

**Canadian Nuclear  
Safety Commission**

**Commission canadienne de  
sûreté nucléaire**

**Public hearing**

**Audience publique**

**March 14<sup>th</sup>, 2018**

**Le 14 mars 2018**

**Public Hearing Room  
14<sup>th</sup> floor  
280 Slater Street  
Ottawa, Ontario**

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

**Commission Members present**

**Commissaires présents**

**Dr. Michael Binder  
Ms Rumina Velshi  
Dr. Sandor Demeter  
Ms Kathy Penney  
Mr. Timothy Berube**

**M. Michael Binder  
M<sup>me</sup> Rumina Velshi  
D<sup>r</sup> Sandor Demeter  
M<sup>me</sup> Kathy Penney  
M. Timothy Berube**

**Secretary:**

**Secrétaire:**

**Mr. Marc Leblanc**

**M. Marc Leblanc**

**General Counsel:**

**Avocate générale :**

**Ms Lisa Thiele**

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

**TABLE OF CONTENTS**

	<b>PAGE</b>
Opening Remarks	1
CMD 18-H3 Adoption of Agenda	3
CMD 18-H4.1/18-H4.1A Oral presentation by Bruce Power Inc.	7
CMD 18-H4/18-H4.A Oral presentation by CNSC staff	48

Ottawa, Ontario / Ottawa (Ontario)

--- Upon commencing on Wednesday, March 14, 2018  
at 1:02 p.m. / L'audience publique débute  
le mercredi 14 mars 2018 à 13 h 02

### **Opening Remarks**

**M. LEBLANC** : Bonjour, Mesdames et Messieurs. Bienvenue à cette audience publique de la Commission canadienne de sûreté nucléaire.

The Canadian Nuclear Safety Commission is about to start the public hearing on the application by Bruce Power for the renewal of the Nuclear Power Reactor Operating Licence for the Bruce Nuclear Generating Stations A and B.

During today's business we have simultaneous interpretation. Des appareils d'interprétation 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 interpreters have a chance to keep up.

Les transcriptions seront disponibles sur le site Web de la Commission dans environ une semaine.

To make the transcripts as meaningful as

possible, we would ask everyone to identify themselves before speaking.

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

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, va présider l'audience publique d'aujourd'hui.

Mr. President...?

**LE PRÉSIDENT** : Merci, Marc.

Good afternoon and welcome to the public hearing of the Canadian Nuclear Safety Commission.

Mon nom est Michael Binder. Je suis le président de la Commission canadienne de sûreté nucléaire.

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

Je souhaite la bienvenue aux gens ici présents, and welcome to those joining us via our webcast.

I would like to start by introducing the Members of the Commission that are with us here today.

I have the pleasure to introduce some familiar faces, so welcome back to Ms Rumina Velshi and Dr. Sandor Demeter.

Also, I would like to introduce our first-time Commissioners, Ms Kathy Penney and Monsieur Timothy Berube. Congratulations and welcome to the Commission.

We have a fifth Commission Member that was also appointed by the Governor in Council, however, he was not able to take part this week. His name is -- I think it's Dr. Marcel Lacroix. He will take part in the April 4th proceedings.

I also would like to thank Dr. Sandy McEwan, Dr. Soliman A. Soliman and Mr. Rob Seeley for their extraordinary contribution to the work of the Commission and their service to Canada. We wish them success in their future endeavours.

So we now have heard from Marc Leblanc, our Corporate Secretary, and we also have with us Ms Lisa Thiele, Senior General Counsel to the Commission.

**CMD 18-H3**

**Adoption of Agenda**

**THE PRESIDENT:** So with all of this, I

would now like to call for the adoption of the agenda by the Commission Members, as outlined in CMD 18-H3.

Any -- okay?

So for the record, the agenda is adopted.

**MR. LEBLANC:** This is Part 1 of the public hearing. The initial Notice of Public Hearing and Participant Funding was published on September 1st, 2017. A revised notice was posted on March 1st, 2018 to announce the location for Part 2 of the hearing in Kincardine.

Submissions from Bruce Power and CNSC staff were filed on February 12th. They were made available on the Web on February 14th, as this will now be normal practice for the Commission to post all CMDs after a successful pilot project that took place for the January public hearing pertaining to the Chalk River relicensing hearing.

To support the CNSC's efforts in being an environmentally responsible organization, