUE: Thank you very much. If I can just add to that with some data that's in our submission, on page 49 of 72. That's the submission from March 13th, in which we state that we have performed a number of other monitoring activities, and one of the indications within groundwater is what we find in precipitation. We find in precipitation concentrations of on average over the licence -- the licence activity of the five years, 75 becquerels per litre, and most specifically in 2014 of 42 becquerels per litre. Now, those precipitation monitors are between 250 to 500 meters from the facility, so close to where the Muskrat River is. So, you're talking about that small a proportion.

If you're looking at concentrations in the well, have they reached a plateau, we don't believe it has. We've taken soil samples a year ago in June and some exactly at the stack, which is indicative, you can understand, of where the concentration will be in future years, and what we found, and that's even before dilution due to the years and decay, that the sample was just over

10,000 becquerels per litre. So over time as it progresses through the soil and gets diluted, the concentration in the well will be even further below that.

MEMBER TOLGYESI: You were saying also that there is no processing during precipitation events and this is mainly due to -- to prevent any -- any tritium with precipitation, weather going in the ground. Now, when there is nice weather you do produce and you emit; there is emissions. Eventually even if you stop during a precipitation, that tritium is on the ground, so with the precipitation it will seep through the ground. So do you have any modeling which -- which will show what's the effect - what's the effect of suspend processing during precipitation?

MR. LEVESQUE: Thank you for the question. Stephane Levesque for the record. A number of years ago before we instituted that -- that precaution, we found that concentrations on site, if we processed while we were operating, were in the tens of thousands of becquerels per litre near the stack. And after we saw processing and made the same measurements, you were getting a few hundred. So it's made a significant impact into the concentrations in water near the stack and it's hard to qualify because all the atmospheric models that are out there are really based on having a certain proportion or range throughout the

year, so they actually grossly overestimate what the concentrations in groundwater would be, but we know from our measurements it makes a huge difference.

MEMBER TOLGYESI: Staff, something to add?

MS THOMPSON: Patsy Thompson for the record. Perhaps if I could try to put all the pieces together.

So when we started having concerns around SRBT was mainly because of very elevated concentrations around the site. And through the various investigations we did, the sources remained -- important sources were entrainment of tritium around the facility, from the roofs and down, and the stacks. We also, as a result of the -- of the tritium studies, looked at what was being done in other jurisdictions. And from that point of view, we -- we did, rather than propose to the Commission a limit based on 1 milliSievert per year, proposed a limit that over time would reduce the amount of tritium going out the stack and being entrained through rain events and other precipitation to the ground. Implementation of that limit and the improvements that SRB have done on their facility have resulted in decreases in levels of tritium in groundwater and that is seen by values not just on site but also off-site, where tritium values in -- in the wells have gone down.

The questions that have been asked in terms of could we do better in terms of predicting long-term performance - excuse me - one of the -- one of the reports that was done for the Tritium Studies Project looked at the ability of models like the CSA N288.1 model to take a source projected in the atmosphere through entrainment and see what the results in groundwater would be. We did do a lot of validation with that, the modelling, with some of the results that exist around Canadian nuclear facilities and we saw that the models were conservative and tended to over-predict groundwater concentrations. And so if the -- if we were to redo such a modeling, it's totally possible to do it with starting as if the ground has no contamination, doing the modeling for ongoing emissions, seeing what we would see in groundwater, but what we know is that the models are conservative and would tend to over-predict.

And so if the real question is how long will it take for levels to reduce, then it is really true measurements. If the question is is the limit sufficiently protective to not have any contamination of groundwater, that's quite a different question and it is, in my view, impossible for SRB to operate with absolutely no entrainment of tritium in groundwater, but what they have done is reduce emissions and they're managing their

operations, orders of magnitude before than they did in the past and they've continued to look at ways of reducing emissions. And so from that basis there is certainty that groundwater levels will decrease, continue to decrease until a steady state is reached, and the levels that we're seeing have essentially no health concerns and will continue to decrease and -- and continue not to pose a concern.

MEMBER TOLGYESI: You were saying that the modelling is quite conservative, which means it really over-estimates the values. Now when you're looking at the intervenor's slide 5, where he compares actually what's in against the predictions, they are quite higher. So if the predictions were conservative, it's kind of unbalanced there.

DR. THOMPSON: So, Patsy Thompson for the record.

So we're talking about two different models. Mr. McAllister will explain the model that is presented in the staff's data. The model I was talking about is if you take emissions, do atmospheric dispersion, and then look at the factors that would cause tritium to come down to the soil and then move to groundwater. That type of model has been seen to be conservative. But I'll let Mr. McAllister explain that other part.

MR. MCALLISTER: Thank you.

Andrew McAllister for the record.

Just to revisit, and Mr. Rinker mentioned some of the earlier in the presentation, but the model that was done in 2011 relied on the soil profiles from the monitoring wells and was looking at average hydrological and hydrogeological parameters, such as I guess constant rate of permeation through the soil column, tritium being fully mixed. So there were some average values that were used in that model. And you know, it generated predictions, it generated trends. And when we look at that, given the model, given the intent of the model over the most recent past licensing period, we do see a good match of the trend of the information relative to the monitoring information that was collected.

Do we see variability in the monitoring information? Absolutely. We're monitoring a natural system. Natural systems are complex by nature. A lot of things can influence a given monitoring sample at a given location. It could be related to fluctuations of releases in the air, precipitation, surface-water runoff, infiltration rates -- and that's just getting us in the vertical aspect. When we start moving horizontally, there's aspects around radioactive decay, dispersion, retardation, and other hydrogeological processes.

So we're not surprised that we're seeing variability in the actual monitoring data. But what we do take comfort in is that the trend of it is very similar to what was predicted; it's a fraction of what was happening historically; and that the residential wells and the Muskrat River remain protected.

THE PRESIDENT: Thank you. Monsieur Harvey.

MEMBER HARVEY: Merci, Monsieur le Président.

I want to go to go the written submission by Dr. Hendrickson under H5.4.A, page 2. There is a table there, "Tritium Wastes Shipped to AECL." And there is a comment right after, on the other page, at the top of page 3.

"The total radioactivity in these shipments amounts to thousands of TeraBecquerels per year. We urge Commissioners to confirm the correctness of this interpretation during the hearing."

So I would like to have some SRB comments about that table here, and to explain the last three lines. For example, the type of packages, what volume that

represents, and the nature of the content of those packages.

MR. LEVESQUE: Stephane Levesque for the record.

Thank you for the question.

If we look at Table 1 in Dr. Hendrickson's presentation. If I go back in time a bit, I'd like to remind members of the Commission that when we first reapplied for our licence in 2008 that we had discussed in detail with the concerned citizens and the members of the First Six Years where they were looking for the most for SRB to do to support our licence application.

And one of the main things was for us to stop using the reclamation unit, which consisted in taking tubes or lights out of our rejects and basically crush them to try to recycle the gas. And it really wasn't a process that was profitable for us. It was really something, again as I mentioned earlier, we did it for an after-sale service for our customers. So we agreed to do that to keep members of the public happy.

But right away what would happen as a result is we still take back product from customers that no longer meet the requirements that they have the products for, for brightness. So what we do now is we take, for example, an exit sign. We assess the brightness of it, see

if it still meets a building code, whether it's the building code the customer wasn't meeting any more or another building code where we can resell those lights within the sign. And if we can't use them, we take the light sources out of the sign, we package them, and we send them to a licensed waste facility.

And that's where you see those numbers, where before what we would have done is we would have put it in our reclamation unit, crush the light sources, and re-use the tritium and send crushed glass instead to a licensed waste facility. So really what it has done is essentially changed the crushed glass to sending light sources to a waste facility.

And if you're asking me about quantities, I got the numbers for 2013 and '14. We've imported from all various customers as part of returning their signs or giving them new signs or them just disposing of them with us, we've taken back approximately 20,000 exit signs in each of those two years.

And I have the detailed reports. And that's where we're proposing -- I said in my presentation to Mr. Hendrickson and other members of the public who have concerns about that -- to basically put in our Annual Compliance Report all our import per countries and get

those details, so that people know exactly what we're importing and where it's from.

MEMBER HARVEY: What percentage of your production does represent those ---

MR. LEVESQUE: Depending on the year that we're talking about, I would say maybe about 40 per cent of the production that we're taking back right now.

You got to realize as well that now with having Shield Source, our then competitor, being no longer in business, we're also taking back signs that come back from them. Because we have their customers looking for new signs and they're looking to dispose of the old signs.

And we re-use as much of the sign as we can. And if we can't, we take those tubes, package it properly according to the regulation, and send it to a licensed waste facility -- a licensed waste facility within Canada.

MEMBER HARVEY: And essentially now the radioactivity, the content is just shipped to AECL and -- now. I mean those, there is some radioactivity in the waste, and it goes to AECL, and then it goes to a landfill or -- what does happen after that?

MR. LEVESQUE: Stephane Levesque for the record.

AECL is one of the places -- actually, right now it's the only place that we send these packages to. From what I understand, they go in long-term storage.

MEMBER HARVEY: Okay.

THE PRESIDENT: Well, maybe now is the time to get CNSC to explain what are the rules of waste disposal. I think the intervenor mentioned that he thought that waste disposal is not allowed. I don't know, I'm putting words in your mouth.

So what are the rules? And maybe, while I know you want to go fast through the security, we cannot go through fast through the security. I'd like some comments about safeguards and the protection of this material. So why don't you start to illuminate us.

MR. NEWLAND: Dave Newland for the record.

While we sort out our answer on the waste disposal and storage, I'll have Mr. Awad and his staff talk about safeguards on import and export of tritium.

MR. AWAD: Raoul Awad for the record. I'm the director general of Security and Safeguards.

First, tritium is a controlled material under our regulation. It requires a licence for export and a licence for import. The most important thing, it's -- see, in some of this submission -- tritium in the dispersed form, which is exported and imported by SRB, is not useable

for nuclear weapons. That should be clear. However, it's under our regulation and we control it under our regulation.

With regard to the safeguard, we removed the clause or the licence conditions of the safeguard because we have -- it's covered under our regulation. And maybe my colleague Karen could give you more explanation about the safeguard issue.

MS OWEN-WHITRED. For the record, Karen Owen-Whitred, director of the International Safeguards Division.

You asked what the rules are related to safeguards generally. So let me just quickly explain that there is an international system called Safeguards. And what we mean by that is the control of nuclear material that could be used in a nuclear weapon. Nuclear material within that system has a very specific definition. It's uranium, plutonium, or thorium. These are the three materials that could be used -- that need to be used when you're making a nuclear weapon. If I can use a very simplistic metaphor, they're essentially the bullets in the weapon. In order to control the spread, the proliferation of nuclear weapons, the International Safeguards System controls those inputs, the three materials that need to be used in order to develop a weapon.

So I would just point out as well that I think there's some confusion. Although tritium can be used in a weapon in order to boost yield, if you don't have one of those three materials to begin with -- the uranium, the plutonium, or the thorium -- you cannot create a weapon. So the system is aimed at controlling those three and, by extension, controlling weapons as a whole.

THE PRESIDENT: So tritium is not part of the safeguard process?

MR. AWAD: Raoul Awad for the record.

Exactly. Tritium is not under IAEA safeguard. However, our regulation, which is based on the nuclear supplier group, controls tritium, because tritium could be used to boost the yield of nuclear weapons.

THE PRESIDENT: So why was it in the clause to start with?

MR. AWAD: Why was it...?

THE PRESIDENT: I mean, I think it was in the licence to start with; right? I mean, you're now removing it from the licence. Why was it inserted to start with?

MR. RINKER: Mike Rinker for the record.

If we went back five, seven, eight years ago to previous licences, the condition was there. The program was not rated and there was an exemption in place.

So it was a condition to do something that isn't necessarily required. It was a redundant condition.

MS OWEN-WHITRED: Sorry, if I may just add -- Karen Owen-Whitred for the record.

That original condition that was in place, it was focused on the depleted uranium which is used at SRB. It was not focused on the tritium.

THE PRESIDENT: So there is some still -- depleted uranium?

MS OWEN-WHITRED: Karen Owen-Whitred.

That is correct. And as has already been stated, any requirements that may be expressed by the International Atomic Energy Agency, which is essentially the UN organization that administers international safeguards, should they have any safeguards measures that they wish to apply to that small amount of depleted uranium, the CNSC has the regulatory capability to do that through the general regulation.

The existence of this specific licence condition, as has been stated, is redundant, and the removal of that condition does not in any way affect the IAEA's ability to apply safeguards should it request those measures to that depleted uranium at this facility.

THE PRESIDENT: Dr. Hendrickson. Would you like to react to this?

DR. HENDRICKSON: Ole Hendrickson for the record.

Thank you, Mr. President.

That's true that tritium is not in itself a -- you can't make a weapon just from tritium. But you can certainly make a much more powerful weapon from the combination of tritium and enriched uranium or plutonium. So I think it's still extremely important to keep controls on the movement of tritium, and particularly when it's attached to depleted uranium. And also on exit signs, because there could be a possibility of re-extracting that tritium from an exit sign.

I don't know the details of the IAEA regulations for the different substances from which you can make nuclear weapons.

But I just wanted to alert the Commissioners that it's extremely important to make sure that tritium does not fall into the wrong hands. And I hope that you'll make sure that that is the case.

THE PRESIDENT: So if I understand from staff, all the security rules still apply here?

MR. AWAD: Raoul Awad, for the record.

All the rules apply. Let me just clarify something: removing the tritium for military use from the sign doesn't make any use for nuclear weapons, because it's

in a dispersed form. It's a component which is not easily -- you know, in theory you can remove it. But practically, it makes it useless for nuclear weapons, this dispersed form.

THE PRESIDENT: Thank you. Question, Ms Velshi?

MEMBER VELSHI: So it's not on safeguards but it is on export of tritium in your light.

What are the restrictions on who you can export it to? And I see you've got just a handful of countries that you export it to. And what are your obligations post-export? And do you always have to accept the used lights back when they no longer have a need for them?

MR. LEVESQUE: Stephane Levesque for the record.

No, we don't always have to accept them. It depends on the manufacturer. It depends on the product they're trying to send back. And we have refused some at times if we weren't sure exactly what product it was that was done by one of our competitors.

Regarding our obligations for export, every time we want to export to a new customer, we have to apply for an export licence and we have to show the end use, what the lights are used for, or the product, in this

case. So the CNSC reviews that and issues the licence or asks for more information based on what we've submitted.

MEMBER VELSHI: Maybe I'll turn to staff. Have there been cases where you have not accepted an application for an export licence?

MR. AWAD: Raoul Awad for the record. You mean particularly for SRBT?

MEMBER VELSHI: Particularly for SRBT.

MR. AWAD: I will ask my colleague, David Reinholz, who is in Ottawa, to answer this question.

MR. REINHOLZ: David Reinholz for the record.

No, in the past we have no record of any licensing -- or any application from SRB that was denied for issuance.

MEMBER VELSHI: Thank you.

So are there specific countries in your licence acceptance process that you wouldn't allow these light fixtures to get exported to?

MR. REINHOLZ: We do have multiple guidelines for following when issuing an export licence, specifically for tritium. One of those is the 1986 Tritium Export Guidelines which were published by the Government of Canada. They stipulate exports of tritium to any state as well as exports of tritium to a state party to the

Non-Proliferation Treaty. There are different requirements for a Non-Proliferation Treaty state versus any other state.

As well, there are also other regulations within Canada, such as the Special Economic Measures Act, as well as the UN regulations which may prohibit the export, depending on where it is going.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Thank you, Mr. President.

I'd like to explore Dr. Hendrickson's submission, page 6. I guess particularly the second, third, and fourth bullets at the bottom of the page, where he discusses the fact that SBR is a tenant in a building which has other tenants, and safeguards for those other tenants.

Are you confident that there is no risk?
Are you confident that you would be able to be aware of a risk should that develop?

MR. NEWLAND: Dave Newland.

Are you referring to 4 or 4A? Is it 4?

MEMBER MCEWAN: No, it's 4A, sorry.

MR. NEWLAND: Four-A.

MR. RINKER: Mike Rinker for the record.

Maybe I could start the answer, and if we need to go a little bit deeper, we can explore use of specialists.

But in general, there's a fairly sophisticated monitoring program that occurs within SRB, the facility itself. There's many different rooms within SRB's control that are zoned. Zone 1, for example, would be the type of activities as offices and meeting rooms and so on.

And so I think it's fairly evident that we have an understanding from a regulatory point of view of where the tritium is going and where it's not going. So the tritium within the building from an SRB perspective is managed correctly and by every indication it's not moving to other parts of the building.

MEMBER MCEWAN: "By every indication" means...?

MR. RINKER: Mike Rinker for the record. So it is monitored and there is calculations.

MEMBER MCEWAN: Thank you.

THE PRESIDENT: I see somebody. Some help is coming along, here.

DR. THOMPSON: Patsy Thompson for the record.

Just to give the help some time to get organized, the questions are related to other workers.

And so Ms Sheri MacDonald will talk about some of the measures within the SRB facility to control exposures to workers.

And Mr. Mike Jones is verifying -- my recollection is that one of the critical groups for which we calculate -- we've designed a monitoring and a reporting of doses -- is a worker in the facilities around that is not employed by SRB, but this is being verified. And perhaps Mr. Levesque could confirm.

MR. LEVESQUE: Stephane Levesque for the record.

Yes, as I've mentioned before, when we calculate the maximum possible public dose to an individual, we assume that the individual is an individual that works in the facility right next to ours and that lives in the community right closest to SRB.

Another thing that we've done in the past, we have what's called an air monitoring station, a passive air sampler directly in our neighbour's facility. And we're using that there just to confirm that the doses within that facility were negligible.

And after the construction of this extension is done, just to confirm what our assumptions

are, is we're going to do the same again and compare the data that we have from before this one.

MEMBER MCEWAN: So, again, if I can just ask a very naive question around the new construction: Is there any risk of contamination of the new construction as it's being constructed from the stacks?

MR. RINKER: Mike Rinker for the record.

So will there be any exposure whatsoever? I think when anyone is working in and around those stacks there is entrainment. You are exposed to some levels of tritium. But people have worked, and we've measured tritium levels in and around those stacks and in and around the construction area, and the dose consequences are not anywhere near those that would cause a health effect. So to say that there's zero emissions or zero tritium is not correct, but I'd say that risk is extremely low.

THE PRESIDENT: Well, let me ask you, are they going to wear dosimeters? Because I'm just trying to figure out will it be such that it will be measurable?

DR. THOMPSON: Patsy Thompson, for the record.

So I will ask Sheri MacDonald to explain the monitoring that is done of workers, because wearing dosimeters is not appropriate for tritium. And then we will talk about what is done for essentially workers and

members of the public within the strip mall or the other buildings.

MS MacCDONALD: Sheri MacDonald, for the record.

The workers, as Dr. Thompson mentioned, wearing dosimeters is not effective, they will not be useful. So at SRBT they have a bioassay program in place.

So workers who work in Zone 3 are monitored on a -- submit a urine sample on a weekly basis, and the other works submit on a bi-weekly basis. And those samples are measured to determine the amount of tritium in their system to determine if there is any kind of dose received.

And they have action levels in place for those levels. And as you can see over the licensing period, the average annual effective doses to workers have been consistently low, .1 to .2 mSv, and the maximum has reached over the licensing period 1.9 mSv. So essentially, they are very low. And these are the people who worked directly with the materials all the time.

DR. THOMPSON: Patsy Thompson, for the record.

If I could add. A number of years ago members of concerned citizens for Renfrew County had raised concerns about exposure to tritium of people working in and

around the SRB facility and had essentially submitted a urine sample from one of the individuals.

At the time Mr. Bertrand Theriault, who is in the room here, our internal dosimetrist, had essentially taken the urine tritium concentration, and we had provided him the air monitoring data that was being measured at the time. And he essentially used the dosimetry models and came up with, from the air concentration to the urine value there was good concordance.

And so moving forward, measuring air concentrations around the SRB facility in other parts of the buildings or around the facility for members of the public gives a really good measure of tritium exposure and tritium dose. So there was, at the time, good concordance between air data and urine values.

MR. LEVESQUE: Stephane Levesque, for the record.

If I could just go back again to how we calculate the maximum dose to a member of the public. We do assume that that individual is working or is standing outside right by the passive air sampler where the construction is occurring. And we calculate the dose due to inhalation, we call it at work, and do the skin absorption, and the total of that works out to less than .35 microSieverts for last year.

So you are looking at .35, and we estimated that in total that person would be getting 6.8 microSieverts. So that would be -- it is a very small dose.

THE PRESIDENT: So are you going to subject them to bioassay tests also?

MR. LEVESQUE: Stephane Levesque, for the record.

No, the number would be so low it would be barely detectable, it would be less than people that are in our facility working in the office area.

THE PRESIDENT: Thank you.

MEMBER MCEWAN: So, to be clear, you don't believe there is any value in monitoring the new construction when it is finished, just for public reassurance?

DR. THOMPSON: Patsy Thompson, for the record.

Our assessment is that the monitoring program that is currently in place with air monitors and other measures is sufficient. If there is a request for reassurance of workers or construction workers on the site, that data can be provided and essentially people, you know, walk through what the data means.

But, you know, the fact that there has

been monitoring very close to the stack for other places, you know, on the same building area, for a number of years we verified those measurements. Should give confidence to anyone working in this area.

MEMBER MCEWAN: Dr. Hendrickson, any comments?

DR. HENDRICKSON: Well, thank you. Ole Hendrickson, for the record.

Our concern was -- as much as anything, I am not an air emissions expert. But I am aware that sometimes stack gas plume behaviour can be changed when the building footprint changes.

And we thought it might be prudent to look in to the possibility that the larger building footprint might affect the way that the plume would get down and perhaps -- I hoped this couldn't happen, but as a non-expert, just to raise the possibility that there could be some uptake of that plume directly into the ventilation system for the expanded facility.

That was the main concern that we were hoping could be addressed.

Thank you.

THE PRESIDENT: And to that concern, presumably they will continue to monitor. And if there is a detected deviation, presumably they will react to it. Is

that -- I have it right?

MR. RINKER: Mike Rinker, for the record.

Yes, certainly monitoring. But in addition, the stack design and how the stack is functioning is also something that is evaluated on a periodic basis. So any changes like this would be incorporated into that assessment.

THE PRESIDENT: And while we are talking about this construction, I think the intervenor mentioned that he was worried about whether the construction will impact Well 24. Will it impact Well 24? That is a key well that gives some readings.

--- PAUSE

MR. LEVESQUE: Just one moment, we are just trying to confirm information.

THE PRESIDENT: While they are looking, go ahead Mr. Tolgyesi.

MEMBER TOLGYESI: It is one to SRB. Isn't the other ventilation then through stack exhausted from the facility because we saw lots of exhaust on the top of the building. So it is some air going through there or everything is going through a stack?

MR. LEVESQUE: Stephane Levesque, for the record.

The two main stacks that you saw are

ventilated mostly directly in Zone 2 and 3. And the building is designed such as Zone 3 is at the highest negative pressure. So the air naturally goes through to Zone 3.

But we do have some small stacks in areas that do not process radioactive material such as the area that inserts the phosphorescent powder into the tubes. There is no radioactive materials in those areas whatsoever.

And there is fume hoods for individuals to work on there while they are doing the coding process, as we call it. There is also fume hoods in the glass forming area where the tubes are formed. Again, there is no radioactive material in that area. And there is various furnaces and air-conditioners throughout the facility in the Zone 1 that are there.

If we take in an incoming package that has a leak it, for the very few times that it has occurred, we have a tritium and air monitor that is in the receiving area. And there could be a very small emission as a result. But I would say that those would be significant in comparison to the emissions that we monitor over the course of a week.

MEMBER TOLGYESI: So you have spot checks in the -- you have some checks on the exhaust even if it is

not coming from production area?

MR. LEVESQUE: Stephane Levesque, for the record.

We have those isolated exhausts. Like I said, the ventilation system in the offices and that, those are monitored for tritium. But there is no tritium being processed for those.

THE PRESIDENT: But I just want to hear from Staff. I think the intervenor and some other intervenors mentioned unmonitored emissions.

Are there any unmonitored emissions from this facility.

MR. BUHR: Rob Buhr, for the record.

I am a licensing and compliance officer of the SRB facility. Like Stephane was alluding to earlier, I think one of the only areas in the facility that are unmonitored would be the shipping and receiving area. So there is a small probability that a source received from a shipment could be leaking. But they would catch that quite quickly with their air monitor. So that would be the only area that has no ventilation.

THE PRESIDENT: Thank you.

Ms Velshi, you want to add to this?

MR. LEVESQUE: Sorry. Stephane Levesque, for the record.

I am sorry for the delay in giving you the answer for the Well 24. I wanted to give you a complete answer. Well 24 is not affected in any way.

What is affected though, and I just want to make it clear, is we had two wells that were removed as a result of the construction. The CNSC Staff is aware of those and it has been reported as well in our compliance report. As Well No. 25 and 33, so those wells have been removed as a result of the construction. But Well 24 is not affected in any way.

THE PRESIDENT: Were they removed or replaced?

MR. LEVESQUE: They were removed altogether. They actually built on top of them.

THE PRESIDENT: Any other questions?

So I have only one question. I think the intervenor questioned whether the 448 limit is still adequate. Staff?

MR. RINKER: Mike Rinker, for the record.

So the limit was established in the previous licensing period as a means to ensure protection of groundwater as a resource. So that goal still remains, and it is much lower than if we were to set a limit for public protection such as a DRL.

So, yes, it is still valid regardless of

what their production is in an annual year.

THE PRESIDENT: Dr. Hendrickson, you have the final word here.

DR. HENDRICKSON: Thank you, Mr. President.

It is still clear to concerned citizens of Renfrew County that the levels of groundwater contamination, contamination of vegetation, air emissions themselves, are at levels that do provide concern to members of the public.

There are also concerns about accidents, particularly potential accidents associated with fire and breakage of tubes and release of tritium in large amounts in the facility.

These considerations have prompted us to again suggest, as we did even before the facility opened, that this is not the right location for a Class 1B nuclear facility in such close proximity to businesses and residences.

I have talked to Mr. Robert Walker at the Canadian Nuclear Laboratories about the possibility of locating SRB at a place where there is an exclusion zone, where there are guards to prevent many security issues that might be associated with the depleted uranium or tritium.

And I would urge the Commission and SRB to

look into the possibility of relocating the facility to a more suitable location.

Thank you.

THE PRESIDENT: Thank you.

We need to move on. And the next submission is an oral presentation by Prevent Cancer Now, as outlined in CMD-15-H5.7.

I understand that Dr. Sears will make the presentation. Over to you.

CMD 15-H5.7

Oral presentation by Prevent Cancer Now

DR. SEARS: Thank you very much.

I am Meg Sears, I am an adjunct investigator with the Children's Hospital of Eastern Ontario Research Institute, and specializing in environmental health. I was originally trained in chemical engineering actually, but now for the last -- over a decade. I have been working in epidemiology, toxicology, and I have had diverse experiences in environmental issues.

I also co-chair a civil society organization called Prevent Cancer Now. And Prevent Cancer Now has made previous submissions to this panel regarding SRB.

So without repeating the kinds of things that you are hearing from other groups, I am trying to fill in how I may assist you with my expertise, both in the epidemiology end of it and data, because one of my big interests is data, particularly in epidemiology, but also in environmental monitoring.

So I am going to speak to two issues. The first is low-dose effects. And it is very true that if you are not stressed with anything else and you have a small stress as a result of some kind of environmental contaminant or insult, that your body responds.

I have had CHR funding and looked at toxic metals. If you are dosed with a very small amount of cadmium, then your body responds by producing the protein that it needs to kind of wrap up that cadmium and take it out of your body.

And there are good effects seen that are associated with these physiological responses. Your body is pretty smart, it tries to take care of you.

But, you know, everybody put up their hand if you have no stresses in your life. That is something that you see in a lab, but that is not reality. And it is not a good approach to public policy.

So when it comes to radioactive exposures, the assumption is made in public policy that, you know,

less is best.

And so the no threshold approach is a very realistic approach and I don't think that there is any reason to think that we should be taking any other approach than that to really try to minimize exposure of the citizens and of the environment to environmental contaminants, particularly the tritium.

The second issue that I have has to do with data quality. And it was only today actually that I found the second SRBT website where they actually do have this data. There is another website that really doesn't have very much. And but the luck of Google I guess I ran into the wrong website to begin with.

But I have to definitely agree that having downloadable data, that would be useful to a toxicologist or somebody who wanted to do mapping or anything like that, it would be very very helpful. The PDF data doesn't have all the numbers in it, and so on.

You can get your bank statement and your telephone bill and everything else offline in downloadable data csv format types of things. So I don't think that this should be a very big deal, but it would be extremely helpful presumably to your staff as well as to the public and I would think anybody else who was interested in environmental research.

And that is something that I have been looking at, is how you can mesh environmental data with health data. And so that is the other half of it, is do we have good data on the kinds of outcomes that you might expect in terms of health outcomes within this area?

And I gather that quite a while back there was a presentation from Lynne saying there were some concerns in this area with colorectal cancer. But I haven't tracked down that data. It would be helpful to have the urine data, for instance. And if people have wells that are impacted, then perhaps offer that as a public service as well.

But this data, you know, worker data, you know, there may be issues of confidentiality, but those can be dealt with in terms of, you know, giving -- but you can't just give averages or medians, you have to give an indication of the spread of the data.

And the spread of the data is something that really shows up when you look at both the well monitoring the data and the vegetation data. Because when I examined that data, from one site, from one year, there is tremendous dispersion of this data. So one day there will be a very high level, one day there will be a fairly low level.

And as somebody who deals with data sets

and statistics, if you have a very small number of measurements, but they are very broad, the chances of you having picked up the highest one within this small number of samples is actually pretty low. So rather than saying, oh well, you know, we took a bunch of samples. Well, that was an outlier. No, that is a sign that you may be missing something very important.

So I would really encourage you, as an approach to environmental monitoring data, to look for red flags as opposed to being kind of placated by saying, well, that was a bad day, but generally we are all right. Because maybe you must miss a lot of bad days. We don't know, we don't have that data. The data quality for the vegetation is very very poor.

And finally, the last thing I would say about data is I would just remind you of what we said in our submission, which was taken from page 47 of the SRB submission, which is the groundwater tritium concentration in residential wells contributing to public dose. And, yes, it did go down somewhat until about 2012, but that is flat-lined. We are not seeing improvements in the last few years.

So to say that everything is fine, it is getting better and better and better, the data is not telling us it is getting better and better and better.

So keeping that in mind, I think that 10 years, seeing as how it is flat-lined, is probably too long. And it would be very good to readdress progress in this area in the much nearer future than to wait for another 10 years going out.

With that, I would -- well, Prevent Cancer Now has also submitted other recommendations in terms of worker and public education and making testing available to citizens and we would support recommendations by others regarding how this type of facility would be better in a more isolated area.

I would be more than happy to take any questions.

THE PRESIDENT: Thank you.

Questions? Dr. McEwan?

MEMBER MCEWAN: Dr. Sears, thank you.

I am sorry you didn't write a little bit more, because I think I might be a little bit less agitated by some of the things you have written, particularly in light of your presentation.

You use the 20 Bq/L as if it is currently policy, and it is not. I think the policy is still 7,000. So I think it is disingenuous to start using a non-policy recommendation that has not been acted on as part of your recommendation at this stage.

How many places in Canada would have water at levels that were less than 20, do you know?

DR. SEARS: My understanding is that places in Canada that are not impacted with nuclear facilities have levels that are at that.

DR. THOMPSON: Patsy Thompson, for the record.

We have provided through the course of the tritium reports on our website, but also through several public hearings, that if you look at tritium concentrations in drinking water supply plants close to all the operating nuclear power plants and in Pembroke and Ottawa and anywhere where there's an impact from any facility that releases tritium, all the drinking water levels are below 18 becquerels per litre generally.

The exception are in some wells around SRB and that's why the CNSC took strong regulatory action. None of the wells where the values are being monitored, elevated levels are being seen, are being used for drinking water purposes.

The residences are connected to the Pembroke supply -- you know, yeah, the Pembroke water supply.

And so there is one area where SRB is providing drinking water is to an industrial facility close

to their site, but it is actually wrong to say that in Ontario, around nuclear facilities, levels are above 20, it is simply not true.

THE PRESIDENT: What is the level of drinking water in Pembroke? What is the actual becquerel per litre?

DR. THOMPSON: Patsy Thompson for the record. It's around the detection limit, it's around five becquerels per litre and sometimes it's a little bit higher, but it's essentially affected by the discharges from Chalk River, but it's around five or seven.

THE PRESIDENT: Thank you.

MEMBER MCEWAN: So, again, I think the way you have written your recommendations is unhelpful and certainly it's unhelpful in terms of public education.

And in particular, the second last bullet on the one page where you're suggesting people relocate if they want to start families.

I mean, I think that's an irresponsible statement to make in a public hearing because you have no evidence to support that or, if you have, you've not presented it.

And would you make the same suggestion for somebody who is living in Calgary where I suspect the background radiation is comparable, or to somebody in the

U.K. who's living beside a large motorway where they will be exposed to large amounts of pollutants?

So I'd be grateful if you could explain to me what you mean by that?

DR. SEARS: It's our understanding, and some -- looking at the facility, that this facility is actually quite close to some residences. So that -- in that context we were not -- we're certainly not saying that, you know, Pembroke should be vacated or anything like that, it's people living in very close proximity.

And for the record, Prevent Cancer Now and certainly the World Health Organization has identified that living in close proximity to motorways also is very bad for child development, for lung development, for asthma, for cancer, for intellectual development.

So certainly there are many instances where somebody who is considering having a young -- considering starting a family, certainly we would recommend that they not live right beside a motorway or right beside a facility like this.

And, you know, distance is your friend in so many instances.

MEMBER MCEWAN: So do you have evidence that the tritium levels in the housing development that is what, about 250 yards away, are raised?

DR. SEARS: There are instances where there are -- well, certainly the groundwater level was elevated, but also the data on the vegetation is very, very scattered, but some is high which indicates that there are sporadic at least instances where there are elevated exposures and --

THE PRESIDENT: Is elevated equated to danger to your health?

DR. SEARS: If you assume that the no threshold model is correct, then there's some kind of elevated risk, but we can't quantify that, we don't have data.

THE PRESIDENT: Well, I thought on some of the vegetation there are limits and, if I understand correctly, those limits on vegetation around this area are within limits.

Staff...?

DR. THOMPSON: Patsy Thompson, for the record. So we have done extensive measurements. So it's not sporadic, there's been years of monitoring around SRBT, not just for regulatory purposes, but for research purposes as well.

We have a good understanding of the historic contribution and the current contribution from SRBT. Taking into consideration the higher measured values

for OBT, HTO in a variety of food stuff, measurements in air and drinking and well water, the doses to the most exposed individuals are still in the order of microsieverts.

Using the LNT to estimate a cancer risk based on microsieverts is totally inappropriate, it's unscientific. And I agree the LNT has great value in terms of setting regulatory limits and driving ALARA minimization, whatever we call it, and pollution prevention, it is an essential tool, but it is not a tool to assess the number of cancers or the cancer risk for individuals in these areas.

THE PRESIDENT: Questions? Monsieur Harvey...?

MEMBER HARVEY: Just to come back to the presentation, my question is addressed to Mr. Levesque.

Is there any possibilities that extreme data could not be collected by the way you're monitoring the air releases or the groundwater?

MR. LEVESQUE: Stephane Levesque, for the record. Do you mean the machine data that they were working on?

MEMBER HARVEY: No, I mean all the data you presented, because the intervenor was saying that the way you're monitoring the air or the groundwater or the

releases to the atmosphere, there is a possibility that extreme data or very high data could not be collected.

MR. LEVESQUE: No, I think that we've got a very extensive monitoring program around Pembroke and that we monitor more than enough to be able to determine the dose to a member of the public.

I mean, we sampled four gardens very close to the facility, the local market. We have 40 air monitoring stations throughout Pembroke. We monitor milk from local producers.

I think there's a lot of things that we do to be able to accurately determine the maximum possible dose to a member of the public, but I'm always open to somebody's suggestion.

MEMBER HARVEY: And the possibility to miss something is very --

MR. LEVESQUE: I don't think we're missing anything, I don't think we are. I think we really have all the inputs into calculating the public dose, worst possible case, to a member of the public.

MEMBER HARVEY: Can the staff just comment on that.

DR. THOMPSON: Patsy Thompson, for the record. I'll add one element and then I'll ask Mr. McAllister to talk about the new requirement for SRB to

become compliant with one of the CSA standards.

A number of years ago in response to concerns expressed by members of the public in Pembroke, the CNSC had put an extensive air monitoring network essentially extending from SRB for several kilometres in all directions.

From that data we have a really good understanding of, with differences in wind pattern at a time when SRB was discharging quite a bit of tritium into the atmosphere, the behaviour of tritium in the environment and the dispersion.

That work was published in a peer review journal where we did correlations between what was being measured in the -- by the monitors we had established and the releases and the correlations were quite good.

So there is a good understanding of essentially the environment, the atmospheric environment around SRBT to allow the establishment of the monitoring program to take into consideration those site-specific considerations.

And I'll pass the microphone to Mr. McAllister.

MR. McALLISTER: Thank you. Andrew McAllister, for the record. And just to pick up, Mr. Levesque talked about always open for continuous

improvement and part of that is, of course, how we regulate that.

There was mention earlier by Mr. Ruiter during the presentation about the CSA standards around environmental monitoring, effluent monitoring and environmental risk assessment and those, again, will be opportunities to re-examine the monitoring programs in place and to see if any improvements could be realized to be in alignment with those standards.

THE PRESIDENT: Ms Velshi...?

MEMBER VELSHI: It's again tied in with the produce monitoring results and the variability that the intervenor talks about because I think there's some other interventions later on that talk about maybe the 2014 results not being consistent with previous results.

And I don't know if you've got the 2014 results, but are they in line with what you show on page 12 of your CMD?

Page 12 of yours.

THE PRESIDENT: CNSC?

MEMBER VELSHI: Yes, the CNSC CMD, I'm sorry, of the EA, the EA Information Report.

--- Pause

DR. THOMPSON: So Patsy Thompson, for the record. We are looking for -- so we do have the 2014

results from the CNSC Independent Monitoring Program.

In the meantime, I'll ask Dr. Mihok to sort of explain some of the variability that has been observed around the facility.

We had for an entire summer the University of Ottawa do a research project on the SRBT facility and we have almost continuous air monitoring data and data from vegetables essentially that were grown in gardens.

So I'll ask Dr. Mihok to talk about this and the significance in terms of essentially regulatory monitoring for SRB.

DR. MIHOK: Steve Mihok, an environmental risk assessment specialist with the CNSC.

So in the sequence of events, over probably the last 10 years there has been a lot of work on produce, work done that I've been involved in personally in 2005, 2007, 2008, 2009.

So again, the take home message is, we do have a good understanding of variability and whether produce match air match soil match rain and so on.

And to sort of close the book on some of the issues and, in particular, to improve our models so that we, you know, essentially do better in the future to predict with less intensive monitoring, we had a research project that we funded through the University of Ottawa in

2012. It was conducted 50 metres from the facility, so essentially next door, and we monitored just about everything and we're working essentially right now with the IAEA MODARIA Project to see how models perform in predicting the numbers that we got.

And again, the take home message from that kind of very intensive monitoring on a weekly or daily basis is that you will see about a factor of 10 variation in any one sample that you get, so you should never read too much into a small number of samples and whether one is a potential outlier or not.

The averages, you know, for reasonable statistical samples give you a good picture of what is happening in the environment, and in the case of this particularly intensive work at about 50 metres from the facility, we really don't have, I would say, any surprises at all; things are behaving the way we expected. The science is going to advance with the work that we've done, but the levels that we see are exactly what we expected from the sort of compliance information that SRBT has been collecting for many years.

And I think, it's a little bit off topic, but since I'm at the microphone, you know, one of the questions earlier was, does the air monitoring data sort of make sense with the changes to the building and so on.

And we've done that kind of independent verification of what happens very close to the facility in terms of air concentrations getting essentially the same numbers as SRB from their passive monitors, but using much more sophisticated techniques and looking in a very great deal of detail the differences between daytime and night time, one week to the next and so on.

THE PRESIDENT: Did you find the missing data?

DR. THOMPSON: Yes, we did.

THE PRESIDENT: Go ahead.

DR. THOMPSON: So I'll ask Ms Kiza Francis to speak to the data.

MS FRANCIS: Kiza Francis, I'm the Acting Director of the Environmental Compliance and Laboratory Services Division.

So I'll speak to the SRB data for 2014 for the produce monitoring results. I'm also going to tell you a little bit about our Independent Environmental Monitoring Program to help maybe give you another or a bigger picture.

So the 2014 produce monitoring results gave an average of 135 becquerels per litre for their produce; whereas 2013 was 91 and 2012 was 48.

In our Independent Environmental Monitoring Program we had -- ours ranged from 19 becquerels

per litre to 180 becquerels per litre. So their average was within what our results were.

And so just to tell you a little bit more about the Independent Environmental Monitoring Program, it's a program that CNSC has put in place since 2012 where we did a pilot at the Chalk River Laboratories and it's to verify that the public -- independently verify that the public health and environment around licensed nuclear facilities are safe.

The IEMP is separate from but complementary to our existing Compliance Verification Program and it helps confirm that licensees' environmental protection programs are working.

So CNSC staff take samples from public areas around nuclear facilities, like parks, farmland, homes, gardens, beaches and samples may be taken from the air, water, soil, sediment, vegetation or some local food like meat or vegetables. In SRB's case we also sampled the wine from the brew your own place beside the facility.

Some of the vegetation samples that we took at SRB in 2013 and 2014 are kale, tomatoes, potatoes, strawberries, carrots, zucchinis. The samples are then tested at CNSC state-of-the-art laboratory by qualified CNSC scientists that analyze them using industry's best practices. We compare the measured contaminant levels to

applicable guidelines for measuring safe levels in the environment, and we also compare to natural background levels if we have that information, and we also compare to a CNSC reference level and that's important to talk about because the reference level has been determined -- it's food specific.

So we look, based on the CSA N288.1 standard which tells us what the average Canadian consumes in a year.

So, for example, the kale CNSC reference level would be 104,000 becquerels per kilogram of fresh weight; whereas our Independent Environmental Monitoring Program showed that it was 180 becquerels per kilogram of fresh weight beside the SRB facility, or near the SRB facility.

So the reference level -- if you would meet the reference level, you would receive a dose of .1 mSv per year.

So hopefully that puts a little bit in perspective the result that SRB had of 135 for their produce.

THE PRESIDENT: Thank you.

Okay, anybody?

Okay. Any last thoughts?

DR. SEARS: Thank you very much. I

greatly appreciate this opportunity.

And I would just finally point out that the 2014 results that are on the SRB website indicate that the range which I was talking about was -- you know, it's not just the average that you have to be concerned about, but the range was up -- well over 400 becquerels per litre, so -- which you were talking about becquerels per kilogram, it's reported in becquerels per litre, but the range is from a few up to well over 400 that is reported.

So it is a very wide range that is being detected and when you have that kind of variability, then a few data points will never give you a fair representation of what's happening.

If your entire reference level is predicated on .1 mSv per annum, then, you know, naturally you're going to end up with higher reference levels, but if you want to compare with background levels, then you're going to have to have more data.

THE PRESIDENT: Okay, thank you. Thank you very much.

DR. SEARS: Thank you very much.

THE PRESIDENT: I think we're going to break for -- take a little break here for about 10 minutes.

--- Upon recessing at 3:10 p.m. /

Suspension à 15 h 10

--- Upon resuming at 3:22 p.m. /

Reprise à 15 h 22

THE PRESIDENT: Okay. I'd like to continue.

And we'll move to the next submission, which is an oral presentation by the First Six Years as outlined in CMD 15-H5.8 and H5.8A. And I understand that Mr. Castrilli will make the presentation.

Over to you, sir.

CMD 15-H5.8/15-H5.8A

Oral presentation by First Six Years

MR. CASTRILLI: Thank you, Mr. President, and Members of the Commission.

My name is Joe Castrilli. I am a lawyer with the Canadian Environmental Law Association in Toronto.

To my left is Dr. Ian Fairlie, a consultant and expert from the United Kingdom who will speak to the health effects or health risks of tritium emissions from the SRB facility.

At the desk behind me is Dr. Hendrickson, who's joined us again because he prepared a report on SRB

emission levels.

And we appear on behalf of First Six Years, a group that's based here in Pembroke.

As a final person who's with us or who will be with us in a moment, Ms Kelly O'Grady, who's the President of First Six Years, who's also with us for this particular presentation in case there are any questions that are asked that are better answered by her.

We've prepared written submissions that are before you. In my case, I do not propose to speak to mine any further than what is already in the written material subject to any questions the Commission might have of me, so at this point, I'm going to turn the microphone over to Dr. Fairlie.

DR. FAIRLIE: Mr. President and Commission Members, thank you very much for this opportunity to speak to you this afternoon.

I'm going to speaking about tritium. It's been the subject of my studies for at least 35, maybe 40 years. It's a fascinating radionuclide, and, unfortunately, it's also very hazardous, and also very misunderstood.

Let's go have a few introductory comments about how much tritium there is here at SRBT.

These are emissions from 2008 to 2014, but

before that, there were much larger emissions and which, in fact, resulted in SRB's licence being revoked for a few years.

These levels are very high in comparison with, say, Darlington or with Dungeness in the UK and all German nuclear power stations. It gives you a range there of the number of terabecquerels per annum.

And you can see that SRB is relatively high, even although it's not a nuclear power station.

When the plant is in operation -- and we've talked about air emissions in various models or so -- this is the result of an IAEA modelling exercise showing tritium exposures from inhalation of -- here one terabecquerel was emitted over a one-hour period.

And you can see that the exposures are -- come out -- from this power station happens to be Romania, and the winds were coming from the southeast to the northwest. And you can see a plume.

And this is what happens, of course, here at Pembroke. This is looking at organically-bound tritium doses from cow's milk and showing, again, a one terabec emission where the wind is light and variable. And you can see the doses are much higher.

We look at tritium concentrations in air near Canadian reactors, and this is -- the reason why I'm

putting this up it to show you the pattern of tritium concentrations near a variety of nuclear generating stations here in Canada.

The Y axis is logarithmic and the values range from .01 to about 30, in other words, a range of 3,000, which is very high indeed.

Just for a matter of information, the only figures that I could see for the tritium concentration here at Pembroke was 12 becquerels. And this fits in, if you look to the extreme left, the sort of mauve blobs -- that's from Pickering -- and you can see that it fits within what's happening -- what has happened or what has been measured at Pickering, also a very large tritium emitter.

However, we are really concerned to find out how much tritium gets into foodstuffs. And this graphic -- by the way, the previous graph on this year were, in fact, prepared for CNSC about 12 years ago by Dr. Osborne and his colleagues. I now have permission from him to use those -- these graphs.

And you can see here that the closer you get to the source of the emissions, the tritium concentrations rise exponentially and we see very, very -- some here are very, very high levels.

So what are the levels here in Pembroke?

Well, if you look at the third slide from

the right, you can see the range from about seven up to over 200. And this gives you -- this range here is indicative of -- well, it's not very good data because that is the only data that I've got that's been provided for by CNSC or SRBT. But they're enough to raise alarm bells, in my mind.

You see, what would be a background level? And the background level would be, say, for Lake Superior, about three becquerels per -- per litre.

Lake Superior is chosen because (a) we've got data for it, and (b) because it's not near any nuclear or tritium-releasing facility.

So we can use two, three as being sort of a background level. In other words, tritium does occur naturally in the environment from a number of sources.

In addition, if we also go on here to look at sewage sludge from a recent document published by CNSC, we can see that levels of tritiated water of 34 becquerels per kilogram, but more interesting and more alarming, in many ways, 400 becquerels of organically-bound tritium.

That means, to me, that the concentrations of organically-bound tritium in people are higher than this to produce, how shall I delicately put it, fecal in -- the citizens of Pembroke to have such high levels of organically-bound tritium means there are things going on

here which we really don't know about.

It means that the people are either eating organically-bound tritium -- because these are very high, almost 400 -- or they are making it themselves because we all make organically-bound tritium. In other words, the lipids, carbohydrates and proteins in our body actually use hydrogen from tritiated water to make organically-bound tritium and new cells which are laid down also create organically-bound tritium.

Alarm bells went off when I saw that figure of 400. It's only one figure, yes, it's true, but it's -- there was a previous figure the year before of 290. In other words, it's not going down, it's going up, if anything.

I'd like to see a lot more organically-bound tritium determinations made in people near Pembroke. You can do so with non-invasive bio assays using fingernails or using hair clippings.

It's true that OBT determinations are expensive and time consuming. However, I think they should be done.

Going on to the next slide.

People in Pembroke take in tritium by a variety of methods, by eating foods contaminated with tritium, by inhaling tritiated gas or tritiated water

vapour or by drinking tritium-contaminated water or by skin absorption.

In fact, it turns out that inhaling tritium and skin absorption are the two main methods of getting tritium in people near -- who live in Pembroke.

I've made an estimation based on the methodology of Richard Osborne of the annual intake values of tritium near SRBT, in other words, within a couple of kilometres. As you can see, air inhalation and skin absorption are by far the largest contributors, but there is a little bit from food and water and drinks.

And I came out with a total of, roughly speaking, two megabecqs, or 200,000 becquerels per annum. And this is -- I don't claim a great deal of accuracy for this. I'm using annual intake values from Health Canada and I'm using the tritium -- environmental tritium concentrations from the data that I've got from -- which was provided by CNSC and SRBT.

But I think that it's the best estimate that I can make. I would say that it's roughly accurate, at least to one significant figure, and I think that that is probably going to be occurring as an average across the whole of the 20,000 residents in Pembroke.

So just turning to tritium for a second, the problem is that tritium has very low doses for -- per

becquerel. It's one of the lowest of all radionuclides. And the estimated tritium doses by the various sources are very low, but if there's any error because of the huge tritium releases, then the consequences could be severe.

I'm going to have to go on to -- there's many, many official reports showing concern about tritium. And what's wrong? Basically, the wrong radiation weighting factor, wrong metabolic models that are used, and a refusal to acknowledge it's tritium.

My main conclusions are that tritium concentrations in moisture, food and water, near SRBT are high. We've got high tritium exposures to nearby residents which are likely to cause various levels of cancers and leukemias, but they're hard to pick up. And I make a number of recommendations, which you can read for yourself.

Sorry I'm over the time.

THE PRESIDENT: Okay. Thank you.

Questions? Who wants to start?

Dr. McEwan.

MEMBER MCEWAN: Dr. Fairlie, thank you for the presentation.

I just need a little help with one slide before I get onto the questions, the one where you discuss key problem, which is towards the end.

DR. FAIRLIE: Official dose per becquerel

for tritium is very low?

MEMBER MCEWAN: Yeah. So that is the absorbed dose per ingested --

DR. FAIRLIE: Becquerel.

MEMBER MCEWAN: -- becquerel. Okay.

DR. FAIRLIE: It's 1.8 times 10^{-11} sieverts per becquerel, 10^{-11} sieverts per becquerel.

MEMBER MCEWAN: Right. Why do you say that it's very low? Is that because of the organic bound piece or --

DR. FAIRLIE: No, this is the official figure.

MEMBER MCEWAN: No, no, no. But why do you say that it is very low and could be a mistake, which is the implication --

DR. FAIRLIE: Yes.

MEMBER MCEWAN: -- of the third bullet?

DR. FAIRLIE: Yes, that's right.

Basically because the official models used assume -- make a number of assumptions which there -- we don't really know.

For example, there's a very big assumption that tritium is uniformly distributed in the body after intake. Well, we don't know that.

It could well be concentrated in various

organs or various tissues, and where it is, is extremely important. A tritium becquerel, for example, in your urine sack wouldn't worry me very much, but if it's actually located next to your DNA, wham, you start worrying. So location is -- well, distribution is very important.

And by the way, may I add, that's the reason why I don't really use sieverts in my determination. I use becquerels because we can actually measure becquerels. We've got a fairly good handle with it.

Dose, it all depends on where it is, so it's tricky, so I don't really rely on dose.

MEMBER MCEWAN: I'm not sure I entirely disagree with you on that, either.

DR. FAIRLIE: You don't entirely disagree.

MEMBER MCEWAN: Yes.

DR. FAIRLIE: Well, I'm glad to hear that.

MEMBER MCEWAN: So let me just come back to this because, I mean, the whole -- that third bullet is basically the thesis for your whole presentation.

DR. FAIRLIE: Yes. If we've got the -- our dose estimates -- our risk estimates, is a better way of putting it -- wrong, then the consequences could be quite serious.

MEMBER MCEWAN: So if -- let me ask you the same question that I asked Dr. Ulsh this morning.

What are the data for the bio distribution or for the binding of ingested tritium? There must be data in the literature. I should have checked, but I --

DR. FAIRLIE: Well, I -- in fact, the reason why you didn't find it is because it's not on the web, it's so old. It goes back to the -- God, Pinsamt and Langham is 1958, and other studies in the late sixties, early seventies.

They're the only human data that we've got, and they're -- hand on heart, for me to say that data is absolutely correct is wrong because those were early days and tritium detection techniques have improved markedly since then.

But the data show that different organs pick up tritium at different concentrations, and there's no rhyme nor reason nor pattern except for this, that organs which have high metabolic rates, for example, liver and kidneys, seem to pick it up a lot.

And also, high -- organ cells which reproduce very rapidly also pick it up, for example, hair -- hair cells. And also bone marrow cells pick it up. And that's to be expected because there's a lot of cells generation going on.

So apart from those rough and ready general pointers, I can't really point you to anything

more. However, I'm more than willing to enter into correspondence with you and show you some of my older data and the -- the older references which I have got. I'm certainly willing to do that, yes.

MEMBER MCEWAN: Okay. So if we go to your sludge data --

DR. FAIRLIE: Yes.

MEMBER MCEWAN: -- your sludge data --

DR. FAIRLIE: It's not mine, by the way.

MEMBER MCEWAN: Well, the sludge data that you used in your presentation.

DR. FAIRLIE: M'hmm.

MEMBER MCEWAN: You -- am I right in thinking that you have assumed that all of the tritium in the sludge comes from excreta and not from the water being used to treat the excreta? That was the implication of what you said.

MR. LEVESQUE: They made two determinations of the excreta. One was of the water -- for the tritium in the water, and one of the fecal cakes. Yes.

That was of -- organically-bound tritium was in the fecal cakes -- dried fecal cakes.

MEMBER MCEWAN: Staff?

DR. FAIRLIE: Sorry. Did you just say staff?

MEMBER MCEWAN: Staff. Sorry, I just want --

DR. FAIRLIE: I beg your pardon.

MEMBER MCEWAN: There was agitation behind you, so.

THE PRESIDENT: Go ahead.

DR. THOMPSON: So Patsy Thompson, for the record.

Dr. Nana Kwamena will speak to the results of the sludge measurements that were done, but one thing we can definitely say is sludge is not fecal cake. It is definitely not fecal cake. It has nothing to do with fecal cake.

But I'll let Dr. Kwamena speak.

DR. KWAMENA: So Dr. Nana Kwamena, for the record, an environmental risk assessment officer.

So as Dr. Thompson has said, it is not the fecal matter. Basically, when the sludge arrives at the treating facility, there are different processes that can be used to process the sewage that comes in.

And so when the water is extracted, you get the liquid effluent, which is the numbers that are provided on the slide, as you can see, the HTO in becquerels per litre, but then you also get a more solid portion. And that's what we measured the OBT levels in.

And so it's not a representation of just the fecal matter that gets processed through the facility.

MEMBER MCEWAN: So simplistically because I'm struggling with this, in -- so the organically-bound tritium is made up of what?

DR. FAIRLIE: Good question. Normally, municipal sewage is made up of fecal matter.

I mean, sorry, maybe I'm being too simplistic here and I'm missing something very obvious. However, when -- I would like to find out from CNSC what exactly is in this sludge. What is it?

I can't think of anything that SRBT would be discharging which -- apart from fecal matter in the -- in the sewage sludge. It's -- I don't know.

MEMBER MCEWAN: It does seem simplistic to me that it's just --

DR. FAIRLIE: My analysis is --

MEMBER MCEWAN: Yes.

DR. FAIRLIE: -- simplistic?

Well, perhaps. I think that if you were to ask most people what's in domestic -- in municipal sewage, they would tell you output -- human output. And perhaps my assumption of that -- I could very easily be shown wrong, but what I've heard so far doesn't really convince me one way or the other.

DR. THOMPSON: So Patsy Thompson, for the record.

So just to put things in perspective, the sewage from, you know, essentially residential and elsewhere does contain fecal matter. There's no doubt about it. But once it gets to a sewage treatment plant, there are aerobic and other processes that will decompose the material and, essentially, you get a slurry that is then solidified and disposed of in various means, so the measurements are on the solid portion.

To essentially take the measurement of 400 becquerels per kilogram, for example, in sludge and say that this is equivalent to the quantity of organically-bound tritium in an individual is, I think, an overly simplistic information.

The -- there is essentially lots and lots and lots of data, and I'll ask Mr. Bert Thériault to come to the microphone.

There is extensive data that have been used to develop metabolic models that represent tritium intake, the formation of organically -- of organic matter, lipids, carbohydrates and proteins with tritium that become organically-bound tritium. Those metabolic processes are taken into consideration in calculating the doses and coming up with the proportion of organic matter in a human

body.

That information has been used, is being used and is represented in the dose conversion factors, and so to say that, you know, only the big number of becquerels intake in -- you know, the 200,000 becquerel intake per annum is the only measurement that matters is wrong.

Really, what matters is the health effect and the potential -- the association between the intake and the health effect. And we know that it takes orders of magnitude more tritium to cause any health effects, and even in some of the epidemiological studies that have been done, for example, when we talked this morning about the study on 42,000 workers where they were exposed to tritium for years at much, much higher levels, we see no incidence of cancer. And to that say, you know, we don't know what happens to tritium, we don't know how to deal with it and we don't know the health effects of tritium is simply wrong.

But I'll ask Mr. Thériault to talk about the metabolic aspects of tritium and how we take into consideration OBT and what the fraction of OBT is in the human body.

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

So in terms of the dose coefficient for

tritium, so just to be clear, these are factors published by the ICRP that represent the dose received by a person inhaling or ingesting one becquerel of a given radionuclide, so they're tabulated for many different radionuclides. They're tabulated for different age groups, for tritiated water, tritium gas, OBT as well.

For -- so for the intake of tritiated water in a biological half-time -- half-life, so the time to -- for the tritium to be removed from the body, tritiated water, is roughly 10 days, and it's based on a large amount of human data. For organically-bound tritium, it's taken to be 40 days, so a longer time.

Now, there are a couple of studies I'd like to draw your attention to. The first one has been published by Dr. John Harrison and colleagues in 2002 in the Journal of -- Radiation Protection Dosimetry Journal.

And what they looked at is they considered the parameters that are inputs into the dose coefficients for tritium and they looked at the variability of the data. They looked at the range, the variability in the half -- the biological half-life of tritiated water, organically-bound tritium, the RBE from one to 2.5, and they ended up with a range of dose coefficients for tritiated water and for OBT.

And what we did is we applied the range

that Dr. Harrison had obtained to SRBT's 2014 data for the dose, and we found that if we took the upper range that the dose coefficients, considering the variability in the biological half-life of OBT, varying it from 20 to 200 days, for instance varying treated water half-life from five to 20 days, RBE from 1 to 2.5, taking the upper bounds of those coefficients, applying to SRBT data we found that the dose for 2014 went from .007 milliSieverts, which we saw earlier today, up 2.02 milliSieverts, So perhaps it gives some context.

The other study is by Dr. Leggett and colleagues. We have the reference here. What they did is they compared the reliability of those coefficients for a number of different radionuclides based on the amount and type of data that was available to develop the biokinetic models for these radionuclides. They included tritium, cesium-137, other radionuclides which are less common such as antimony-125, ruthenium-106. And they found that for tritium they classified it as a Category 1. So the more reliable coefficient, the less uncertainty for tritiated water and the moderate to high reliability for OBT. So perhaps this gives some context.

Thank you.

THE PRESIDENT: Go ahead.

DR. FAIRLIE: Thank you. Ian Fairlie, for

the record.

For five years, from 2000 to 2005, I was the scientific Secretary of the U.K. government committee looking into precisely this. It was an exciting time, there were a range of views expressed, as you can imagine. We looked specifically at tritium and the committee couldn't agree. There were about five on each side, five who said we really have to look at this matter much more seriously and five who said no, everything is fine. So we had to agree to disagree. And that's exactly where we are now here.

Myself, I was persuaded that there were large uncertainties with tritium, larger than the ones mentioned by Leggett or Harrison, as mentioned by the CNSC staffer.

I would say that we should apply -- in the face of that uncertainty or difference of views that we should apply the precautionary principle. It's the best thing. If we are not sure, let's err on the side of caution, because essentially the duty of the Commission is to protect the health of Canadians. My understanding is that, and that means that I think we should look carefully at this matter and you know, say, well, we might be wrong here.

In particular, both of the people cited

mentioned doses and I think that dose estimations are highly unreliable, particularly for tritium, and I would rather go looking at a range of other things to get a handle on how to approach tritium.

If I may, Mr. President, with your permission, there is a slide further on which perhaps explains this. I had to rush through. Can I show this slide about what I was wanting to talk about? May I?

THE PRESIDENT: You can show it. We have read whatever you submitted to us. It was read very carefully.

DR. FAIRLIE: Of course, right. I'm just trying to -- right.

The reason why I think that the doses from tritium are wrong are threefold here. Because we apply -- our officials apply the wrong radiation weighting factor, which is, in loose terms, we talked about this, RBE, relative biological effectiveness, earlier on. At the present moment we use one unity and this is an important issue, because if we get it wrong on what the radiation weighting factor is, then it has important implications.

The United Kingdom's Advisory Group on Ionizing Radiation, it is the premier group in the U.K., which I advised and we had a joint report, says that we should really use a weighting factor of two. The United

States, back in 2008, recommended a weighting factor of 2.5.

However, the ICRP said it wasn't going to change from unity. And I can tell you that the reason for that is because the French government and its representatives on ICRP said no. No. Because they had a prize industrial application, a fusion research reactor, ITER in Cadarache and it puts out very large amounts of tritium, not petabecquerels, exa-becquerels in their estimate, and doubling the dosage from tritium would prohibit its construction.

But it's not -- and if you look at the RV values, and these are all different experiments, 1 to 23, and this is the best evidence that I can give to you, the panel, and these are in vivo studies, live animal studies, rats or mice in most cases. They are not cell studies. They are not in vitro. These are in vivo studies. This histogram shows you that if you line them up in their ascending order you can see that over on the left the RBE -- these are the experimental results of RBE. There isn't a single one which shows you a value of one. The lowest is 1.3. And if you rank them and put them up, you will see the highest is about 3.4. And this -- so we have got 23 experiments here which all show high values from RBES. That's pretty good evidence

MEMBER MCEWAN: Can I just ask you if that's justified by -- sorry. Can I just ask if these are stratified by whether it's Auger emission or in vitro emission?

DR. FAIRLIE: No, these are tritium HTO.

MEMBER MCEWAN: This is all HTO?

DR. FAIRLIE: All HTO.

MEMBER MCEWAN: Because that's not actually what you say in the -- I mean you imply that that's a mixture of Auger emissions and low --

DR. FAIRLIE: No, no. This is from my article that I wrote.

MEMBER MCEWAN: Okay.

DR. FAIRLIE: And my article was titled "RBE and wR for Auger Emitters in Low Range", but these experiments are HTO.

MEMBER MCEWAN: Yes, okay.

DR. FAIRLIE: It's good that you brought it up, however my article does go on to Auger emitters, mainly because the Cherry committee that I was on spent a lot of time on Auger emitters and tritium, as you know, has the same problems as Augers.

THE PRESIDENT: Look, as interesting as all this debate is between you two --

DR. FAIRLIE: Sorry.

THE PRESIDENT: -- just for the record, you cannot do it while we deliberate, but after we render our decision you two can bond for as long as you want.

DR. FAIRLIE: I beg your pardon. You have my humblest apologies.

THE PRESIDENT: However, we have to bring it down to something practical.

DR. FAIRLIE: Okay.

THE PRESIDENT: As regulators we are bound by some international convention and that includes dosage. And if I understood the argument, even on RBE applied to these low levels of tritium, the levels are so low that it is protected. Somebody correct me if I'm wrong.

DR. FAIRLIE: Okay, that's very true.

May I go back a couple of -- with your permission, Mr. President, I would like to go back a couple of slides and show you that it was one of three things. It's the wrong radiation weighting factor, but there are two other things which are wrong as well.

Do I have your permission to very briefly discuss those?

THE PRESIDENT: Very briefly because we have --

DR. FAIRLIE: Very briefly, okay. Two sentences.

When you have about, say, a Becquerel of tritium inside you, you have to convert that to some sort of -- well, what's the official dose -- to a dose and that's where you use metabolic or some people call it dosimetric models and these models can be very wrong. There are studies which I could send you which shows uncertainty ranges from 200 to 20,000 in metabolic models. It all depends on which data and which studies you use for modelling the output or the excretion rates of tritium. The previous evidence is that there is a half-life of 10 days for water, for tritiated water. I would go along with that, but when it comes to OBT it's much more tricky.

There are three excretion equations which can be applied showing excretions lasting -- or half-lives, biological half-lives going out to three or four years for the long-lived components. So there is a lot of uncertainty when it comes to the dosimetric models.

I'm sorry, that's more than one sentence.

The third is that tritium has a lot of very strange properties. I have not been able to discuss them, but following the slides the ability of tritium to jump from molecule to molecule within a 10 to the $-15/2$, i.e. exchange reactions, is incredible. It boggles the mind. You say, "Well, why does tritium do this?" because hydrogen is the lightest atom and so it's much more

swappable than the heavier items. But it means that tritium gets everywhere and it is not taken into account.

THE PRESIDENT: But the bottom line still is health of the population.

DR. FAIRLIE: Yes.

THE PRESIDENT: You know, I don't care how it goes, your hypothesis is that it is unsafe. If I understand correctly, you listed Pickering as a high emitter and presumably it has been running now for 30 years. We should see some significant impact on the population. We see none. That's the presentation that we get here.

So how do you square -- so first to you, how do you square that and, staff, how do we bring it down to something that we can use as a regulator?

DR. FAIRLIE: Is that question to me or to the staff?

THE PRESIDENT: Both of you.

DR. FAIRLIE: May I go first?

THE PRESIDENT: Go ahead.

DR. FAIRLIE: Thank you. There are some epidemiological studies -- I beg your pardon -- near in Canadian facilities. They are not very good. Some of them only borderline statistical significance, others don't have any statistical significance. In my formal written

submission I say that we should not -- we should lower our expectations when it comes to what we can get out of epi studies. They are not a very good true for digging the truth, unfortunately. I wish they were, but they are not.

What you need to do is look at really big studies which have high levels of statistical significance, where the protocols used in the epi studies are very good, which are case control studies rather than ecological. When you do look at those -- they are not in Canada; they are in other countries -- we seek different patterns emerge. We see large incidences, for example, of childhood leukaemia near all German nuclear power stations.

This is a German government study. It's called the KiKK study, K-i-K-K. I recommended to you, because if that is going on in Germany where the tritium exposures are quite low, what's going on here?

THE PRESIDENT: We have been presented with a finding of this study at least half a dozen times.

So staff, can you bring your latest understanding of that particular study?

DR. THOMPSON: Patsy Thompson, for the record

A lot of the information that Dr. Fairlie presents in terms of the RBE, the metabolic differences, the CNSC in one of our reports, the report on health

presents all of that information and we do make statements that our understanding is the RBE is probably between two and three. That is one of the reasons, as Mr. Thériault explained a few minutes ago that we do sensitivity analysis and we do use those numbers when appropriate and when we looked at the range of metabolic factors, the range of RBE, including a high RBE factor for the people around the Pembroke facility, the doses are still low.

But to bring things back to protection of health, Dr. Fairlie is right in terms of we should not just be looking at epidemiological studies. That is why in the tritium study report we looked at all of the evidence from effects on cells, effects on organs, effects on whole animals. And so we looked at the weight of evidence from the laboratory analysis as well as epidemiological studies and all of that evidence indicates from laboratory studies that it takes orders of magnitude higher than 200,000 Bq per kilogram, Becquerel's of intake to have any effect even on cell cultures and on whole animals. So using the weight of evidence, it clearly does not support Dr. Fairlie's position.

In terms of protection of health, we do take this seriously. We have done a number of studies and we systematically look in every community where the CNSC has facilities what the situation is.

So I will ask Ms Rachel Lane, the CNSC's epidemiologist, to talk about in her discussions with the Medical Officer of Health here what the situation is and then perhaps she can talk about the findings of the RADICON and other studies that have been done around the NPPs where there is tritium exposures.

MS. LANE: Rachel Lane, for the record. I am the CNSC's epidemiologist.

I actually spoke to the Renfrew County and District Health Units' Medical Officer of Health in preparing for this presentation and she told me that they are planning on updating their cancer report this year. However, if you go to Public Health Ontario, it provides updated data on cancer incidence by health unit in Ontario. So I went to that website and I looked at the community.

Overall, all cancers, lung cancer and breast cancer incidence in Renfrew County was similar to the rest of Ontario and colorectal cancer was significantly higher in Pembroke -- sorry, in Renfrew County, and prostate cancer was significantly lower than the rest of Ontario. When speaking with the Medical Officer of Health, she and I had the discussion of chronic diseases and leading causes of -- leading factors that are related to chronic diseases and the main risk factors for chronic disease are unhealthy eating, physical inactivity, harmful

use of alcohol, tobacco use, and so on. so one cannot -- so one has to take all of this into consideration when looking at cancer rates in a community.

Now I would like to talk about the epidemiological studies that have been conducted in Canada. First of all, in Dr. Fairlie's submission, he stated clearly that all of these studies were ecological studies and commented on their blunt nature and then in his presentation today he went on speaking about that cohort studies and case controlled studies are far better methodological designs. This is correct.

There have been two cohort studies and two case control studies looking at the health effects of radiation among people living near or working in a nuclear facility in Canada that have been conducted relatively recently. What's important in Canada is that we have CANDU nuclear facilities, so tritium of course is a concern. So if one were to find effects one would expect to see likely effects in Canada.

When we look at 42,000 nuclear energy workers looking at their cancer mortality, from the 1950s to the late 1999, we see no evidence that they have increased risks of cancer due to their radiation exposure. When we look at tritium specifically, it has no impact on this relationship. This is key.

Secondly, when we look at children living around nuclear facilities, we looked at the nuclear facilities in Ontario. We found no childhood leukaemia clusters. Now, whether you use an RBE of one, two, 20 or what have you, it basically comes to level and if you -- no matter what the level of radiation that these people have been exposed to in Canada, which we believe we know very clearly, the bottom line is we do not see health effects.

We also have looked at case controlled studies of people who had preterm -- sorry, parental preconception exposure to radiation and specifically to tritium. In those case-controlled studies, the children of those workers had no evidence of increased childhood leukaemia or congenital abnormalities. There have been numerous ecological studies in communities near nuclear facilities and there is no consistent evidence of any reason to think that people living around nuclear facilities are any different than other communities in Ontario or in Canada.

Thank you.

THE PRESIDENT: Just very quickly, does that include the KiKK in Germany?

MS. LANE: No. KiKK is in Germany, not in Canada.

However, there has been extensive work on

KiKK's study and it has been clearly stated among international respected experts, the SSK, which was the group that looked in detail at that study, and so on, that it is very clear that the increased childhood cancer among children 0 to 4 within 5 km of the nuclear facilities was not due to the radiation emissions coming from the plant. That study looked at distance, not doses.

There have been two studies that have looked at doses rather than distance from a nuclear facility and those two studies, one is in France and one is in Canada, shows that the dose's distance is not a good indicator of radiation exposure because of wind patterns and eating habits, and so on and so forth. So distance is not a good indicator of dose. Those two studies found no relationship between radiation exposure among people living near facilities and childhood cancer.

THE PRESIDENT: Thank you. We have to move on. Questions?

DR. FAIRLIE: I would like to --

THE PRESIDENT: You will get your chance. Does anybody want to add anything else? Go ahead.

MEMBER MCEWAN: So as I went through your submission I went to some of your references and in one of your references, the 2014 Journal Of Environmental

Radioactivity paper, hypothesis to explain childhood cancers, you actually mentioned in that paper the 2011 Comare study in the U.K.

DR. FAIRLIE: I'm sorry, the what?

MEMBER MCEWAN: The 2011 Comare study in the U.K.

DR. FAIRLIE: Comare study.

MEMBER MCEWAN: Yes, Comare, sorry.

DR. FAIRLIE: I beg your pardon, yes.

MEMBER MCEWAN: That again suggested that there was no association -- that the KiKK study was wrong in that association.

So I was disappointed that in this document you make the overt statement that the German study is correct and none of the caveats that you discussed in that manuscript that the German study may be wrong. So I was disappointed.

And I'm going to make two more comments and then I will shut up, too.

The first is I make the same comment that I made before, I think your recommendation eight on page 22 of your submission is irresponsible in the way it's written. I think that you are creating fear among the population that is probably unjustified and you have certainly written it in a way which I think is not

commensurate with our responsibilities.

The second thing is, I have some good friends in the ICRP and I think they would be very offended of your characterization in the document of it being a self -- I can't remember what it was, a self-serving trade organization.

DR. FAIRLIE: Self appointed was the word.

I don't know where to begin here. I will go back now and I will deal with your first, if you don't mind.

Ian Fairlie, for the record.

My recommendation that pregnant women and women with young, very young families should consider moving elsewhere was not made lightly. I thought about it long and hard and I know that obviously it would raise concerns amongst families concerned, very much so; however, it was based on very good evidence, in my view. Very good evidence. In the sense that there are now over 60 studies worldwide showing increased leukaemias amongst families who live near nuclear power stations. That's not one-six, six-zero, and the best of which is still the KiKK study, although there has been -- a number of governments have tried to object to that.

So faced with the evidence that there are raised increases of childhood leukaemias near facilities

putting out large amounts of tritium, a precautionary approach is to say, look, you may want to think about this. Not in a declamatory or inflammatory way at all, it's basically saying this is what the scientific evidence shows. There's good evidence showing this and, therefore, you may wish to consider it. It's with a heavy heart that I made that recommendation; however, I have -- my scientific imprimatur on this was that the evidence was strong enough to make that recommendation.

Now, the third point was your ICRP. Well, they are self-appointed.

What was the first one?

MEMBER MCEWAN: The COMARE study, that you don't actually discuss --

MR. FAIRLIE: Oh, yes, the COMARE study.

MEMBER MCEWAN: -- in a very lengthy --

MR. FAIRLIE: In 2011, yes, in the U.K., yeah, right. That study was probably one of the worst studies that I have ever seen in my life. The government, the Department of Health, had asked COMARE to do a study which updated a previous study, with more recent data, and they did it but at the last minute they yanked the more recent data and said we couldn't present the data because it was -- there were too many difficulties with it. However, the press release accompanying the report talked

about the increased database, but it wasn't there. Secondly, the study arbitrarily included non-Hodgkin lymphoma as well as ALL into the study even though there were no cases of it. So that meant the study diluted the data. Now, these are no-nos when it comes to doing epi studies; you shouldn't be doing that. You should set out what you aim to do, do that. Instead what they did was they looked at the data and said, no, no, no, no, we're going to have to change it around a bit, and that is unconscionable, it really is, and, therefore, that's why I don't refer to it. And, by the way, you may say, well, where do you get these opinions from. I got this opinion from a number of people who were on COMARE and were ashamed at the actual report that was had and they disassociated themselves from it.

Now, to answer Dr. Lane's comments about epi studies, the first study that she mentioned was worker studies. And everybody knows that there's a healthy worker effect and I didn't include workers because it's such an unreliable way of looking at effects. You have to compare workers with workers rather than workers with the general population.

The other studies that she mentioned were extremely poor methodologically speaking. I don't really count them as real case control studies because the method

for choosing the controls were not elucidated at all and the number of controls were very small. So, they were very poor studies and I didn't rely on them in making my overall conclusions. You may say, Ian, you're picking and choosing here. But what does one do? You have to look hard at the various studies and figure out whether they are worth the paper they're written on in many cases.

Now, you may say I -- you know, it's all your personal opinion. Perhaps. I have given you the evidence on which I base my opinions and I think the evidence is very good. I could go on to discuss a number of reports which have validated the KiKK study, including websites from the German Bundesministerium, which actually back up with the KiKK study and explain to you why the German Nuclear Control Commission didn't like the KiKK study and said, no, they didn't like it. I should say to you that -- that one of the main reasons why the German government has backed off nuclear power stations, and the Swiss government and the Italian government, et cetera, is because of the KiKK study.

THE PRESIDENT: Okay. Very quickly because we've got to move on.

MS LANE: The -- the healthy worker effect, Dr. Fairlie is correct; however, the study that I am referring to does look at dose response relationships

and that is only within the nuclear worker. So when we look at dose response relationships, we're only looking at those with low doses within the group versus high doses, and we found no relationship between dose or exposure and cancer.

Secondly, the case control studies, what you do is you look for cases, first of all, those newly diagnosed. We use the Canadian Cancer Registry, which is national. We also use the Congenital Abnormalities Database, which is a national population control database. We look at those cases and -- and controls and we see if cases and controls have parents who had radiation exposure, and we did not find that relationship. The reason why there were so few cases and so few controls was because there were so few childhood leukaemias and so few congenital abnormalities, so there was absolutely nothing wrong with either one of those studies.

And then finally with respect to the KiKK study and other studies that have looked at children living around nuclear facilities, there has been a recent workshop, and you may read the article by Laurier et al, 2014, that has looked at all of the studies of these children and they have concluded that there is absolutely no evidence suggesting that it's to do with the radiation exposures; however, all of these experts do feel that the

understanding of childhood leukaemia is not well-known and that there needs to be a more collaborative effort between physicians, epidemiologists, biologists and so on to understand the etiology of childhood leukaemia much better so that we can address the childhood leukaemia issue better. Thank you.

THE PRESIDENT: Okay. Final word, sir. Obviously we're not going to resolve --

MR. FAIRLIE: No.

THE PRESIDENT: -- some differences here. As a regulator, as you know, we have to listen to medical authorities, international bodies, and this is not a place to get a consensus. Obviously it's a difficult issue. We've got to listen to all the input and decide to follow forward on it. But you do have the last word here.

MR. FAIRLIE: Okay, my last word. Thank you very much.

I agree with the dilemma you're in. I mean, I appreciate it, I really do. And if there's any way in which I can help more, I will.

There is a moral issue here that nobody has talked about and there is an ethical dimension and to me it's important. We are -- we are deliberating whether these tritium emissions should be allowed or not and -- or licensed or not, and my heart goes out to pregnant women

and families with very, very young children. They're worried about that, they really are. We know that embryos and fetuses and infants are very highly radiosensitive and we -- I think we should be doing our best to try and protect them. We know that tritium emissions float through grade school and through children's classrooms. I think we should be trying to protect them. We know that -- that the people who work at these facilities, many of them are youngsters and clearly teenagers from the photographs that we see. These kids shouldn't really be exposed to high levels of tritium. And there is -- what about the 20,000 people or so who live in the Township of Pembroke? We should really be thinking about them as well. We're really putting a blight on them.

So for those reasons, I think that we should adopt the precautionary principle and we should look long and hard at whether we give a licence to them. Thank you.

THE PRESIDENT: Thank you.

The next submission is an oral presentation from Ms. McNeill as outlined in CMD 15-H5.9 and 5.9A.

--- Pause

CMD 15-H5.9/15-H5.9A

Oral presentation by Ms Janet McNeill

MS McNEILL: I always wind up going off script a little and I guess I'm going to start right from the to going off script. I mean, I have this all written and carefully timed it, five minutes.

Just off the top, if a person was at their first CNSC hearing, something they would notice is that it takes an awful lot of managers and complex management to manage this supposedly non-problematic substance. That's something you would notice right away. Okay, back to the script -- script.

Good afternoon, CNSC commissioners and staff, SRB personnel, members of the public, and all those watching via webcast. I do appreciate the opportunity to speak to all of you at this public hearing. As you know, this is not the first time I have spoken at a CSC -- a CNSC hearing. In fact, I have done so several times now: in Ottawa, in Curtis, in Port Hope, in Toronto. My first presentation to you, in fact, was the SRB hearing five years ago, May 2010, in Ottawa.

Many people believe Albert Einstein defined "insanity" as doing the same thing over and over and expecting different results. Sometimes I wonder about

myself appearing at hearings over and over apparently expecting different results, yet never seeing them. As it happens, it actually wasn't Einstein who coined the phrase, you can look that up, but he did say that using nuclear energy is one hell of a way to boil water. This is not a *non sequitur*, since it is in the nuclear reactors in Southern Ontario that Pembroke's problematic tritium originates, a fact, I believe, not everyone in Pembroke is aware of.

Full disclosure and no surprise to you, Commissioners, I'm an antinuclear activist, though becoming one took me by surprise and was definitely not part of any plan on my part; it just kind of happened. I have been antinuclear ever since as a young university student I read this book, *Hiroshima*, by John Hersey.

It was the tritium situation here in Pembroke, however, that finally propelled me beyond being quietly antinuclear into antinuclear activism. I spent more than six years living up in Renfrew County, in Deep River mostly, and then some time in Pembroke. I loved and still love it up here and feel a strong loyalty and connection to this area and to the people here.

Being aware that many people are intimidated at the idea of speaking to a CNSC tribunal and seemingly able to get past my own reluctance and fears

about doing so, I feel more or less obliged to take part, as I know I am not just speaking for myself but also for others who find they simply can't do this. So it may be insanity, but here I am.

As I appointed out to you previously, I do not have a technical, scientific or mathematical mind. I am, on the other hand, very well attuned to language, everything associated with language. I have learned how to dig and decipher my way through the language used by the nuclear industry. Many of us call it "nukespeak".

Over the past several years I have read a lot of books that have informed me about the way the nuclear industry operates. I have a pile of them here. There are some really well-told personal stories by people who grew up in nuclear towns: This one, *Full Body Burden - Growing Up in the Nuclear Shadow of Rocky Flats*, is the story of Kristen Iversen's experiences growing up in Rocky Flats, Colorado, where nuclear weapons were being made in such incredible secrecy most people in the community had no idea what was going on, and where there were plutonium, fires, spills, and also tritium inexplicably present and never satisfactorily explained, as well as a lot of cancer.

Welcome to Shirley - a memoire from an atomic town tells of Kelly McMasters' growing-up years in another nuclear town, Shirley Long Island, where the

Brookhaven National Laboratory was leaking massive amounts of tritium into the groundwater. People were getting sick with cancer and children were developing and dying from an exceedingly rare brain cancer at frightening rates.

I also recommend *This is my homeland - Stories of the effects of nuclear industries by people of the Serpent River First Nation and the north shore of Lake Huron* for a snapshot of the earlier piece of the nuclear fuel chain, uranium mining, the Elliot -- the Elliot Lake story.

Pat McNamara's book *Port Hope - Canada's Nuclear Wasteland* is another, a book I know I mentioned to you at the Port Hope hearing. A story so mind-blowing I still marvel at what I learnt about Canada's role in the world's weapons trade and the cooperation of our governments at all levels, municipal, provincial, and federal, ever since the 1940s. It shattered many illusions I had held and, to tell you the truth, pretty much broke my heart, and I'm not making that up.

Of course we all live downstream from nuclear operations, even those who profit so hugely, but Pembroke, with its elephant in the room, is disproportionately affected.

Tritium and the SRB story: Not well enough understood by enough people. Sometimes I wonder if

it's the GTE instead of the GTA, the Grand Tritium Experiment.

Health impacts: As part of my supplementary submission I sent in a document that explains the 1959 deal between the World Health Organization (WHO) and the International Atomic Energy Agency (IAEA) in 1959. I already said that. IAEA is the global body that exists paradoxically to both regulate and promote nuclear energy. This 50-plus-year-old document lays out that WHO would need to get IAEA's agreement on any research it wanted to do. Why would the Nuclear Promotion Agency choose to support research demonstrating the health impacts of nuclear operations? But, never mind, even without the participation of WHO there is plenty of scientific research available, proving that exposure to radioactivity harms people, damages DNA, and sends its poisoned arrows into generations to come. Another of the presentations here today has focused on health. We just had it, so there's no need for me to say any more about tritium and health impacts here in Pembroke.

Regarding CNSC science: I think it's important for the people of Pembroke to understand that the CNSC is not as scientific as it lays claim to being. While the language of the nuclear industry can at first appear too technical for the average person to understand, one

learns pretty quickly that the CNSC staff's language is actually often surprisingly full of unscientific claims and conclusions. Remember, I have been involved in a lot of CNSC hearings by now.

I've heard the CNSC's Dr. Patsy Thompson say, in an apparent attempt to dismiss the industry's responsibility for exposing hundreds of workers at the Bruce Plant to alpha radiation during refurbishment activities in 2009, quote, "Bruce Power has a healthy safety culture for the following reasons: the alpha-event was unforeseen for reasons that I don't have right now; there was no evidence that there was a potential for this event, so it's not something that Bruce Power or its employees decided to ignore," end quotes. Her line of reasoning appears to be: Since we did not think it would happen and did not predict it or find it probable, we cannot, therefore, be held responsible if it does.

In response to a question from the CNSC Tribunal at the 2014 Pickering Hold Point hearing regarding potential risk of a catastrophic accident at the Pickering Nuclear Generating Station, CNSC staffer Dr. Rzentkowski said, "... we can --" quotes, "... we can say the risk is zero, because there was never a significant accident in the CANDU fleet." Really? This is a science-based prediction?

Okay. I'm going off script again here.

Spills and nuclear industry terms: When you get used to this stuff, spills are always said to be small; doses are always very low; releases are always below regulatory limits, and then there are DRLs. I haven't time to speak about the very unscientific concept of derived release limits, but I did address it in my supplementary submission. DRLs are used to convey a false reassurance that omissions are not a problem.

SRB's request for a 10 year licence: I find SRB's request to be unsupportable. This company has on innumerable occasions proven itself untrustworthy, unreliable, dishonest, and has been guilty for 25 years of blanketing the citizens of Pembroke with tritium via air, groundwater, and releases to the public sewer system. It isn't safe for people here to eat the produce grown here because of SRB's operations.

So, given that, can anyone in this room really believe the company ought to be given a 10 year licence? A 10 year licence would vastly reduce the already insufficient scrutiny of the company's activities. We saw what happened with SSI in Peterborough, 18 years of false data and yet the endorsement of CNSC staff for a 10 year licence. There is a similar pattern here with SRB with 15 years of unreported -- underreported emissions. Happily, SSI has been shut down because of public pressure, I might

add. Good news for Peterborough, bad news for the Pembroke environment, with SRB having taken up SSI's slack. SRB needs/has always needed a shorter, tighter leash, not a longer, looser one.

To conclude, I ask you to deny this licence request. I ask you to really listen to, digest, and then act on the evidence presented here today as well as that received by written submission, by organization and individuals who have nothing to gain financially from SRB's continued operations, but I don't really anticipate your shutting down SRB, the CNSC is a licence-granting body. I have never known you to not grant the licence the proponent was asking for. I am aware that there is more to this tritium and nuclear waste business than meets the eye. I believe there are big elephants in the room here. So instead of you asking to shut down this company, much as I wish you would do so, I ask you -- I ask that you order SRB to relocate to a place where there is a reasonable buffer zone, so the Pembroke population and environment can be protected from being subjected to any more years of tritium emissions. Pembroke does not need a tritium emissions factory nor does it need a storage facility for nuclear waste, and its nearby landfill site should not be used for the dumping of nuclear waste either. Since we know the radioactive burden that already exists here is not going to

disappear magically overnight, the only solution is to stop adding to it. I've heard it said it's never the wrong time to do the right thing. I beseech you, please do the right thing for the people of this community. Twenty-five years is long enough.

THE PRESIDENT: Thank you.

Questions. Mr. Harvey.

MEMBER HARVEY: Yes, I would like to refer to the written submission, the additional written submission that's H5.9, the -- there's no pagination on that, but it's about the release limit. I don't know if you can find that -- that page. It looks like the first page. No. There is -- at the beginning there is seven pages -- or eight pages. That's after that. The -- I would like the staff comments on --

UNIDENTIFIED MALE SPEAKER: Page 9.

THE PRESIDENT: It's H5.9A. If you go down -- there is no page numbers, but if you go to section B, derived limits, is that what we're seeing?

MEMBER HARVEY: Yes, that's right.

THE PRESIDENT: "Derived Release Limits".

MEMBER HARVEY: That's right, the first page. It's -- at the beginning it's "... absurd release limit for tritium". I would like the comment -- the staff comments mainly for the second paragraph, and, "When --"

the "'CNSC has currently set [derived limits] ...," it's for SSI, but I would -- I would like to have the comments even about that paragraph.

That one here.

MEMBER VELSHI: It's this page.

MEMBER MCEWAN: It's this page and this paragraph.

MEMBER HARVEY: It starts "This is over 200 times higher than the total global natural tritium production rate".

THE PRESIDENT: You found it?

MR. RINKER: Yes.

THE PRESIDENT: Okay.

MR. RINKER: So, we found it. I can provide a general answer, maybe not comparing it to the global natural tritium production rate, but the limit here at SRB was established not by the DRL model but more to protect groundwater as a resource, and, in contrast, there wasn't that same groundwater issue to the magnitude that we observed at SRBT. The licence limit, when SSI was operating many years ago, was the traditional DRL-type model of 1 milliSievert per annum was their licence -- was the DRL for that -- for that facility.

MEMBER HARVEY: But what about this -- this "over 200 times higher than the ... global"? Is that

correct or it's ...

DR. THOMPSON: Patsy Thompson for the record.

I would say it's really not relevant. Like my understanding is this refers to tritium production from cosmic reactions, and it's really not relevant in terms of --

MEMBER HARVEY: Not relevant for the --

DR. THOMPSON: -- regulating a facility. What is important in terms of regulating a facility is taking into consideration essentially the population around the facility and making sure that there are controls in place such that exposures remain below the appropriate limits.

And in all cases -- and SSI I would agree is an exception -- but in all cases the public has continued to be protected from discharges to the environment. The release limit is one factor, but you know there are action levels and administrative levels on licences that essentially prevent discharges from reaching the release limit. And there's a reporting requirement when an action level is exceeded. And usually the action level is set very much lower than the release limit.

MEMBER HARVEY: Mrs. McNeill, would you like to comment to it?

MS McNEILL: Well, DRLs are a measure that are used to reassure the public. And I'm not reassured, because what your staff has just said is that they're not really relevant. So this is a measure the industry uses, and now the industry is dismissing it. So this is the sort of thing that, you know, I mean you just don't have any -- it doesn't lend you credibility to say that, Well, it's inconvenient for us to talk about this now, so we've got something else going on.

DR. THOMPSON: Patsy Thompson, for the record.

What I said is that the limits are based on one millisievert per year, taking into consideration site-specific characteristics in terms of if there are schools, residential areas, and other characteristics. And then we back-calculate, essentially, to make sure that there is one millisievert to the most exposed critical group in the area, and then we set a limit on emissions. On top of that, there's regulatory controls in terms of action levels and administrative levels to make sure that the facility is controlled appropriately and the discharge does not reach one millisievert per year.

MEMBER HARVEY: So you didn't say that the derived limit was not relevant, but the text -- the comparison was not relevant.

DR. THOMPSON: Patsy Thompson for the record.

That's correct. What I said is that comparing a release limit of one millisievert in terms of how many becquerels of tritium it is to the global production of tritium from cosmic reactions, for example, is not especially useful or not relevant.

Thank you.

THE PRESIDENT: Question, Ms Velshi?

MEMBER VELSHI: I have a question for staff on page 3 of the intervenor's submission.

There's talk of years and years of false reporting of tritium emissions. It's the fourth paragraph down. And I know we heard from SRBT this morning that even when they had the high emissions they was still working within their licence base.

Has there ever been issues of false reporting deliberately by SRBT? I'll ask staff and then you can comment on it, Mr. Levesque.

MR. RINKER: Mike Rinker for the record.

We're not aware of any false reporting. I'm not sure where that information comes from. SRB did report they were within their licence limits. When we did some extra monitoring around 2006, when we realized there

was a groundwater issue, we tightened their limits very tightly. And they're still within those limits.

MEMBER VELSHI: Maybe I'll ask Ms McNeill, do you have evidence that would have led you to make that statement?

MS McNEILL: Unfortunately it's not with me. I gave the piece of paper to somebody else this morning.

My understanding is that monitoring wells were not being properly reported on. Is that correct, Kelly?

MS O'GRADY: Missing.

MS McNEILL: Missing?

MS O'GRADY: They weren't in their compliance reports.

MS McNEILL: Monitoring wells were missing from ...

MEMBER VELSHI: Missing is quite different than false reporting ...

MS McNEILL: Under-reported.

MS O'GRADY: They didn't report that their monitoring wells were built overtop. It wasn't in their compliance report. It wasn't on their website. It wasn't in the staff CMD. It wasn't mentioned anywhere. You actually had to drive to the site and see for yourself, and

you would have to know that there were monitoring wells in that location and just put two and two together.

MEMBER VELSHI: Mr. Levesque, comment on that?

MR. LEVESQUE: Stephane Levesque for the record.

I'm not understanding, because we've never falsely reported any numbers or withheld any numbers from the public or the CNSC. So I really don't understand the accusation. And might I say that in addition to reporting these numbers that we've had third parties come in and verify our emissions to verify that they were in line with what we had been reporting, and all those numbers were successful.

MEMBER VELSHI: And did that apply pre-2008 as well?

MR. LEVESQUE: Stephane Levesque for the record.

Yes.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Anybody else? Okay.

Any final comments?

MS McNEILL: An analogy came to me this morning, which was the company says, Well, you know, we've cleaned up our act now, so you can trust us now. The fact

is the reason the company has cleaned up its act is because of the public pressure from my colleagues here in Pembroke. And the company's been going for 25 years, so they seem to be suggesting that because they behaved better in the last five.

The analogy that came to me was an abusive partner. A woman is, say, getting beat up by her husband, and he keeps saying every time, I'm going to get better; I'm going to get better; I'm going to get better. How many times do you let the partner come back? You know, it's is this really a trustworthy company, I guess, is my point. Do you really feel you can trust them given the various things that have gone on in the past. That's it.

THE PRESIDENT: Thank you.

I'd like to move on to the next submission, which is -- sorry, I'm skipping here -- which is an oral presentation from Ms O'Grady as outlined in CMD 15-H5.10, 5.10A, and 5.10B.

CMD 15-H5.10/15-H5.10A/15-H5.10B

Presentation from Kelly O'Grady

MS O'GRADY: Good afternoon.

My name is Kelly O'Grady. I live in Pembroke. And I want to thank the Commission for holding

the hearing here in Pembroke. It's really important. We have people that are attending this hearing today that normally wouldn't be able to go to Ottawa to see it. So it's a really good experience for them to see just exactly how licences are decided upon.

I also wanted to thank Dr. Thompson for doing the OBT-HDO ratio study. I think that was really important work that you did, and I'm glad to see that there are some studies going on in Pembroke, because we are so unique because of our very exceptional tritium levels in human, in biota, in air, in water moisture, et cetera.

So my presentation is mainly going to look at physical changes to SRB over the last 20 to 25 years. So I'll just update this slide. I'm going to be looking at the differences between Zone 1, Zone 2, and Zone 3. Because I don't think the public really understands and I don't think I really understood until I actually got a full copy of the 2007 systematic analysis of tritium sources. Because the copy we got back in 2007 was redacted and it had important diagrams on there that really do explain a lot.

So Zone 1 is the waste storage area, to my understanding. Zone 2 is the waste packaging area. And Zone 3 is where waste processing was going on. And by "waste processing," I think that means that they were

actually crushing the glass, releasing the tritium, and then having the glass go back to waste storage. You may correct me when you have a chance to speak.

MR. LEBLANC: Excuse me, Ms O'Grady, are you going to follow with the slides?

MS O'GRADY: Oh, sorry.

MR. LEBLANC: Okay. Thank you.

MS O'GRADY: Okay. So SRB is one of three tenants occupying the Butler Building located at 320 Boundary Road. The building is owned by Michael Harrington. Michael Harrington recently applied for a building permit for an expansion of 812 metres. We're curious about that.

We know that SRB occupies approximately 40 per cent of the building as is, and with the new addition, we're not exactly sure how much that will change.

So the facility is divided into three zones. Each zone is determined by its potential for tritium contamination due to handling procedures. And this is according to the systematic analysis. Each zone has ventilation systems specific for the type of work being performed.

Yeah, so what we're looking at here at this slide, this is the changes to the facility from 1990 to 2007. There's three slides. So if you can see, Zone 1

is the white area here. Zone 1 is the administrative office area, shipping, receiving. Zone 2 is where they do the silk screening and the painting. And then this is Zone 3, this is the active area. These are the stacks. This is a little garbage shed that was there, a little -- they used to store their waste in. You can also see that shipping came to the front of the building during this time. Total square-foot area was 6,700 square feet.

So then between 1996 and 2001, SRB added on another 3,000 square feet. And that looks like it mostly went to the Zone 1, but there was this little area added on here to Zone 2. So this is the new addition, right here. And if you want to compare with the year before, you can see the difference. So it expanded. Now it's 9,766 square feet. You can see that they've added a waste room here in the corner to Zone 3, but there is no other changes to this zone. Most of the changes are expanding this area.

And then between 2001 and 2007, they expanded Zone 1 again by another 3,000 square feet. So you can see this area right here is all new, built on. That's a lot of space for an administrative area, I think. Now the total space is 12,766 feet.

These areas are curious. We're not exactly sure what the ventilation system is for Zone 1 or

Zone 2. It's not really discussed. We found a document showing the Zone 3 ventilation area. Stephane tells us that that's confidential information. And I disagree with that. I think that should be public.

So if you look, there's the changes from 1996 to 2001. So this is the new area, here.

And then in 2011, SRB dismantled this area here. So it's my understanding that there's nothing going on right there. There's a number of fume hoods in that area, and there's fume hoods in this area as well.

During our tour, I asked Jamie where the -- I asked Stephane as well -- where the actual breakage occurred, the October 28th incident. And he said it happened right here in Zone 2. So this is where the breakage caused the alarms to go off. So definitely there is tritium exposures there. There should be some sort of monitoring. We've never seen any kind of reporting for that. And that's the first time we've heard today that there was actually another stack -- there was a third stack at SRB. New to us.

Okay. So the other point is since the birth of SRB, since its arrival in Pembroke, Zone 3, which is their active processing area, has never expanded. There have been no changes except to add that one little storage room to it -- a storage room which, by the way, isn't

sealed. It has an open door to the outside. And how convenient is that? You can put your stored waste in there, take the lid off. It won't be monitored in your stacks. Sorry. I had to throw that in.

Okay. So this is SRB's footprint. They claim to be adding another 180 square metres to Zone 1 again. And again, I've already told you Zone 3 is the smallest and it has remained relatively unchanged.

And so 815 square metres for the Michael Harrington Butler Building actually translates to about 8,772 square metres [sic].

This is the floor plan that they give to the public, and this is what they tell the public, that this is where the expansion is going to go, this little area right here, right in front of their shipping area. It makes me wonder how they're going to get their trucks in there. And there's really no driveway that comes in here. It doesn't even look like a truck drives across the lawn, because they'd have to go through Med-Eng over here to travel down a little kind of a hill and get over here to deliver their shipments. It's a very curious set-up.

So there's issues around transparency. I have difficulty with this graph. I think it's just done to show the public that there's a downward trend. There is definitely an upward trend in the amount of tritium waste

that they're processing. And they also claim that they did no measures except maybe change the diameter of their piping, yet their emissions have gone down to levels that you would expect to see when they are not processing, which is very curious as well. And I haven't seen anybody explain that satisfactorily.

And that again raises the question: Are they actually monitoring releases? It raises two questions, actually. Are they actually processing? Are they actually manufacturing lights in Zone 3? Because that's where they would be manufacturing and that's where you would expect to see at least 5,000, 6,000 gigabecquerels of tritium released from the rig stack alone, not this number. It just makes me curious why the number is so low if they're still doing 400-and-some rigged cycles per month.

The other thing is that we're concerned about monitoring, whether they're actually capturing all the tritium releases. And we know that Zone 2 -- that's where the accident occurred, that's where the alarm was persistent, and that's where you had to actually carry the damaged tubes that you were shipped into Zone 3 to let it exhaust underneath the rig stack hood to the atmosphere.

So the stack ventilation system, that was another point that we raised. I thought that their

ventilation system, their bulk and their rig stack numbers should be reported separately.

So I really am not in favour of a licence for this facility, given that they are not disclosing their true activities to the public. It definitely seems to me that they are a nuclear waste facility. We've come across invoices from the U.S. that show us that indicate that this is SRB's main activity right now, and it is very profitable, let's say.

The other concern is the licence application guide, which tells licensees that they can release solid waste under three tonnes per year per building. They can also release liquid waste per year under the total amount per building. So my question to the Commission is, and to CNSC staff, is: SRB is building on another addition are they going to be allowed to have two release limits?

Thank you.

THE PRESIDENT: Thank you. Questions?

Mr. McEwan.

MEMBER MCEWAN: Thank you for the presentation. And I must say, thank you for the plans. I used them a lot as I was reading it. I was grateful for them. Thank you.

I'm still not sure what you're saying, though. Forgive me. I listened very carefully to what you were saying. Did I hear you correctly that what you're saying is that in fact they're not manufacturing signs, but they're functioning as a waste facility? Is that what -- that's what I think I heard you say.

MS O'GRADY: It's what I'm putting together, just like we had to put the well stuff together.

The emissions in Zone 3, which is their active area, are not elevated at all. They're like a non-processing. That's enough -- that's what you expect if the equipment itself was off-gassing. So either that and the processing is going on in other areas of the facility and they're not monitoring it, or they're monitoring it and they're not reporting it -- that's the other explanation -- or they've come up with some system of capturing the tritium. And they haven't. They don't have a secondary containment system. They haven't done anything to their processes since 2006. They changed the diameter of whatever tubing it was and whatever width it was, was it a quarter-inch, was it three-quarter inch? Nobody knows.

So yeah. That's what I think is happening. And the public really needs to be aware of this. This is something, if it is happening, this should be public information. And this hearing should be a little

bit more elaborate. There should be a very active engagement with the public because of the changes to this facility.

MEMBER MCEWAN: Staff?

THE PRESIDENT: Let's start with this.

First of all, I want to ask a question in reaction to this, and then I want to hear from staff whether it's possible to hide emissions in this plant somewhere without it being discovered.

Go ahead.

MR. LEVESQUE: Stephane Levesque for the record.

And like I said, I'm a little disappointed, because we in good faith actually gave an hour-and-a-half plant tour to Ms O'Grady just recently in March during work hours, and showed her the facility and went through as much as we could. And I been forthcoming with all the information, including things like the ventilation diagram which she refers to, which is actually in her intervention.

I'm actually a little confused. A lot of the things that are in her supplementary submission and presentation are falsehoods, and I can address them right now.

Regarding the one you're speaking about specifically, regarding the emissions from the facility, there's a table in her presentation and statements that are made that are releases from the waste room. I'll address the main one: releases from the waste room are not monitored. But yet in the document that the floor plans were taken from, which is the sources document, which is dated March 29, 2007 -- and I know, because that's the only document that we put the changes in the facility from what it was to 2001, because it hasn't changed since 2001. In this same document, it states that there are releases from the waste room and that they're monitored. It says it clearly in black and white. And again, there's the sources document from March 29, 2007.

And that's the same for a number of other things in the presentations. And I can address them one at a time, but no, the emissions regarding the waste room, regarding the stub crusher fume hood, they're all monitored. And we actually discussed that during the plant tour on March 16th. So if somebody asked me, Are the emissions from our facility monitored? Yes, they are. And I think I mentioned, you already heard that if there's something that comes in the facility -- a broken sign or lights that are broken -- and there's some small emission in Zone 1 while it's transported to Zone 3, there's a

possibility for a fraction of emissions to be resulting from that. But that's a very rare occurrence that that's happened.

THE PRESIDENT: So you mentioned some false information in her presentation. I mean, what are the false information you're talking about?

MR. LEVESQUE: There's lots. Lots.

THE PRESIDENT: Well, give me another one or two.

MR. LEVESQUE: Okay. It is we are not a waste facility. We showed that during the tour. The only something that someone would define maybe as waste that we take back is we take back, as I mentioned earlier, old product that's expired. And that only represents, like I said, nine per cent of our revenue in 2014 and six per cent so far in 2015. So it's entirely false to say that.

We are processing in Zone 3. We are not doing any operations in Zone 1 that creates any significant release of any sort. So that's entirely false and it's totally misleading. And we actually went through this during the plant tour with Ms O'Grady and Dr. Hendrickson.

Regarding wells that we're not reporting, I also don't know what we're talking about. I'm sorry, I can't speak to something I don't know.

THE PRESIDENT: Staff? Can somebody hide emissions?

MR. RINKER: Mike Rinker for the record. I will give a first answer and then pass it back to Dr. Steve Mihok.

We do inspect and visit this facility. It is not a large facility. You can look in every room and every corner to understand where is the material and where is the work that's being done. So there isn't any possibility for hidden material that could compose a release.

And I will pass the question back to Dr. Mihok.

DR. MIHOK: Steve Mihok.

It's a bit of a jigsaw puzzle. We have all sorts of lines of evidence that tell us whether what is being reported is factually correct. We have air monitoring, slow monitoring, precipitation monitoring, stack monitoring, produce monitoring.

And one of the reasons corrective action was taken many years ago was some of those numbers actually didn't match and they didn't match because there was a mistake essentially in the amount of tritium that was being reported, relative to what was actually leaving the stack and it was essentially a spreadsheet error. It was one of

those annoying things that crept into the data.

Now, when some of these things came to light many years ago we had various crosschecks on whether or not fugitive emissions were occurring. That was one of the ways of understanding why things didn't match up and one of the better ones was the roof runoff, so the times when SRBT was not processing, and so on, what did the roof runoff look like? If there were large fugitive emissions then there would be a lot of tritium in that water running off the roof. Well, there wasn't, so that was a very good line of evidence.

We have done other studies on and off, but the most important one is the one from 2012 when we worked with the University of Ottawa to monitor the air on a very fine scale. So we have lots of data from that summer on weekends and so on, when again we knew no processing was going on and what we found in that study was essentially that the levels of tritium in the air near the building are very, very close to background. So it's like the tap gets turned off when SRBT is not operating.

So there are some fugitive emissions and we have that data from 2007 when they weren't processing tritium. They were just handling it in light tubes. We have a very good understanding of those numbers and how they contribute to the overall total.

So I just worked up those numbers literally days ago, cross-comparing across years and something on the order of maybe only about 10 percent or 20 percent at most represents other processes going on in the facility when they aren't actually operating the rigs or splitting the tritium, something like that.

THE PRESIDENT: Thank you.

Questions? Ms Velshi...?

MEMBER VELSHI: Sir, there have been a number of allegations they are becoming a dumping ground for waste and you said 9 percent of your revenue comes from the taking back of used light. How much of your processing volume is from that, your processing volume of tritium so, you know, you're 30,000 terabecquerels or whatever? How much of that would be from these returned fix --

MR. LEVESQUE: Stephane Levesque, for the record. Thank you for the question.

When we talk about processing we talk about taking tritium from a bulk container and putting it into a light source, so taking back an expired life source doesn't count as part of processing whatsoever.

MEMBER VELSHI: Okay. So your actual business volume has gone up of production rather than -- I mean in addition to probably taking back. Okay, thank you.

Mr. President, if I can ask another

question, unless someone else has one?

This is to staff. The intervenor talks about differences in U.S. requirements, regulations and hours when it comes to these devices and inventory management. Can you explain what the differences are and why and are we less rigid in hours and, if so, why?

MR. BUHR: Rob Buhr, for the record.

In the United States all manufacturers or distributors of radioactive signs are required to follow the regulatory requirements and those are considered general licensees. However, they go on a little bit further for people who purchase the signs. They are called specific licensees and they don't have a specific license, but they are expected to follow certain rules around handling these signs. One of the main differences is that these industries or people who purchase the signs have to keep an inventory of how many signs they have in a building and they have to account for where they go. So if the sign is sold or given to another facility, they have to account for that and show tracking records of where that inventory went.

In addition to that, there are also requirements are around how they dispose of that sign, so they are not allowed to send the signed directly to landfill. It is supposed to be disposed of in a proper

manner.

In Canada it's slightly different. We have kind of two thoughts on the waste. So somebody like SRB who manufactures the signs is under a license and therefore they are required to dispose of it at a proper disposal facility. On top of that, they are also supposed to provide like a procedure for how to dispose of the sign properly when they sell the sign and give options on how to retrieve the sign back after it is no longer useful. So SRB does this.

The second kind of waste option is when SRB sells the sign, or any manufacturer's sells a sign in Canada. That person who purchases a sign, there is no requirement on how to dispose of the sign so they are given the option to return it to SRB or to a proper disposal facility or they can dispose of it in the landfill. Those are the main differences between U.S. regulations and Canadian regulations.

MEMBER VELSHI: So from the way you have described it, ours seem a bit more lax than the U.S. ones, where if I were to get one of these lights I can go and throw it in my local landfill site; correct?

MR. RINKER: Mike Rinker, for the record. Yes, that is correct.

It is generally not homeowners who have

exit signs. It is businesses who may have a number. So it's in their interest to send it back to SRB.

Nevertheless, some do end up in landfills and there is no regulation that would require them to do otherwise. There is data about what are the tritium levels around landfills. We have had CNSC subject matter experts look at that data in the U.S. and the U.K. It is generally -- leachate from landfills, I believe, is in the order of hundreds to a couple of thousand Becquerels per litre. So there is certainly a signature of these things in landfills, but there is a signature of many contaminants that are together with that leachate.

MEMBER VELSHI: So is the U.S. regulation driven by landfill contamination a concern or is it anything other than that?

MR. RINKER: Mike Rinker, for the record.

So we believe there was an issue some time ago with Walmart that had many signs. I think some were unaccounted for, and it was that -- well, the NRC did not have a concern -- I think there was on the order of 15,000 signs -- about the health consequences. They felt maybe it was prudent to put in a requirement to respond to public interest, public concern, and also to deal with this issue.

THE PRESIDENT: What happened to the Walmart? I remember there was an order to all equipment

older -- to report back in what was the end result?

MR. RINKER: So I don't know the complete story. I know some of those signs were -- it was a company called Isolite who took over control of those signs and at the time Shield Source, who was also required to collect signs, did retrieve some -- had the import license from Isolite. So they may have been returned in that case.

THE PRESIDENT: So as the intervenor argues that Isolite has some relationship with this RBT -- in other words, did all this stuff come back to Canada?

MR. LEVESQUE: Stephane Levesque, for the record.

Thank you very much for the questions because this is one of the things I was going to bring up that's very important to me personally, is on page 3 of Ms O'Grady's H5-10A, if you wouldn't mind bringing that up, please? I think in red it says:

"In retrospect, it is apparent that SRBT was involved in some way with the Walmart tritium light inventory through their partnership with Isolite. SRBT..."

That would be me in this case:

"... should be held accountable for misinforming the Commission and for

their lack of transparency."

I was asked those same questions back in 2008 and '10 and I stand on what I said then. We did not have at that time any knowledge of what happened to those signs, nor do we today, nor did we have at that time any relationship with Isolite.

Their relationship began after Shield Source, who is a sister company of Isolite, started getting into some issues with the monitoring of their emissions and we had a meeting, I believe in January 2013, where we discussed supplying them. We supplied them samples in February 2013, so several years after this happened. So we are actually not aware of what happened with the large number of signs from Walmart, nor were we involved.

So we can't answer the question for you. I'm sorry, I don't know if they came back to Canada. I have no idea.

THE PRESIDENT: Just so I understand what Ms Velshi just asked, in the U.S. how do they dispose of those signs nowadays?

MR. LEVESQUE: Stephane Levesque, for the record.

I know that we take back some signs and apply for import permits, take back some signs from customers in the U.S. So that is a route.

I know there are other routes that they go to waste brokers, none of which are sister companies of hours. We do know them because some of them come to us for quotes to want to get rid of those signs, some of them have other means of getting rid of them other than SRB Technologies.

THE PRESIDENT: But waste broker, it could be a municipal waste?

MR. LEVESQUE: There are private companies out there that just handle various types of waste, including tritium signs.

THE PRESIDENT: I'm still trying to come to grips with here you don't need any intermediary. You can go and throw it away in the local dump; is that correct?

MR. LEVESQUE: Stephane Levesque, for the record.

Yes, an end user is allowed to throw it to the dump, but we offer the service of taking it back.

THE PRESIDENT: So do you know if some do that in volumes? Some users actually dispose of them in municipal dumps?

MR. LEVESQUE: Stephane Levesque, for the record.

Not to my knowledge, no.

THE PRESIDENT: Ms Velshi...?

MEMBER MCEWAN: So can I just be clear that I understand? For the expired signs you contract with a company to take them back. You bring them back to your facility and you are really just acting as a transit point to then go to Chalk River; is that correct?

MR. LEVESQUE: Stephane Levesque, for the record.

No, not exactly. There is the case that companies come to us to dispose of signs that are in their possession, but there are also end-users that come to us to get rid of signs for replacements. And we just don't take the signs and send them to waste disposal. We take the signs, we log them in our inventory, we assess whether there are parts that can be reused.

In certain cases we reuse the entire sign because it hasn't expired yet. It's still well within the luminosity required to meet building codes.

In certain cases we take the lights out and we use them for totally different applications.

And, yes, in some cases we take the lights out, repackage them and send them to AECL or another licensed waste facility, but never to landfill.

MEMBER MCEWAN: Okay. But you are not actually processing the tritium in the signs?

MR. LEVESQUE: Stephane Levesque, for the record.

No, we are not. That's an operation that ceased when we went for our license as requested by the members of the public.

MEMBER MCEWAN: So the complete light is either reused or sent to Chalk River?

MR. LEVESQUE: Stephane Levesque, for the record. Exactly.

MEMBER MCEWAN: Thank you.

MEMBER VELSHI: I just want reassurance from staff that we have actually assessed the potential risk of us not monitoring what happens to these signs at the end if they are not returned for disposal at a proper facility.

DR. THOMPSON: Patsy Thompson, for the record.

So at the risk of getting Mr. Binder a little bit upset I'm going to quote a document from the AECB days. So there is a regulatory document that was created probably in the early nineties on exemption of essentially fire detection and such equipment and that -- essentially, that regulatory document did a number of assessments looking at the health consequences of disposing of fire alarms and light signs and things like that and the

assessment at the time was that those would be below -- would be de minimus and de minimus was defined as 50 microSieverts.

And on that basis the regulatory document allowed for disposal to landfill of essentially those pieces of equipment on the basis that it would be unlikely that several large numbers would be disposed of at the same time. On that basis, I know that a number of years ago there were issues with OPG trying to send material to Ontario landfills. Essentially it was contaminated soils, and there were some measurements of tritium in landfills and then some discussions.

My recollection of that data is that the concentrations were in the hundreds of Becquerels per litre in certain landfills, but certainly not to the levels where we would see a risk and, as was explained earlier, leachate from landfills is handled then appropriately.

THE PRESIDENT: So is there a number? Is there a number now that defines the release limit and therefore you can do this under that particular release limit?

DR. THOMPSON: Patsy Thompson, for the record. My understanding is that individuals can dispose of such things through regular garbage essentially to the landfill, but for bulk material there is a requirement to

send the material to a CNSC licensed waste facility. We could come back perhaps -- I don't know if there is a break -- with more details, I know it is in some of our regulations in terms of the cut off, but I don't have that number with me.

THE PRESIDENT: Okay. Thank you.

Go ahead, Monsieur Levesque.

MR. LEVESQUE: Thank you very much.

DR. THOMPSON: Oh, we just have the information. Sorry.

THE PRESIDENT: Go ahead.

MR. RINKER: It's in the *Nuclear Substance and Radiation Device Regulations*.

"A person may dispose of a tritium safety sign without a license as long as it contains less than 925 gigabecquerels of tritium."

THE PRESIDENT: So how do you make sure that everybody follows this up? Okay, let me ask it differently. When you put yesterday the sign originally, what is it's -- what level is it when it's new?

MR. LEVESQUE: Stephane Levesque, for the record.

For the signs produced for Canada, they are below that tritium content of 925.

THE PRESIDENT: So from the get-go they are disposable? Is that the way I can understand it?

MR. LEVESQUE: Stephane Levesque, for the record.

Yes.

THE PRESIDENT: So if somebody wants to be really malicious and accumulate them, then you get into a different issue. Can you? Is it cumulative? Can I buy 100 of those things and I am above my release limit?

MR. RINKER: Mike Rinker, for the record.

According to the regulation, one sign with 925 gigabecquerels of tritium activity can be disposed of and if you had 10 of such signs you could dispose of them.

THE PRESIDENT: I think the AECL document requires review.

DR. THOMPSON: Patsy Thompson, for the record.

I know a number of years ago there was an issue that there were some buildings being dismantled in Winnipeg where a number of signs were disposed of with the garbage and I know there was some review at this CNSC, or AECB at the time, but my understanding is that when the *Regulations* were updated it took into consideration the potential outcome of disposing of signs when there are a number of signs in industrial buildings.

THE PRESIDENT: Okay. Questions?

All right. By all means, it is your turn now.

MS O'GRADY: Mr. Rinker made a comment about SRB is a small building and you can't hide anything, but I can show you the slides of the layout. There is one area of this building that we have never been through and it's this area right here. It's never been on our tour. Zone 1. We have maybe seen part of this area, but this has never been -- Zone 1 has never been part of our tour.

And we have never actually seen inside the waste room. We understand it is high level waste in there, so we were happy that you didn't actually open the door. I'm a little bit worried when you say you can open the other door but you don't because it's sealed.

My other comment is Mr. Levesque says that he doesn't know exactly what happens to these lights, but the U.S. does. The USNRC really strictly regulates their lights and in fact there is a mediatory. They are called Lampmaster and they give the client the packaging instructions. So you are only allowed to pack 10 lights per box and if you pack eight and you pack 10 in another and then two in another one you are going to be dinged \$100 or \$150. It is \$150 per light.

If you send SRB more lights than you told

them that you were going to send them, that's another fee of \$50 or \$100. If you send them a damaged light, they have the right to send it back to you or refuse your order. So they definitely have a very nice setup here, so if you were to relook at that AECB document, I mean you are going to be putting a little bit of a dinge into their very handy little business.

I think I just wanted to ask Stephane. When you say your waste lights go to a licensed waste landfill, are you referring to yourself?

THE PRESIDENT: Go ahead.

MR. LEVESQUE: Stephane Levesque, for the record.

No, we are referring to a CNSC licensed waste facility, not SRB Technologies, typically CNL.

MS O'GRADY: (Off microphone).

MR. LEVESQUE: Stephane Levesque, for the record.

Not ourselves included.

THE PRESIDENT: Anything else? But just talk about this top-secret little zone here. What are you hiding in there?

MR. LEVESQUE: Stephane Levesque, for the record. Thank you very much for the question.

This is one of the -- and if I can address

a couple of them you asked me and gave me the opportunity at the falsehoods that I was talking about.

Ms O'Grady and Dr. Hendrickson actually finished their tour in Zone 1. If you look at the yellow, right where you see the blue saying "Main Floor", just over 1,100 square feet, these were where all the offices were where she met a number of staff, including our project engineer here, Courtney Sinclair, and this is where the tour ended. So she saw that facility.

So I am baffled. I'm sorry but --

THE PRESIDENT: Is there any secured zone that you wouldn't let the public in?

MR. LEVESQUE: Absolutely none. We showed Dr. Hendrickson and Ms O'Grady everything.

Ms O'Grady, when she came to Zone 3, I wanted to show her that we didn't store waste, because you are looking at a room that is 7 x 6. I said, "And I will show you the waste room." I was going to open it, and she didn't want to. And Dr. Hendrickson was okay with me opening the room, so I did and showed it to him. I believe he is still here today.

And, you know, the tour was not just with me. It was with our Vice President, Ross Fitzpatrick. Jamie MacDonald and Doug McNab joined us for part of the tour and Courtney as well.

THE PRESIDENT: It sounds to me like you need to ask for another tour.

MS O'GRADY: Yes.

THE PRESIDENT: Right. Anything else?

MS O'GRADY: No. Thank you very much.

THE PRESIDENT: Thank you.

MR. LEVESQUE: I'm sorry. I just had a couple of things quick that our -- I just want to make sure that people realize that with the expansion there is again nothing hidden and what we are looking to do is to store plastic parts to use in our signs.

We apparently have three trailers. If you can see -- if you drive by tonight you will see three trailers at the back of SRB. There is no waste stored in the trailers. There are brand-new parts to use for our signs in our other products and we are looking to add that area to add parts into it.

Another thing that was said is the number of employees at our facility. I think that we have been open. I see on the presentation here how many people actually work and live in the Pembroke area. Other than Mr. McNab who lives in Arnprior, all of us live in the Pembroke area.

There is nothing misleading about what we do. We still do silk screening, unlike what it says in the

presentation, and no waste is stored off-site. We don't have another building that we store waste into, so that's a falsehood as well.

Thank you for the opportunity.

THE PRESIDENT: Okay, thank you.

We need a break for 10 minutes -- 15 minutes. 15 minutes. We are getting tired.

--- Upon recessing at 5:24 p.m. /
Suspension à 15 h 24

--- Upon resuming at 5:43 p.m. /
Reprise à 17 h 43

THE PRESIDENT: Okay, we are ready to proceed.

I would like to move to the next submission, which is an oral presentation by the Canadian Coalition for Nuclear Responsibility as outlined in CMD 15-H5.11.

Dr. Edwards, the floor is yours.

CMD 15-H5.11

Oral presentation by

Canadian Coalition for Nuclear Responsibility

DR. EDWARDS: Thank you very much, Dr. Binder.

Can you hear me okay? Hello, can you hear me?

THE PRESIDENT: Yes, go ahead please.

DR. EDWARDS: Okay, fine.

First of all, I would like to congratulate the licensee and the CNSC staff for reducing greatly the emissions of tritium into the environment. I think that is certainly something to celebrate.

On the other hand, I think we have to acknowledge that it was through interventions that these problems were brought to the attention of the CNSC, which lead to the monitoring and the work that has subsequently been done to lead to these improvements. And this monitoring is really the direct result, I believe, of citizen intervention.

As a result, I think that a 10-year licence is way too long. I think that there is no way that this plant should be granted, in my opinion, more than a two-year licence at a time so that we can see what is

happening, we can really see whether these projections that have been wrong in the past may turn out to be wrong in the future.

Although we have heard evidence to indicate that the monitoring is so well done and the modelling is so well done that it is impossible to be very far off in the numbers.

I remember quite vividly that just a few years ago it was discovered that the sister plant, the tritium light facility in Peterborough, Ontario, the SSI facility, it was discovered that they had been under reporting their tritium emissions by an order of magnitude for something like 18 years. And that in all those 18 years the CNSC had never caught this.

So it makes me feel uneasy about these kind of assurances, that the CNSC is so good at their job, the CNSC Staff is so good at their job, that nothing can get by them. I simply don't believe that.

I also think that if there is too long an interval between licensing intervention periods, then the Commission does not have a chance to review what the Staff is doing, what the licensee is doing, and to form their own judgment as to how well things are proceeding.

So since the Commissioners are really the ones who are ultimately responsible under law for

protecting the health and safety of citizens and the environment, I do think it is important for them to have these processes.

Before I go any further I would just like to put in a couple of factual points. Earlier it was mentioned about the permissible level of tritium in Japan. I have looked at a record from 2014, May 28, 2014, and apparently it is 1,500 Bq/L. They had measured 1,700 Bq/L which was over their maximum limit in one of the monitoring wells. So it was not 10,000 Bq/L in Japan, it is 1,500 Bq/L.

I would also like to go on record as saying that Tritium is in fact a nuclear explosive. It is simply not a primary nuclear explosive, that is indeed you can't build a nuclear weapon with tritium alone.

But the secondary nuclear explosive is ignited by the primary nuclear explosive and it more than doubles the explosive power of an atomic bomb, a fission bomb, and as a result it is the key to miniaturization of nuclear weapons and therefore the deliverability of nuclear weapons. And it is also the key to making the transition to fission weapons and H-bombs, the fusion weapons.

So I think it is extremely important regardless of whether it is not in the same category for sure as plutonium and highly enriched uranium, but it is

extremely important. Now that we have rogue states that have developed nuclear weapons, but may not have ready access to tritium, this tritium traffic is very important in that regard.

Now, I would like to point out that history has shown that we have made mistakes in the past. You know, the first example of illuminated dials and so on, radioactive illumination, was the radium dials of the past. And they have been phased out, they are regarded now as having been a mistake.

When I was a kid we had these foot machines, you could look at your toes wriggling in your shoes through an x-ray machine. That has been phased out, it was regarded as a bad idea as well.

We had lung x-ray machines. We would pull into the parking lot at schools and all the people -- all the children in the school would go through and have a lung x-ray. That has been done away with, as regarded as much more risky than any benefit that it offers.

Radioactive heart pacemakers using plutonium have likewise been phased out. So I think that we have to bear in mind that this whole idea of using tritium, which is really a waste to begin with, it is a nuclear waste product of CANDU reactors.

If you go into the OPG website they make

it perfectly clear that the only reason they built the tritium facility was not to create a market for tritium, but to safeguard the workers and the citizens and the environment by segregating and sequestering this dangerous material.

And on their website they say that we are safely storing it, sequestering it from the environment.

Now we have a private company which with the licensing of the AECS and then the CNSC is taking this waste by-product and basically spreading it around. And all of it ultimately ends up as waste; it either ends up in a licensed waste facility or it ends up in a landfill or, God forbid, it might end up in a nuclear weapons program.

But the fact of the matter is it was already removed and safely sequestered before. I think that in the opinion of the CCNR, the Canadian Coalition for Nuclear Responsibility, we feel that it was a mistake to give this company a license in the first place, to liberate this sequestered waste product and make it into a much more problematic situation by polluting the local environment and also polluting distant environments with these products.

Be that as it may, one thing seems clear to us, and that is that the City of Pembroke should not have to bear the brunt of this nuclear radioactive

contamination from such a plant. If the plant could operate in a more or less hermetically sealed manner, if in fact the radioactive emissions were truly negligible and truly exceptional, that they only happened very rarely and in very small amounts, then one might consider it as a possibility to operate in a residential area or in a small community like Pembroke.

But given the fact that by its nature it is a fairly difficult operation to try and contain this tritium gas, and so quite a bit of it does escape, it would be much more appropriate for it to be moved to, for example, Chalk River. If that is where the stuff is ending up anyway, if that is where the licensed facility for the waste products that are returned are there anyway, why not have the whole facility there?

So I believe that the CNSC, in its role as protectors of the public and protectors of the environment, should be exerting strong pressure on SRB Technologies to phase out their operations in Pembroke and relocate them to another site which is more appropriate, maybe adjacent to the Darling tritium removal plant where they can incorporate these fabrications right there on site where the tritium is removed, or at Chalk River Laboratories where the waste ends up.

But I remember as a professor at Vanier

College when the student association approached me and said they wanted to make Vanier College a no-smoking facility. I thought, wow, that is going to be very difficult because so many students are smokers and even the teachers are smokers. How are we going to bring about a smoke-free environment? Nevertheless, it was done and everybody is very happy about it, we have a smoke-free environment.

Nobody argued that we should determine what should be the acceptable number of cigarettes or what should be the acceptable level of second-hand smoke? Everybody agreed that we should do away with it, not that we should have an acceptable level.

And I think that it is common thought in the medical community that if you have a carcinogenic agent of any kind, an agent which is cancer-causing or mutation-causing, that the ideal situation is to have zero exposure, and that is what one should aim for.

Because contrary to what some of the staff people have been saying, that you have to have huge exposures, to perhaps millions of becquerels before you can have harmful effects, this is simply not a scientific statement.

In fact, Dr. Muller who won the Nobel Prize in genetics long ago demonstrated that the harmful effects of radiation apply right down to the very very

lowest levels to single-cell exposure of single nuclear radiation incidents. In fruit flies you can have mutations caused at that level.

Also the BEIR report, not the BEIR VII report, but the BEIR V report which had to do with non-penetrating alpha-radiation and deal in particular with radon gas.

They pointed out that there is no reason to believe that a single radiation incident with a single cell could not be a precursor for cancer. Because we now know that cancer is usually monoclonal in origin, that is it begins with a single damaged cell which then replicates a cancer.

When we hear evidence that some cells are possibly benefitting from exposure to radiation, I think these cancer cells would also think that they had been benefitted because they are very vigorous indeed, they can reproduce like crazy, but that is exactly what makes them a cancer. It is because they are wild cells, they are cells that reproduce very rapidly and endanger the host's body that they are in.

So I think that this non-scientific idea that because a little radiation may be helpful to a large number of cell that therefore we shouldn't worry about it. I suppose somebody might have argued from the tobacco

companies that maybe a few cigarettes would have been beneficial. If you just smoked a few cigarettes and not too many, perhaps it would be a good idea.

But that is not why cigarettes were banned. Cigarettes were banned because they are killing people. And radiation is also limited primarily because it can kill people or cripple them through radiation-induced cancers and other diseases.

So I do think that the company should be really strongly pressured to move away from Pembroke and to move to a facility which is more appropriate for it to be there.

I also think that the Commissioners should reflect upon the fact that their role is not only not to promote nuclear power nor to justify nuclear power, nor to defend nuclear power, but to defend the public and to defend the environment.

And consequently, I think the Commissioners should take a cue from those who have said that there is no such thing as an acceptable level of asbestos. Asbestos should simply be avoided insofar as it is possible to do so. That is why they took asbestos out of brake linings of automobiles, because even small amounts of asbestos in the air can cause deadly diseases.

MR. LEBLANC: Ten minutes.

DR. EDWARDS: In a similar way, I think that the Commission should not be thinking about what is an acceptable level of exposure to a known cancer-causing element, but how can we best protect the population when these exposures are really not necessary. They don't have to be where they are and, in fact, perhaps they don't have to be at all associated with the enterprise that SRB has chosen to engage in, which is really marketing a dangerous radioactive waste material.

MR. LEBLANC: Just for your information, Dr. Edwards --

DR. EDWARDS: This was always sequestered by OPG and taken out of the environment.

Thank you.

MR. LEBLANC: Thank you. Well, I was just going to say that we were way beyond the 10 minutes, but thank you for concluding. Thank you.

THE PRESIDENT: Okay, thank you.

Questions? Who wants to go first?

Mr. Tolgyesi?

MEMBER TOLGYESI: I have one, Mr. Edwards.

As you said, it is true that tritium is a nuclear waste from nuclear power plants. However, if I use that kind of analogy for lumber industry, wooden chips are a waste for lumber industry. However, this waste becomes a

feed for heating.

Does it mean that should this nuclear waste tritium be stored or under severe regulatory conditions it could be reused, recycled?

DR. EDWARDS: Yes. My answer to the question is that I think in the case of radioactive materials recycling is an inappropriate concept.

The three Rs do not apply in the opinion of the Canadian Coalition for Nuclear Responsibility to radioactive materials; reducing and reusing does make sense, but recycling does not make sense if it means putting it into general commercial distribution, and especially if it is going to end up in landfills.

We have talked about the hazards to the Pembroke environment from crushing the glass and letting the tritium escape. Well, imagine what happens if these things end up in landfills. I do hope that the CNSC will revisit those regulations and see to it that landfill disposal of this size is not allowed.

THE PRESIDENT: M. Harvey?

MEMBER HARVEY: Dr. Edwards, one of one of your points is to move the facility. But at the end of the day, what would be the difference if we consider that the releases are controlled, the damages are very limited to the nearby facilities. And supposing that the same people

would work there, so at the end of the day what would be the difference?

DR. EDWARDS: Well, I think the difference is that it is recognized that in the early days it was always emphasized that there should be no unnecessary exposure to atomic radiation unless there is a benefit to the people who are being exposed.

These people in Pembroke are mostly not being benefitted by being exposed to the tritium. Whereas, you could argue that at CRL, at Chalk River Laboratories, you do have people who are earning their living as employees of the nuclear establishment and they are always being subjected to radioactivity, which the general public is not being subjected to, as part of their job.

We have to bear in mind that the effect on pregnant women can be quite severe. I was present during the select committee on Ontario Hydro Affairs hearings that took place in 1979 and 1980 when tritium first came to public attention.

And one of the people who testified there was Dr. Edward Radford who was also one of the chairmen of the BEIR committees. And he pointed out that if there is a sudden spike of tritium release such as has occurred, for example, I know in Peterborough at the SSI Institute there was quite a substantial release at one particular moment.

In five minutes they released a tremendous amount of tritium.

If this happens during a certain stage of pregnancy the fetus, especially if it is a female fetus, can be severely affected by that because the damage she will carry for the rest of her life.

And so we want to get these kind of facilities away from ordinary, you know, day to day families who are just living their everyday lives. They shouldn't have to be subjected to this.

MEMBER HARVEY: Maybe I would like to have the Staff comment about moving the facility. What would be the difference? What would be the advantages, would there be some?

MR. RINKER: Mike Rinker, for the record.

So we have a facility that is safe, emissions are under control, public dose is exceedingly low. It is difficult to think of an advantage other than it may reduce the fear or preoccupation that some neighbours may have.

MEMBER HARVEY: Mr. Levesque?

MR. LEVESQUE: Stephane Levesque, for the record.

Yes, I think you can understand I have been asked this question once or twice. And I can give you

a major disadvantage for moving the facility. Because now we have a network of 46 monitoring wells, we have a weather station that we monitor all the environmental data, and I have been doing it for almost five years now. And we understand that ecological system, we understand that system, that environment.

And to move, to pick-up the facility and just to move it somewhere else, you are starting all the way over again. You know, so there is a lot of work and a lot of data that you can see that we have done in analyzing the environment, and how the environment responds to our emissions. And that would be to start all over again, and I don't think in anyone's benefit.

DR. EDWARDS: On the other hand, the fact that those installations are there is only for one purpose, and that is because of the hazards posed by tritium. If you moved it to Chalk River, you wouldn't have to worry about that particular environment that you are dealing with now and you wouldn't need those monitoring wells and so on. You have got a different situation at Chalk River. They are used to dealing with these materials.

THE PRESIDENT: If I understand correctly, there is all kinds of monitoring in Chalk River, all the buildings, and the Ottawa River, is that not correct, Staff?

DR. EDWARDS: Absolutely.

THE PRESIDENT: But the intervenor made another point, and I would like to hear your view. If you are going to stay or like to stay in this facility for a long time, looks like you got an increasing business, what about zero emissions? Can you become an hermetically sealed organization?

MR. LEVESQUE: Stephane Levesque, for the record.

Obviously that is our greatest goal. Because if we could have zero emissions, there would be very little discussion today. It would just be historical. So it is something we have been working hard on. As you can see, I think that we have reduced the ratio of what is released. But that is why we want to dedicate 5 per cent of our revenue to finding emission reduction initiatives.

We are not aware of any technologies right now that could reduce it to zero, it would be to trap it and move it somewhere else, and there are dangers associated with that. But over a long licence term we can definitely put our heads to that and dedicate our time to try to hopefully come back to you and be as close to that as possible.

THE PRESIDENT: Thank you.

Questions?

The intervenor mentioned the famous mistake of SSI that was going on for quite a significant amount of time, both by SSI and Staff.

How can we assure it doesn't happen again?

MR. RINKER: Mike Rinker, for the record. So there were some regulatory oversight lessons learned. With that, there was some -- and industry has also learned from that event, what happened at Shield Source.

And I think we can see that what SRB was required to do, but they voluntarily increase the frequency to have a third party annually come in and make sure that they are their stack is performing and their monitoring of their stack is being then as they expected it and as they are reporting.

In addition to that, we now have a IEMP, Independent Environmental Monitoring Program for which we have two years of monitoring data, which we have done independent to the SRB program and we will probably be back in Pembroke again later this year to relook at this facility.

And the third line of evidence is the research that was done on tritium cycling in the environment often focused on the SRB facility in the past and in more recent years. SRB has been very cooperative to allow us to grow vegetables and grass next to their stacks

and to really try to understand how tritium is cycling in the environment in this area.

So I think as a regulator we have a body of knowledge that has improved. As a licensee they have taken lessons learned from that experience and the independent monitoring by both the CNSC and that SRB is employing will avoid this sort of mistake.

THE PRESIDENT: Thank you. One other question. The intervenor on his page 5 argues that SRBT is exporting material all over the world, including to such countries as Iran, and do not seem to be carefully tracked or accounted for.

So first question is, are you shipping to Iran? And secondly, would you track this?

MR. LEVESQUE: Stephane Levesque, for the record.

No, we used to have a permit to ship to Iran when it was part of the community, and we did ship some lights that were used for compasses. But that was a number of years ago. And since then, the relations with Iran has ceased, and we haven't made an application to renew that permit, as we are not looking to supply them anymore.

THE PRESIDENT: Staff?

MR. AWAD: Raoul Awad, for the record.

Actually in 2005 we issued a licence for SRB to export to Iran about I think 70,000 signs. And these 70,000 signs have almost half gram of tritium. But, as I said in the beginning, this tritium in dispersed form is not useable for nuclear weapons. You need a lot of technology to remove it and make it available. And the threshold really to be useable is beyond three grams of...

And for the question, yes, we are monitoring every shipment, we have prior shipment notification, we have -- depending on the licence, sometimes we have -- after the licence report we have annual report and we are tracking all the shipments that SRB is doing.

DR. EDWARDS: So I gather that CNSC knows exactly where those 70,000 signs are inside Iran?

MR. AWAD: Raoul Awad, for the record.

No, it is not what I said. I said, we send 70,000, but we are tracking by country where the export is happening.

THE PRESIDENT: You are also saying that you do not have a security or a weapon concern about that shipment. Is that what you are saying?

MR. AWAD: Exactly. Because .5 grams is very low. And in dispersed form, which makes it unusable for any nuclear weapon application.

DR. EDWARDS: I would like to challenge that statement just on the record. I don't have a reference for it, but tritium is tritium. There is no such thing as enriched tritium or non-enriched tritium. Tritium is tritium.

MR. AWAD: Raoul Award, for the record. There is a difference between the dispersed form of tritium which is used in the light sources and the pure tritium used in the nuclear weapons.

To get the pure tritium from the dispersed form there is a very complicated technology which is still theory, nobody did it until now.

THE PRESIDENT: Okay. Questions anybody? Okay, Dr. Edwards.

DR. EDWARDS: Thank you very much. And so I will just conclude by saying one thing.

THE PRESIDENT: Okay. Just one minute, I think Mr. Levesque wants to say something here.

MR. LEVESQUE: I am sorry, I just want to make sure I clarify something, I am sorry, but they weren't exit signs, they were small lights, basically the end of your pencil eraser, and they were used in compasses. I just want to get that clarified because that is actually what it was.

Thank you.

THE PRESIDENT: Dr. Edwards, over to you.

DR. EDWARDS: Okay. I do believe that in order for the public to have confidence in nuclear power and in the Canadian Nuclear Safety Commission, I think they have to see that the Staff is not speaking the same language as the licensee.

And unfortunately time and again, and today is a good example once more, it seems that the attitudes of the Staff towards chronic exposures to radioactive materials is virtually identical to the attitude of the licensee. What does it matter? It is just a chronic exposure to a carcinogen. What's the problem?

I don't think that is an appropriate attitude for a body which is supposed to be representing the public health and safety. I think that their attitude should be this is a problem, we don't want to have chronic exposure to -- unnecessary exposure to a carcinogenic material.

So I think that until the public can see that there is a clear distinction in attitude between the regulator and the licensee that the CNSC will continue to lose ground as a credible regulator.

THE PRESIDENT: Thank you. We would like to continue and move on to the next submission.

MR. LEBLANC: Yes. So we just want to

verify if Dr. Judith Deutsch is in the room. We've been trying to reach her all day, she was the next intervenor. If not, her intervention will be treated as a written submission.

We are now at the stage of going through the 38 written submissions that we have because that also includes one from Mr. Zach Ruiter who had been scheduled to present today and who informed us that he was not able to do so and that we should consider his submission as a written submission.

But if you allow me, Mr. President, I understand that Dr. Newland wanted to clarify a statement he made earlier with respect to the Participant Funding Program.

Am I right, Dr. Newland?

MR. NEWLAND: Yes.

MR. LEBLANC: Please proceed.

MR. NEWLAND: Thank you. Yes, I would just like to clarify my remarks regarding the availability of PFP funding for the review of CNSC's annual reports.

Currently PFP funding is not available for those reports, however, we are undertaking on an ongoing basis evaluations of the PFP Program to ensure we are improving the Program and we are considering the possibility of using the program for such annual reports.

Thank you.

THE PRESIDENT: It was my understanding, however, that any time somebody can apply for a research/analysis kind of application to the Program and it will be considered, because I thought at one time we were imploring some university faculties to apply to the Program.

Am I right?

MR. NEWLAND: Dave Newland, for the record. To date we have not permitted that for our annual reports.

THE PRESIDENT: No, but for any study of some sort, not necessarily associated with an application. You're not familiar with that? Okay. Anyhow...

MR. NEWLAND: Yes, I think you're right.

THE PRESIDENT: You'll have to review that.

Okay, Marc...?

MR. LEBLANC: Yes. If you allow me, I'm going to go through the list of written submissions starting with the one from Mr. Zach Ruitter, that would be 15-H5.5.

THE PRESIDENT: I have to find it.

CMD 15-H5.5

Written submission from Zach Ruiter

MR. LEBLANC: And ask the members if you have any questions for staff or SRBT on this intervention.

THE PRESIDENT: Go ahead.

MEMBER VELSHI: Question for SRBT. Is this, as the intervenor says, a technology that is quite obsolete or is this a growing market with a whole lot of potential applications? Where do you see your company going in the future?

MR. LEVESQUE: Stephane Levesque, thank you very much for the question.

We obviously see it as a growing market. There's a lot of applications that used to use LED lights or electrical lights that have problems with having condensation due to water and things like that where they don't want to use any power source or create a spark, like in an airplane.

There's also a lot of military applications for illumination where our product doesn't generate any heat so it can be detected by heat-seeking equipment.

We're only a small company so we don't have a lot of marketing behind us, but we see that if we

were able to spend more on that it would be a much more growing company.

MEMBER VELSHI: And so what are you constrained by right now from growing; is it just your natural growth rate or is it trying to find new markets, is it your production capacity and equipment constraints?

MR. LEVESQUE: Stephane Levesque, thank you very much for the question.

It's a lot of that. We don't have enough resources to be able to put it in marketing, to be able to go to the market anymore and it's steps that we're making, small steps, but we're one application away from finding a new way to use tritium light sources, like tritium exit signs.

Thank you.

THE PRESIDENT: Anybody else? Mr. Tolgyesi...?

MEMBER TOLGYESI: Just one. Can you just tell me, just estimate, in the world market, are you a big player, small player because it will determine also if you have potential to grow?

MR. LEVESQUE: Stephane Levesque, for the record. I understand and in the -- we have three parts to our business.

We have the emergency lighting, which is

the exit sign. From what I understand, we're about three per cent of the market in that respect in North America. We're relatively untapped in Europe for signage.

Regarding aerospace, if you talk about emergency or evacuation exit doors, we're probably at about 75 per cent of the market, but still a little bit to grow with new. So pretty well next time you fly in a plane, more than likely it will be our signs and ones that were made by our competitors are no longer in business.

Regarding military, it's new applications that come every day and it's really hard for that one for us to quantify how many more illumination devices there is, how much proportion of the market we have.

MEMBER TOLGYESI: And who are the main, I'll say, competitors, from where?

MR. LEVESQUE: Stephane Levesque, for the record. Competitors, in each market they would be different. They would use either a photo-luminescent based product and there's been problems associated with that, a LED product or an incandescent light product.

So there's different technologies, but they all require either wiring, battery. And you can think of applications like in a mine where it's really hard to get wiring into, a place that handles chemicals where a spark could generate a major fire, or like I said, the

military generating heat, you can be detected, or aerospace to have more wiring runs just creates more problems in qualifying the plane.

So there's different technologies other than the competing ones and sometimes when people have been using those and find out about our product, they say, I didn't even know this existed because maybe to us today we've been talking about tritium lights and it seems familiar to us, but when you talk to people in the general population about tritium lights, there's not many people out there that are aware that that technology exists.

THE PRESIDENT: But I thought the question was, are there any other company that produces tritium-based lights.

MR. LEVESQUE: Stephane Levesque, for the record. Sorry, I didn't understand the question.

There's a company in Switzerland that produces tritium lights, but their market is focused more on using tritium lights for applications like watches and gun sights. They're not producing any exit signs, aircraft products or products for the military.

THE PRESIDENT: Where do they get their tritium from?

MR. LEVESQUE: My understanding is they get it from Canada.

MEMBER TOLGYESI: You were saying that you're quite present in the aerospace -- in the airplanes. Lots of airplanes in North America, they are maybe half Boeing and half they are coming from Europe. Are your products used also in the airplanes fabricated in Europe?

MR. LEVESQUE: Thank you for the question. Stephane Levesque, for the record.

About 90 per cent of our products are shipped outside of Canada, mostly to the U.S. and U.K. If you just look at the aerospace products which, again, is about a third of our business, I would say that Bombardier is pretty well one of the only Canadian manufacturers, De Havilland, the rest is sent all over the world.

THE PRESIDENT: Okay, thank you.

MR. LEBLANC: So the next submission would have been a submission from Science for Peace or Dr. Judith Deutsch. It's at CMD 15-H5.12.

CMD 15-H5.12

Written submission from Dr. Judith Deutsch

THE PRESIDENT: Monsieur Harvey...?

MEMBER HARVEY: Well, there was only one sentence. In the third paragraph, the middle of the third paragraph at the end:

"There is evidence that the CNSC failed to regulate, to report tritium levels, to adhere to subsequent scientific findings...", et cetera.

So could you just comment on that?

MR. NEWLAND: Dave Newland, for the record. I think the evidence is there that we did regulate and that we took regulatory action, as we showed during our presentation, at various points during the life cycle of the plant.

So I reject that.

THE PRESIDENT: Okay. I've tried to avoid it a couple of times, but I think I'd like some staff view about the ongoing, where we hear a conspiracy theory between the IAEA and the World Health Organization, this is in the fourth paragraph.

"...the IAEA effectively gagged WHO on matters of health in the presence of ionizing radiation."

We've been hearing this idea that the WHO is controlled by the IAEA.

DR. THOMPSON: Patsy Thompson, for the record. There's actually an earlier intervention that has actually, has put in the agreement, it's intervention 15-H5.9A and essentially it's an agreement for

collaboration between the IAEA and the World Health Organization.

I wouldn't qualify this as a conspiracy. The CNSC and many other organizations have memorandum of understanding or agreements. We have one with Health Canada, for example, Environment Canada and others.

WHO has done a number of studies on the health effects of radiation. The IARC, the International Agency on Research for Cancer is under the WHO, they have declared radiation to be a carcinogen. They've done studies on Chernobyl, on Fukushima, on radon and on many other aspects.

So I think the WHO has played the leading role in terms of science in relation to radiation effects.

THE PRESIDENT: Thank you.

MR. LEBLANC: So the next submission is from Mr. Jeff Brackett, CMD 15-H5.6.

Any questions?

--- Pause

MR. LEBLANC: So the issues raised have already been addressed with earlier interventions.

The next submission is from Cheryl Gallant, MP for Renfrew, Nipissing, Pembroke at 15-H5.13.

--- Pause

MR. LEBLANC: The next submission is from

Terry Lapierre, Chief Administrative Officer, the City of
Pembroke, CMD 15-H5.14.

--- Pause

CMD 15-H5.14

Written submission from

**Terry Lapierre, Chief Administrative Officer, the City of
Pembroke**

THE PRESIDENT: I'd like to hear from SRB
whether the Municipality and the water and the sewage
section and the health has ever expressed any concern with
you people.

MR. LEVESQUE: Stephane Levesque, for the
record. Thank you for the question.

In 2010 there was an individual that
worked at the water waste facility for Pembroke that
expressed some concerns and the concerns were heard by I
think the Ministry of Labour for Ontario and although we
weren't asked to go in the proceedings, we took part and we
proposed to actually do additional monitoring to show this
individual that he wouldn't be exposed to any significant
risk.

We did that and it satisfied the Ministry
of Labour and the City of Pembroke.

And we also had an information session with all the workers at City Hall back around the same time in 2010 and there hasn't been any concerns expressed since.

THE PRESIDENT: So when you make a presentation to the Pembroke Council, is it open to the public?

MR. LEVESQUE: Sorry, Stephane Levesque, for the record. Yes, it is and we always do it also when it's televised on a local television channel and they do that, you know, at certain intervals and we make sure that it's televised.

We advertise it on our website and, yes, it's open for members of the public to take part.

THE PRESIDENT: Thank you.

MR. LEBLANC: The next presentation is from the Mayor of the City of Pembroke, Mr. Michael LeMay, CMD 15-H5.15.

--- Pause

MR. LEBLANC: The next presentation is a written submission from the Security Company, CMD 15-H5.16.

CMD 15-H5.16

Written submission from the Security Company

MR. LEBLANC: Dr. McEwan...?

MEMBER MCEWAN: Sorry, just the mock fire scenario that he mentions. You briefly alluded to it in your presentation. How much of a stress of the whole emergency system do you think it was; was it very rigorous, was it -- did it bring up any major flaws?

MR. LEVESQUE: Bring up any...?

MEMBER MCEWAN: Major flaws or major issues?

MR. LEVESQUE: Thank you very much. No, it didn't. Our response and regulatory requirements we met, but we identified -- we had a lot of staff that were involved who also had been independent evaluators for the City of Pembroke and we identified 38 minor areas of improvement and a lot of those have already been completed, but there's nothing major in it, we can say it was a success.

MEMBER MCEWAN: So a couple of examples of the minor areas?

MR. LEVESQUE: Stephane Levesque, for the record. Yes, I think one of the main ones was during the exercise people that were at the facility, myself, the incident commander and others that were at the facility handling the emergency were communicating back with others that were being directed to a marshalling area through cellphones and in case there was a problem in

communication, we realized and the CNSC staff also made that recommendation that we should use two-way radios instead. So we since purchased two-way radios to do that.

Another thing was, as we were leaving the facility we didn't have with us a map of the facility to be able to show the responders. Although these responders had toured the facility on several occasions, it would have been easier to show them to a map, it's right here.

And that's two of the main ones I can say.

MR. LEBLANC: The next submission is from the Algonquin College, CMD 15-H5.17.

CMD 15-H5.17

Written submission from Algonquin College

THE PRESIDENT: What is the nature of your support to the Algonquin College Radiation Program?

MR. LEVESQUE: Stephane Levesque, for the record. We do various initiatives with them. If you don't mind, I'll pass this to Jamie MacDonald.

MR. MacDONALD: So Jamie MacDonald, for the record. Our partnership with Algonquin College is long standing.

We've had a member on the Advisory Board for the Program for Radiation Safety. It's a unique

program at the College and so we've worked collaboratively with Algonquin College to make sure that issues pertaining to radiation safety for a facility such as ours are considered when they're developing their programs.

We've also hired summer students that have graduated from the Program. And as you can see with the submission, we've even gone to the length of donating scintillation counters.

MR. LEBLANC: The next submission is from Colleen Sauriol, Planning and Building Department, City of Pembroke, H5.18.

--- Pause

MR. LEBLANC: The next submission is from Josef Allen, CMD H5.19.

--- Pause

THE PRESIDENT: This intervenor has a very strong view about some of the criticism. In here they -- go ahead.

MR. LEBLANC: The next submission is from the Pembroke Fire Department, H5.20.

--- Pause

CMD 15-H5.20

**Written submission from
City of Pembroke Fire Department**

MR. LEBLANC: Mr. Tolgyesi...?

MEMBER TOLGYESI: It's related to fire department. When you do your fire drills and emergency exercise what you did, in the building there are some other enterprises, you are not the only one. So are these other ones included in your emergency drill or fire drill and to what extent, because you have 250 metres there are private two houses, to what extent -- how it extends, your emergency exercise?

MR. LEVESQUE: Stephane Levesque, for the record. Thank you very much.

I'll answer in two parts. First, the fire drills. Regarding the fire drills, there's no involvement from any other members of the community, but the next fire drill that we have, we will be posting it on the website so that people are aware in the community, if they see a fire truck at the facility, what's happened.

Regarding the emergency exercise that we had, it was our first one. What we did is Vice-President Ross Fitzpatrick and myself went and met all the agents and businesses in the community to discuss with them that we

were going to do this.

We also mailed and went door-to-door to the homes within -- the homes and facilities within 500 metres of the facility and basically put out a public notice to say that we were going to do an emergency exercise. We posted it on our Facebook page and obviously everyone within the Fire Department was aware.

So for this first involvement we didn't require anyone else to evacuate their facilities, we just made them aware that we were going to conduct it on that day.

MEMBER TOLGYESI: So they were informed but not participating?

MR. LEVESQUE: Stephane Levesque, for the record. That's correct, for this first exercise.

MEMBER TOLGYESI: Do you expect that you will involve them eventually?

MR. LEVESQUE: Stephane Levesque, for the record. Yes, it's something that we've talked internally about and we think that the next exercise that we plan, we will involve our neighbours as part of the exercise.

MEMBER TOLGYESI: Did staff participate or observe some of this emergency exercise?

MR. CALLIGHEN: Hello. Mike Callighen, for the record. I am a Licensee Emergency Program Officer

with the CNSC.

Yes, we actually had a large contingent of CNSC staff there, as typical for exercises so we can observe from several vantage points. So yes, we did observe the exercise and I concur with the statements of Mr. Levesque.

THE PRESIDENT: While I'm on the subject, did anybody also check to see that the security of the facility is adequate?

MR. AWAD: Yes. We had a security inspection recently. There was an arrangement between SRB and the local police. Now, this arrangement is moving to SRB and OPP, Ontario Provincial Police, because there is no more Pembroke police and they are now I think negotiating, them or you, which governs the intervention of the police in their facility.

Maybe Mr. Levesque could give more information about it.

THE PRESIDENT: Go ahead, please.

MR. LEVESQUE: Stephane Levesque, for the record.

It's important to understand this transition. A lot of the police officers for Pembroke actually moved over to the OPP. So a lot of these officers are familiar with our facility.

Nonetheless, we recently met the staff sergeant for the Pembroke contingent. He visited our facility and had a full plant tour. We asked him if we could have an MOU with them as we did with the Pembroke police before. A couple of weeks ago we were told that they had a draft that was going to be sent to us any day. After we see that draft we will be working with them on completing that, after which we will give a tour to all the officers, including those that have been at our facility before.

MEMBER TOLGYESI: In case of a real fire, not a drill fire, the firefighters, they are using high pressure water jets. Could it break or make damage to your tubes and eventually have a radiation or could they be exposed to radiation?

MR. LEVESQUE: Stephane Levesque, for the record.

The firemen, when and if they were to fight a fire at our facility, they would use a self-breathing apparatus. So the dose that they would get as a result of fighting a fire would be little to zero.

But nonetheless one of the actions that we have identified during the emergency exercise is that as the fire department entered and they noted that there were a number of lights that people had been working on to glue

on our signs, and so on and so forth. And it was noted by one of the firemen that if they were to combat a fire that could break some of the light sources. So one of the actions that we took was to basically have storage units where the least amount of lights possible would be left on the floor while we are working, so it's something that we are looking at.

CMD 15-H5.21

Written submission from Isolite

MR. LEBLANC: The next submission is from Isolite, H5.21.

THE PRESIDENT: So what is the nature of the relationship between you and Isolite?

MR. LEVESQUE: Stephane Levesque, for the record.

To understand the relationship, first I have to explain that Isolite and then Shield Source are owned by the same group. So when Shield Source had their problems at their facility we had a meeting with the management and owners of Isolite and Shield Source to basically discuss that there was a possible way that we could supply them or their sales organization the exit signs that they required. One of the conditions and things

that were discussed is that what we wanted to make sure is that everything that happened with their decommissioning activities would be handled through all the regulations where they didn't leave the country. They had no intention of doing so anyway, but that was one of the conditions.

And also that they would basically open their doors and show us actually what went wrong had Shield Source so that we could learn from it, for example these emission discrepancies so that we could basically learn from that and incorporate that in our facility as lessons learned.

So basically if you look at today what the relationship is, they are just one of our very good customers and we have a great relationship with them because they actually know the business inside out having operated a facility for a number of years and sold those products.

THE PRESIDENT: Ms Velshi...?

MEMBER VELSHI: Did you hire any of their staff?

MR. LEVESQUE: Stephane Levesque, for the record.

The offer was there, but I guess being in Peterborough and far away from Pembroke it wasn't a possibility.

CMD 15-H5.22

Written submission from Main Street Community Services

MR. LEBLANC: The next submission is from the Main Street Community Services, H5.22.

THE PRESIDENT: Dr. McEwan...?

MEMBER MCEWAN: Thank you, Mr. President.

Sorry, I guess this sort of leads to a slightly broad question. How involved are you in community activities? As we go around we hear of sort of fairly broad involvement. Do you see that as part of your mandate, social mandate with the city and the region?

MR. LEVESQUE: Stephane Levesque, for the record. Thank you for the question.

I think that since Mr. Fitzpatrick and I have purchased the company from the then foreign owners, I think that we are two individuals that live in the Pembroke area. We have a vested interest in helping as many people as we can, you know, in as many different fronts as we can and if we can, you know, afford to do so we will do so and continue to do so in the future. It's not really related to us having a good profile in the community because we release a quantity of tritium, but it's just something that is dear to us, being guys from Pembroke and we wanted to

help us much as we can.

CMD 15-H5.23

Written submission from

Peter Emon, Warden of the County of Renfrew

MR. LEBLANC: The next submission is from Peter Emon, Warden of the County of Renfrew. It was probably Peter Emon. I apologize for that.

CMD 15-H5.24

Written submission from

Ron Gervais, Deputy Mayor, City of Pembroke

MR. LEBLANC: The next submission is from Ron Gervais, Deputy Mayor, City of Pembroke.

CMD 15-H5.25

Written submission from

John Yakabuski, M.P.P., Renfrew-Nipissing-Pembroke

MR. LEBLANC: The next submission is from John Yakabuski, M.P.P., Renfrew-Nipissing-Pembroke, CMD H5.25.

CMD 15-H5.26

Written submission from Harrington Mechanical Ltd.

MR. LEBLANC: The next submission is from Harrington Mechanical Ltd., H5.26.

CMD 15-H5.27

Written submission from A. Bucholtz

MR. LEBLANC: The next submission is from Mr. Bucholtz at H5.27.

THE PRESIDENT: So this intervenor argued that it should not be in a residential neighbourhood and I understand there is a whole new development being proposed nearby. Are they all aware of your operations?

MR. LEVESQUE: Stephane Levesque, for the record. Thank you for the question.

Yes, we have done a lot to notify, especially people within 500 metres of our facility. They have had on two separate occasions our pamphlet that I have discussed today.

They also would have been given that notice during the emergency exercise and we actually did some door to door activities to see as many people as we can and that is something we are going to continue to do in the future.

THE PRESIDENT: So the developer who is building the new residential subdivision, if I understand there is a new subdivision going on, are they informing everybody that, you know, you exist nearby?

MR. LEVESQUE: Stephane Levesque, for the record.

I'm not sure what discussions happen between the city and the developer.

THE PRESIDENT: The developer himself is aware?

MR. LEVESQUE: Stephane Levesque, for the record.

I'm not sure, to be honest. I don't know.

THE PRESIDENT: Thank you.

CMD 15-H5.28

Written submission from Garry Amyotte

MR. LEBLANC: The next submission is from Garry Amyotte, CMD 15-H5.28.

CMD 15-H5.29

Written submission from Steel Fire Equipment

MR. LEBLANC: The next submission is from

Steel Fire Equipment, 15-H5.29.

CMD 15-H5.30

Written submission from Monika Schaefer

MR. LEBLANC: The next submission is from Monika Schaefer, 15-H5.30.

THE PRESIDENT: Okay. Well, I guess I will bite.

So there is a statement, the fourth paragraph, a cucumber sample 4.8 km from SRB contained 117 Becquerels per litre OBT. How significant is that number?

DR. THOMPSON: Patsy Thompson, for the record.

Dr. Kwamena is just behind me. I believe she has it.

DR. KWAMENA: Dr. Nana Kwamena, for the record.

So that number comes from the info report that we put out from a research study that we did near SRB in 2008 and 2009 and we published that in the Environmental Fate of Tritium in Soil and Vegetation and in that report we calculated the dose as a result of this OBT to HTO ratio of 15.4. The doses that we calculated are a fraction of the public dose limit. It was .004 milliSieverts and so

this is well below the dose limits that are known to have healthy effects. This is obviously a theme that we have said a number of times throughout these hearings, that although we have these higher than expected ratios, the dose consequences are much below the public dose limit.

THE PRESIDENT: Okay. Would you eat this cucumber?

DR. KWAMENA: So as I stated, the dose consequences from eating this cucumber is well below the regulatory dose limit and, therefore, I would feel comfortable eating the cucumber.

THE PRESIDENT: Thank you.

CMD 15-H5.31

Written submission from

International Physicians for the Prevention of Nuclear War

MR. LEBLANC: The next submission is from the International Physicians for the Prevention of Nuclear War, CMD 15-H5.31.

MEMBER VELSHI: I just want to get this correct for the record. The second sentence in there says that this company on numerous occasions has imported more radioactive tritium waste from Britain, Russia and the U.S. than was allowed. Can you comment on that, please?

MR. LEVESQUE: Stephane Levesque, for the record.

I got the same thing, Mark. Thank you very much.

The things that we have imported from Britain and Russia and the U.S. were all done with import licenses describing exactly what we were importing. I don't -- I am assuming that the reference to radioactive waste means product that's expired. I know that from the British Ministry of Defence we have received product from their military that was expired and that we have replaced and used the parts that we could. Russia, I don't ever remember importing any products from Russia. The only thing that we have ever imported was a tritium container because that is another supplier of tritium.

In the U.S., yes, we have imported, you know, expired exit signs and product from the U.S., but never have we ever gone over any of those import licenses and we have reported that to CNSC, based on what the requirements were at the end of the year or at the end of the license term.

Thank you.

MEMBER VELSHI: Staff, do you have anything else to add to that?

MR. AWAD: Raoul Awad, for the record.

No, but just to mention that all the imports and exports are very carefully monitored.

THE PRESIDENT: You know, that really causes me a problem. This is an Associate Professor of Clinical Science at the Northern Ontario School of Medicine, so where does he get this stuff? Any idea?

MR. AWAD: Raoul Awad, for the record.

We usually publish in our annual report how many export and import licenses we have and SRB publishes from time to time what they are importing and exporting and just looking to all this information you can construct pieces -- from this information you can construct any theory.

THE PRESIDENT: Dr. McEwan...?

MEMBER MCEWAN: And again, just to be absolutely clear that I understand this correctly, in the last paragraph, the first sentence of the last paragraph he says:

"SRB should not be recycling or reclaiming tritium gas." (As read)

I am clear, you are not reclaiming the gas. You are perhaps recycling the lights themselves?

MR. LEVESQUE: Stephane Levesque, for the record.

That's correct. If you don't mind, if I

can maybe answer a bit your question of where this individual may or may not be getting this information is -- and I brought it with me today if you want to have it on record, but this is the type of pamphlet that is being distributed in the neighbourhood right next to SRB that makes these same type of claims and it's signed and it's listed by, you know, "Contact Ms Kelly O'Grady". And I would welcome the Commission to have a copy of it so that they can see it.

THE PRESIDENT: Well, since you mention it, it will be part of the record I assume. So is it stated exactly the same kind of --

MR. LEVESQUE: It's very similar. So if I give you a copy of it, because I like to --

MS O'GRADY: (Off microphone).

MR. LEVESQUE: -- I would like to retain the original, but it is -- it does say "For more information contact Kelly O'Grady".

So I didn't ask directly if she sent it out to the neighbourhood, but I know that her name is on it. You can have a copy. I don't think it's totally different than what the submissions you have been given.

MS O'GRADY: The information is (off microphone).

THE PRESIDENT: We have the CMDs right in

front of us.

MS O'GRADY: (Off microphone).

MR. LEVESQUE: Stephane Levesque, for the record.

The pie chart is actually exports, not imports. That is actually in our annual compliance report and discussed at length. It talks about our exports and it's actually our products. This talks about importing waste.

THE PRESIDENT: Okay, thank you.

CMD 15-H5.32

Written submission from Ken Collier

MR. LEBLANC: The next submission is from Ken Collier, CMD 15-H5.32.

CMD 15-H5.33

Written submission from James Deutsch

MR. LEBLANC: The next submission is from Dr. James Deutsch at 15-H5.33.

CMD 15-H5.34

Written submission from

Coalition for a Nuclear Free Great Lakes

MR. LEBLANC: The next submission is from Coalition for a Nuclear Free Great Lakes, CMD 15- H5.34.

CMD 15-H5.35

Written submission from Kelly and Roger Goldberg

MR. LEBLANC: The next submission is from Kelly and Roger Goldberg, CMD 15-H5.35.

MEMBER MCEWAN: So Johnson Meadows, is that that subdivision that is immediately behind and across the -- I think it's called the International Road?

MR. LEVESQUE: Stephane Levesque, for the record.

Yes, it is.

THE PRESIDENT: Well, they claim they have been living -- they say they have been living there for 15 years, so that's not a new subdivision; right? So they have no concern with living there for 15 years. Okay.

CMD 15-H5.36

**Written submission from
Community Living Upper Ottawa Valley**

MR. LEBLANC: The next submission is from
Community Living Upper Ottawa Valley, CMD 15-H5.36.

CMD 15-H5.38

**Written submission from
Canadian Nuclear Association**

MR. LEBLANC: The next submission is from
the Canadian Nuclear Association, 15-H5.38.

CMD 15-H5.37

Written submission from Darlene Buckingham

MR. LEBLANC: I probably missed one. I
missed 15-H5.37, which was a written submission from Ms
Darlene Buckingham.

So were there any questions with respect
to the submission from the Canadian Nuclear Association?

CMD 15-H5.39

Written submission from Seiler Instrument & Mfg Co., Inc.

MR. LEBLANC: The next submission is from Seiler Instrument & Mfg Co., Inc., 15-H5.39.

CMD 15-H5.40

Written submission from James Penna

MR. LEBLANC: The next submission is from Mr. James Penna, 15-H5.40.

CMD 15-H5.41

Written submission from Ed Jacyno

MR. LEBLANC: The next submission is from Mr. Ed Jacyno, 15-H5.41.

CMD 15-H5.42

Written submission from BETALIGHT B.V.

MR. LEBLANC: The next submission is from BETALIGHT B.V., 15-H5.42

CMD 15-H5.43

Written submission from Gilles Provost

MR. LEBLANC: Le prochain mémoire a été déposé par M. Gilles Provost, CMD 15-H5.43.

CMD 15-H5.44

Written submission from Dorothy Goldin Rosenberg

MR. LEBLANC: The next submission is from Dorothy Goldin Rosenberg, CMD 15-H5.44.

CMD 15-H5.45

Written submission from Siegfried (Ziggy) Kleinau

MR. LEBLANC: The next submission is from Mr. Ziggy Kleinau, CMD 15-H5.45.

MEMBER MCEWAN: Again, I just want to be absolutely clear, perhaps from staff, paragraph 4:

"Much of the company's production is exported with those ... lights eventually falling into the wrong hands."

Is there any evidence that that is happening, if indeed there are wrong hands?

MR. AWAD: Raoul Awad, for the record.

There is no evidence. There is no -- and we know who -- what the end-user -- it's one of the conditions of the license, the end use of it. And, as I said in the beginning, it is dispersed form. Even if it will go to the wrong hand there is no use for it.

MEMBER MCEWAN: Thank you.

CMD 15-H5.46

Written submission from Jo Hayward Haines

MR. LEBLANC: The last written submission is from Ms Jo Hayward Haines at CMD 15- H5.46.

So, Mr. President, you may want to proceed with the last round of questions.

THE PRESIDENT: Okay. So we will move to the final round and starting with Ms. Velshi.

MEMBER VELSHI: Thank you, Mr. President.

So over the last few years, the last licensing period, you have hired a whole lot of new people. There have been a number of changes to various programs. In fact, pretty much your entire program seems to have gone through massive changes and I just wondered how you were managing the change. And would you term that your whole managed system and the programs underneath, at what stage

of maturity are they today?

MR. LEVESQUE: Stephane Levesque for the record. If you -- if you look, I think, on the submission of -- I'm sorry, on our written submission on page 9 of 72. And you can see there our -- all our document and management systems. There is a number of those programs, I would say about half, that have undergone significant changes in the last couple years, but the other half, I would say, are really mature and have been there for a long time. The half that's undergone significant review is mainly as a result of the -- the new regulatory standards, the CSA standards, and new regulatory documents that have been issued.

MEMBER VELSHI: Right. And I know, so in slide 17 you actually list all of those that -- that have changed and my question was how are you managing the change given also all the new staff that you have brought on board in the last little while?

MR. LEVESQUE: Stephane Levesque. Thank you for the question. We have a number of core staff that have about 20 years' experience at the facility and those staff have really mentored and helped with the new staff coming on board. And I think I mentioned in my submission that we have a lot of committee meetings. A lot of the new staff have an integral part in each committees, to

basically be part of the change. So staff at all levels is basically involved with the changes, but we always have somebody with a lot of experience with them to help them through it.

MEMBER VELSHI: So my experience has been that you actually go through a formal change management process, part of your management system to make sure that nothing falls through the cracks and I just wondered if you were approaching this in a systematic manner.

MR. LEVESQUE: I'll ask Jamie MacDonald to complete the question.

MR. MacDONALD: So, Jamie MacDonald for the record. One of the key CSA standards that we're moving towards implementation is obviously N286-12. We performed a gap analysis against our current management system at that time against those requirements and submitted to CNSC staff actually as part of the licence application an implementation plan in order to comply with all the clauses that apply to us. That plan currently takes us out till, I believe, the end of 2016, when we expect to have closed all those gaps.

We do, for the list of programs that are undergoing change right now, virtually the same strategy. So for the training program, it's the -- the same principle. We look at the new regulatory document 2.2.2.

We assess where we're at as a company and where the gaps lie, and we develop a plan in order to close those gaps in the most controlled and safe fashion that we -- that we can.

MEMBER VELSHI: Staff, do you have anything to add to the changed management discipline?

MR. NEWLAND: Dave Newland for the record. I just make the observation that they are transitioning to the CSA standard. The rate at which they have changed for a small company I think is appropriate. And I would also add that where they brought in people, they have been at relatively senior positions, and so it wasn't being sort of like a major reorganization that would really require such a formal methodology such as that.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Monsieur Harvey.

MEMBER HARVEY: Just one question, it has been touched a while ago. It is about the monitoring equipment to perform a validation of the tritium-in-air sample collection system (bubblers). "For the next licensing period, SRB has committed to annual third party validation as a result of operating experience from industry peers." So is it a new request from the staff or you decide that by yourself to add yearly independent validation?

MR. LEVESQUE: Stephane Levesque for the record. As a result of the issues that happened at Shield Source with respect to monitoring your emissions, we're the ones that basically developed a plan that included those yearly verifications. We were always doing it every two years, but we thought that doing it yearly will probably add another level of certainty on our emissions.

MEMBER HARVEY: It hasn't been initiated by a request from the staff?

MR. LEVESQUE: Stephane Levesque for the record. No.

MEMBER HARVEY: Comments about that?

MR. RINKER: Mike Rinker for the record. It's correct, there is a number of areas throughout SRB's programs where they have voluntarily gone the extra step. One of those examples we've put in our CMD where we put, "Their Fitness for Service is fully satisfactory," where they have implemented a CSA standard for nuclear power plants in a graded approach way that was not a requirement but -- but certainly is a step forward to try to do the right thing and this is another example.

MEMBER HARVEY: Merci.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Thank you, Mr. President. On slide 21, I don't think you need to

look at it, you identify all your committees, and you have a Workplace Health and Safety Committee. Do you have people from all across the company represented on that committee? Sort of people from the shop floor all the way up.

MR. LEVESQUE: Stephane Levesque for the record. Yes. Yes, we do. We have people that are at all different levels of the organization.

MEMBER MCEWAN: So if -- if one of the people who work in your facility feels that they are being asked to do something unsafe, that -- or something that they're uncomfortable with, are they able to refuse that job until it's been discussed with either you or with the Health and Safety Committee? Do they have the ability to rapidly escalate an issue if they don't feel it's been resolved? Recognizing you're a very small company.

MR. LEVESQUE: Stephane Levesque for the record. I say definitely and that's part of the reason why we've had only one lost injury incident. We started ourselves working on the shop floor and we understand the -- how important it is for us to be listening to the staff because they're the ones doing the job every day, so, yes, they have full means and autonomy to do that as part of the committee.

THE PRESIDENT: Thank you.

Monsieur Tolgyesi.

MEMBER TOLGYESI: Merci, Monsieur President.

On page 15 you are saying that you decided to create a new position of compliance manager, who is reporting directly to the president. Now, on page 13 is organizational chart, he is not responding to the president but he's responding to the vice president, as any other director. Is there something which is ...

MR. LEVESQUE: Stephane Levesque for the record. I'm sorry for the confusion in that. That's a mistake on my part. When I say directly to the president, I -- I actually meant senior management, which is comprised of myself and Ross Fitzpatrick, the vice president. So, she reports directly to the two of us.

THE PRESIDENT: We're going in a circle here. Ms Velshi.

MEMBER VELSHI: Is your operation, like, a 40 hour week operation? Like ... What are your operating hours?

MR. LEVESQUE: Stephane Levesque for the record. Each employee works 39 and a half hours plus overtime if need be, but there's different -- there's three different shifts at the facility that make it so that from Monday to Thursday people operate between 7:00 a.m. and

7:00 p.m. On Friday currently during summer hours, we call it, we operate from 7:00 to 4:00 p.m., but during the winter that would go back 7:00 to 6:30, I think - it's 6:30? Yeah, 6:30 on Friday.

MEMBER VELSHI: And you shut -- you shut down your production when there is precipitation. So how many hours a week on average would that be or hours a month?

MR. LEVESQUE: Stephane Levesque for the record. That's probably why it was easy for us to ask customers to give us letters of support and they understand basically our operations because we've had some orders late because we've had to stop operating during periods of precipitation. There's been some weeks where we've had very little processing occur. It's happened sometimes during certain periods, but we can manage to meet all our requirements over the course of the year. Originally when we imposed that we weren't sure where it was going to lead us, but we're definitely able to manage it.

MEMBER VELSHI: But if you were to track that as your percentage of time you're shut down because of weather, what percentage of your regular operating hours would that be?

MR. LEVESQUE: Stephane Levesque for the record. We don't track it like that because it's really

not a concern of us right now. But if I was to just give you a gut feel, I would say 75 percent, prorating of the time. And that's just a gut feel really.

THE PRESIDENT: Thank you.

Monsieur Harvey.

MEMBER HARVEY: You're a small company, and reading your submission, you -- you hold something like 91 committees last year, which make every three -- three days, and I suppose the same people appears to many of those committees. And how do you manage that? And do you have minutes produced for each committee, and to what extent some of those minutes can be open to the CNSC staff?

MR. LEVESQUE: Stephane Levesque for the record. Thank you for the question. We've been able to manage having the increased number of committee meetings simply because we've actually looked at it. We try to not have one person on too many committees, as to not overburden them with it. We have somebody that's fully dedicated to taking minutes on the committee and that's their -- part of their full-time job is to do that. The minutes are very extensive. They include findings from the previous meetings, discussions from that meeting with actions. Everyone gets to sign and review those meeting notes afterwards to make sure they're acceptable to them before they're formally issued. And they're posted on the

board within the facility for everyone to see. And that's the first thing we grab when CNSC staff comes for inspection because a lot of the things we discuss in improvements or problems are all documented in those meeting minutes.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Thank you, Mr. President.

Again, just on staffing, to keep -- to keep the theme, on page 15 you note that you created a new position of Manager of Health Physics and Regulatory Affairs. I'm surprised that that position came so late and I'm surprised that you weren't demanding a position like that much earlier in the process given the issues of the past.

MR. LEVESQUE: Stephane Levesque for the record. When I spoke about committees, one of the things I spoke of initially in the presentation was the Health Physics Committee. And I think Mr. Harvey was asking me how many people were looking after health physics issues and I answered seven. Initially I would say not this licence but the licence before, seven years ago, we had four people on this committee that had the most experience working at the facility and most experience in health physics, including myself, the vice president, and two other members of our staff with experience, one of which is

the compliance manager. I think that what we found is that as the company started growing we added a fifth and a sixth member, and we basically as senior management, Ross and I, saw the need to really have somebody that would act more as a coordinator between the tasks that these seven people were performing. So there's still tasks performed between the seven of us, but really Jamie really acts as the coordinator. It's something that I or Ross wasn't able to do anymore as part of management. It was better to have somebody solely dedicated for that. So, that's why we were able to manage it for so long in that way.

MR. MacDONALD: Jamie --

MEMBER MCEWAN: Do you have the independence you need to do the job?

MR. MacDONALD: Jamie MacDonald for the record.

Thanks for the question, and, yes, I certainly do. Stephane and Ross' door is open all the time and they have taken any suggestion that I have ever put forth in the realm of health physics, and the team as a whole have complete licence to make recommendations and changes where we see fit to make that radiation doses are as low as reasonably achievable.

MR. RINKER: Mike Rinker for the record. So I would concur that the -- the work -- or the job of

what Mr. MacDonald does now was shared and was completed in the past, but, as in a number of areas, SRB did an organizational chart review a number of years ago and recognized some key positions that would supplement how they would implement their programs and what you see here is a result of that.

THE PRESIDENT: Mr. Tolgyesi.

MEMBER TOLGYESI: On page 17 you -- you are talking about committee meetings, 91 altogether, but -- so you mentioned specific committees, but there is something other and that is the highest number of meetings. What's that other?

MR. LEVESQUE: Stephane Levesque for the record. I totally understand the question. It's these meetings that really don't fall in another category. Because sometimes we sit there and we say -- because it's four of us, it's not necessarily about waste, it's not necessarily about this, let's call this a other committee meeting. It's one that doesn't really fall within the other categories, but it's more or less controlled in the same way, with meeting minutes taken by the same individual, as discussed, having actions and having reviews just like all the other ones, and they're also posted.

THE PRESIDENT: Ms Velshi.

MEMBER VELSHI: In your slide on

performance assessments, you mentioned that in the last licence period OPG conducted three audits. So as your supplier, what was the scope of their audit? And does it overlap with what the CNSC may be looking at as well?

MR. LEVESQUE: Just one moment.

Stephane Levesque for the record. Sorry for taking a little bit of extra time. I didn't want to miss anything. During those three audits what was reviewed is listed on page 21 of our written submission. It was our operating licence to make sure that we had a valid operating licence to process and possess tritium; our operating procedures involving tritium; our inventory control records; the storage, use and handling of the isotopes; the training activities; the physical security measures that we took at the facility; the staff monitoring procedures, and the instrument calibration and tritium accounting. So, yeah, all lot of these things are also verified by CNSC staff, but they do a different way; they don't look at it as a safety control area.

THE PRESIDENT: Monsieur Harvey.

Dr. McEwan.

MEMBER MCEWAN: So one question related to the 5 percent that you're going to commit to research, I -- that's clearly a laudable goal and -- and there are obviously opportunities for you there, both for

improvements and for innovation. How are you going to do it? You're a small group. You're a small firm. Are you going to do it internally, you're going to contract with universities, colleges? Are you -- I'd just be interested to know how you -- if you have a plan for building that.

MR. LEVESQUE: Stephane Levesque for the record. We were hoping that if we were issued a 10 year licence based on those numbers, that we would have no problem having a minimum of 5 percent, and we were looking at using a combination. I think we spoke about we have an individual that's an independent contractor that works at the facility that has over 30 years' experience. He was going to visit different establishments to see what they knew. He was going to do that with our Manager of Health Physics and Regulatory Affairs to see what those people knew about different technologies on how to reduce emissions, and that was going to include, you know, people like the University of Ottawa, who are heavily involved in -- in tritium monitoring, and it was going to involve different contractors and different government facilities.

THE PRESIDENT: So, can we get periodic updates on progress on this? Because one of my questions would be what can we expect -- when is the next annual report for SRBT?

MR. RINKER: Mike Rinker for the record.

The scheduled date, there's two days, the agenda is not published, but September 30th to October 1st.

THE PRESIDENT: September the 30th.

MR. RINKER: Or October 1st, two days.

THE PRESIDENT: Okay. So at that time we would expect, I guess, updates from a lot of things we've been discussing here. I would -- sure would love to hear periodically about how you're doing on this research.

MR. LEVESQUE: Stephane Levesque for the record. Yes, for sure that was something that was planned is to have as part of our Annual Compliance Report and obviously we want to share that with members of the public who have concerns, so we'll definitely highlight anything that we found or was able to develop during each year.

THE PRESIDENT: Thank you.

Monsieur Tolgyesi.

MEMBER TOLGYESI: On page 25 you are talking about training and you are saying that there are written tests conducted following an annual radiation protection training. And what happens to those individuals who are not obtaining the pass criteria of 75 percent, that's what you are demanding?

MR. LEVESQUE: Stephane Levesque for the record. I'll pass that question to Jamie MacDonald.

MR. MacDONALD: So, Jamie MacDonald for

the record. During the annual training session we administer testing. Should an employee fall below the pass/fail criteria, typically with the annual training it's an all-day event and they wouldn't get that feedback immediately, but the next opportunity that employee, we would sit down, go over the parts of the test that would have been missed, reinforce to make sure that the understanding of the concepts are there, and re-administer testing to have confidence that this person is fully qualified to continue on working in the capacity that they do.

MEMBER TOLGYESI: And are you testing only the fields which he missed or you administer a new full exam?

MR. MacDONALD: Jamie MacDonald for the record. That hasn't happened yet, I guess I should say. We've tested this year was the first year that I conducted it in this room actually and we had a 100 percent pass rate. So, we haven't explored whether or not we would test with a new test. Yeah. So, we would -- I'll just pass it to Stephane.

MR. LEVESQUE: Yeah, if can just add for a few more years of information, thank you, before that. When we had people that didn't meet the 75 percent failure rate -- I'd like to add that the test is given to all

individuals, even those that don't work with tritium. And why we do that, because there are some people that will never work in the areas with tritium, is because we think people are interested in knowing, it's good for us to know and they're ambassadors for our company. So, they can go elsewhere and tell people and meet other people that can teach people in the community. But we've had some people in the past that weren't working with the isotopes that failed the test and I basically give them a new test, but testing roughly the same things but a completely different test. So, not the same question.

MEMBER TOLGYESI: And these tests are restricted to those in the radiation protection or in all other fields?

MR. MacDONALD: So, Jamie MacDonald for the record. The annual radiation safety training that we administer is given to 100 percent of the staff that work with our facility, from Stephane's level all the way down.

MEMBER TOLGYESI: It's only regarding radiation protection, there's no other test?

MR. MacDONALD: There have been elements that we have tested questions in quality management, for example, testing on knowledge and awareness of our nonconformance process, but the lion's share of the test questions that we would administer are relevant to

radiation protection in our facility.

THE PRESIDENT: Thank you.

Ms Velshi?

MEMBER VELSHI: There was a question asked earlier that we didn't get around to getting to the answer, which was the level of effort required for you to prepare for these licensing hearings, if you can share that with us along with any benefits that come as a result of participating in one of these. I'm sure there must be some.

MR. LEVESQUE: Thank you very much.

For the record, well, one of the benefits I can see is that we notice that some members of the public don't seem to express themselves until the licence hearing, and we're hoping to change that. And that's something we're going to try to promote and to push people, say do you have any questions, do you have any concerns, so that's one positive.

And regarding the effort required for a small company like us to go through licensing, it's really a lot of work. It's astronomical.

There's a lot of us that have to dedicate our time to being able to produce the documents that you see in a way that's presentable to yourselves, to members of the public who may not have all the information on the

facility, so there's a lot of thinking involved, a lot of revisions, a lot of things to do.

If it was just a matter of rehashing the same data as our annual compliance report, it wouldn't be so bad, but the application process and the putting together the specific documents for people to see, I think, is really time consuming.

MEMBER VELSHI: Can you put a number of full-time equivalents to that?

MR. LEVESQUE: It's Stephane Levesque, for the record.

It's in the hundreds of hours. And if -- if you look at we hired, I would say, about a year and a half before today Mr. MacDonald as a manager of health physics and, at the same time, coincidentally, Mr. McNabb as a consultant, we could not have done it with the five of us that were in the health physics team. You know, we definitely needed those two individuals to be able to do all the paperwork required to go through the licensing process to relieve me to do other things like public relations, so on and so forth where before I would have been involved in doing that.

And that's why I'm saying that with the time that, hopefully, we would have with a longer-term licence, we could dedicate that to finding ways of reducing

emissions which we do all the time anyway, but it would give us a lot more time to do that.

THE PRESIDENT: Monsieur Harvey?

MEMBER HARVEY: One last question.

When establishing the financial guarantee, are you taking into account the groundwater contamination and the -- some reclamation that could be required and will the -- all the wells will stay there and will be followed for a certain number of years?

MR. RINKER: Mike Rinker, for the record.

So reclamation of tritium in the groundwater is not considered in the cost estimate, but decommissioning of all of the wells would be, yes.

THE PRESIDENT: Or is there enough funds now in the kitty or about to be replenished to do the job of decommissioning?

MR. RINKER: Mike Rinker, for the record.

The short answer is yes, and their preliminary decommissioning plan was recently reviewed. How the cost estimate was determined was determined accessible to staff.

MEMBER HARVEY: But the money is not there yet. I mean, it will be there during the next three years.

THE PRESIDENT: Well, 500 -- I don't remember the exact number now -- is already there.

MEMBER HARVEY: Yeah, yeah, that's right. But the \$100,000 is not there -- not yet there.

MR. RINKER: Mike Rinker, for the record. That is correct, so the majority of the money is in place and, with some lessons learned from a facility that went through a similar decommissioning, I would -- you know, it's hard to say what would -- if it was to close tomorrow and all the money wasn't there what would happen, but I think considering the performance of this facility and the fact that more than enough money is available to put the facility into safe state and to restore it, it's a reasonable plan.

MEMBER HARVEY: Merci.

THE PRESIDENT: Dr. McEwan?

MEMBER MCEWAN: Thank you, Mr. President. Again, final question, I think for staff. This is a sort of question that we skirted a little bit earlier.

This is a relatively complex facility in small volume in a leased facility. Does the fact that it is a leased and not an owned facility create any licensing or regulatory issues, and is there any linkage in any way to the actual owner of the facility, Mr. Harrington?

MR. RINKER: Mike Rinker, for the record. So this does not raise a concern with

staff. There are many licensees that do lease their facilities.

Should there be an issue that SRB leaves town, they live here, unlikely, but the landlord is -- ultimately would be responsible and we have powers of order to ensure that they would take over.

MR. LEVESQUE: Stephane Levesque, for the record.

I just want to add that our landlord's been intimately involved with our licensing throughout the years. They've been the landlord for a number of years. They realize that there's a financial guarantee that's in place, that we're looking to replenish, to top up.

They've been at the facility. They understand. They wrote that letter of support for the licence hearing. They're well aware of their responsibilities.

THE PRESIDENT: Mr. Tolgyesi?

MEMBER TOLGYESI: My last question is, I'm going back to the fire protection.

In the building -- you are sharing a building with some other ones -- is there a fire wall between you and your neighbours so if it's a fire in your place it doesn't expand or it delays the expansion of a fire so the firefighters could intervene?

MR. FITZPATRICK: Ross Fitzpatrick, for the record.

Yes, there is a fire wall in place and also, with the new expansions coming in place, the whole building is now sprinklered.

THE PRESIDENT: Ms Velshi?

MEMBER VELSHI: My last question to staff.

There's a lot of concern, misinformation about the facility and the waste management aspect of it. So in the annual report -- and I don't know if it normally includes that, but I think it would be helpful if there's more detail provided on not only the number of shipments, but at the volume both from the processing as well as from signs that had been received and how much of that has resulted in waste.

I think it may bring in more light to exactly how much of the business is waste as opposed to actually producing the inspections.

MR. RINKER: Mike Rinker, for the record.

I think we recognize that the purpose of the annual report is to explain performance to the Commission but also to the public, so we've heard the need to make sure that our understanding of groundwater is recovering, so we'll increase the data presence in that and also, I think, on the waste inventory.

THE PRESIDENT: So on that particular item, on the groundwater, you know on your page 32, you have one of those charts that I really like. I'd like to see in the annual report continue.

To me, this is measuring all the wells all the way to the Muskrat River and, as you know, I like those little blue almost invisible little numbers that, as far as I was concerned, look like gradients, movement, plume movement.

I'm reading into it all kind of things.

So over time, hopefully, that will allow you to refine your model as to whatever happens, it's the outcome at the river that matters, right. So we want to know not only the surface, but also deep what goes into the river.

And hopefully, we can model that a little bit more and keep track of it as we get more and more data.

Is that reasonable?

MR. RINKER: So Mike Rinker, for the record.

We agree, and last year's report did contain this, so we'll continue to update this figure, but we'll also show some explanation that those lines are groundwater contours, not tritium contours, so they show the direction of which groundwater is flowing if you're a

hydro geologist, so we'll put some explanation around what those lines mean.

THE PRESIDENT: But if that's where the water is slowing, I assume the tritium flows with the water.

MR. RINKER: We need to put some context there because it's flowing so slowly that by the time it would reach the Muskrat River, it's likely going to decay to near -- to almost immeasurable numbers.

THE PRESIDENT: But that's your safety argument.

MR. RINKER: That's our safety argument. And -- but it's not just surface water that we're concerned with. It's actually the groundwater itself should somebody put in a well, access it for some reason in the future for drinking water or something. We want to make sure the groundwater itself is protected.

THE PRESIDENT: So you will keep us updated on -- in the annual report on this.

MR. RINKER: Yes, we will.

MEMBER MCEWAN: Could I just --

THE PRESIDENT: Go ahead.

MEMBER MCEWAN: It would have been very, very helpful on this map also to clearly identify where that housing development is to -- I'm not sure where it is

other than sort of looking, I think, north is to the left. Southwest. Looking southwest of your facility.

It would be very helpful to have that put on the map, too.

THE PRESIDENT: Okay. Whose turn is it now?

Anybody has any other question? No?

Okay. I have just two quickies.

Are all employees undergone by us a testing -- urine tested, all employees? How frequently do you do this?

MR. LEVESQUE: Stephane Levesque, for the record.

Yes, all employees go urine test. It's every week for those that work in Zone 3, so that's the zone where tritium is processed, and every two weeks in the other zones.

THE PRESIDENT: So they have -- you ever find any detectable numbers? I noticed that in the LCH there is 1,000 becquerel per millilitre for any sampling period. This is the action level.

Has that ever been exceeded?

MR. MacDONALD: Jamie MacDonald, for the record.

That action level has not been exceeded as

far back as I can go. I know for sure it was not exceeded during the previous licence period.

Routinely, of course, we will detect tritium in our employees that work in the active area, and that is the input into our dose calculations that we've reported to you here today, so we do see positive tritium in urine, but the doses that result from that are very controlled and very low.

I'd like to say, you know, if we can -- our goal as health physics team is to try and have everybody at peak production fall below the public dose limit, so that's kind of what the team has decided to strive for.

THE PRESIDENT: Go ahead.

MR. LEVESQUE: If I can just add a little bit of history, we remember that the last time somebody exceeded the 1,000 was in the late nineties, so just to put some perspective in it. It hasn't happened since.

THE PRESIDENT: So my last question, just out of curiosity, on your Licence Condition Handbook on 39 of 61, there's something called chart recorder measurement, 10,000 microcurie per metre cubed. What is this?

MR. MacDONALD: Jamie MacDonald, for the record.

So as well as doing sampling of our

emissions through our bubbler systems, which is the emission of record that we use -- we sample those each week -- we also have a system that we call the real time stack monitoring system.

And so in real time, we have tritium air monitors monitoring the concentration of tritium that goes out our stacks. And those outputs are hooked up to chart recorders.

On the chart recorder that the action level of 10,000 microcurie per cubic metre, that's basically at the top of the scale. And so if we were to be in the condition where there was an emission of that concentration exceeding a duration of an hour, we would have exceeded an action level and that would require us to perform an investigation, perform a root cause analysis and address the problem and also report to CNSC staff all of those items.

THE PRESIDENT: But since we've been told there is no dosimeter for tritium, how reliable are those monitoring? Are they immediately they will detect an exceedance, or is it a period that you have to go -- do bells ring, something rings, flashing light? What goes on?

MR. MacDONALD: Jamie MacDonald, for the record.

During our processing operations, it's

part of the procedure for staff to be continually checking those emissions. They aren't necessarily hooked up to a physical alarm system, but they respond very quickly to any process upsets that we'd have within a matter of 10, 15 seconds.

And so the responsiveness of the people that are doing the processing is very speedy, but if --

THE PRESIDENT: Is it visual or is it -- there's no alarm. Why are there no alarms?

I mean, I thought human beings did not tend to look at devices, et cetera, et cetera.

MR. MacDONALD: So Jamie --

THE PRESIDENT: That's why co-pilot has alarms.

MR. MacDONALD: Yeah, Jamie MacDonald, for the record.

It is a visual system that we utilize, and it doesn't have an alarm hooked up as it is today.

THE PRESIDENT: Staff?

MR. LEVESQUE: Sorry. If I could just add a little bit on that.

So our operating procedures, as our process takes place, requires the staff actually to look at the chart recorder on numerous occasions. And the process that they perform, they know right away if something

happened within the system and they look right away at the chart recorder.

THE PRESIDENT: Well, again, my observation is that you've got so many monitoring spots from stack to et cetera, et cetera, I don't rely on human being interface. Human-machine interface is the cause of most failures.

It would be nice if there was some trigger that alert them.

MR. LEVESQUE: Yeah. Thank you for the suggestion. That's something we can definitely look into.

THE PRESIDENT: Okay. Any other -- staff, you want to comment on that, by any chance?

MR. RINKER: Mike Rinker, for the record.

I think just in general, there are -- our radiation protection program for workers is quite good, but that's a reasonable suggestion for improvement.

THE PRESIDENT: Somebody going to disagree with us.

MS MacDONALD: Sheri MacDonald, for the record.

I'm not sure this is the information that you're looking for, but in terms of worker protection, there are tritium and air monitors in the facility that continuously the air concentrations of tritium, so they do

alarm if the concentrations are elevated so workers are aware and react accordingly, so they are protected.

I'm not sure if that's the same --

THE PRESIDENT: How are they alarmed? Is the alarm --

MS MacDONALD: They are alarming. They are alarming.

THE PRESIDENT: Because I was told they are not.

MR. LEVESQUE: It's Stephane Levesque, for the record.

That's a room monitor for the area that they work in, and I think what we're referring to is it's monitoring the actual stacks for the emissions, so it is two different things.

MR. MacDONALD: Jamie MacDonald, for the record.

And I'll certainly say that Sheri is correct. We have monitoring throughout the facility, and they have alarm set points set very low that can tell us very quickly if there's an upset condition at a very low level so that all of our staff can react according to their training.

MR. JONES: Hi. Mike Jones, environmental project officer, CNSC, for the record.

I just wanted to point out that the action levels that do correspond to the release limits for the facility are actually linked to the bubbler system, so in addition to what we're discussing now, there are fixed action levels that are -- you know, we -- they are looked at on a weekly basis when the bubbler values are obtained. And the chart monitor would be like a secondary way of determining whether an action level for the air emissions exceedance had occurred.

THE PRESIDENT: Okay. Thank you.

I think that this concludes the hearing.
Right?

You have the last word.

MR. LEVESQUE: Thank you very much for your time and the opportunity to be able to answer some questions and make additional comments, but thank you.

THE PRESIDENT: Okay. Thank you.

So Marc, any closing remarks?

MR. LEBLANC: Just if anyone borrowed some interpretation devices, please return them so you will have your driver's ID returned to you.

Thank you, and safe travels.

--- Whereupon the hearing adjourned at 7:43 p.m. /

L'audience est ajournée à 19 h 43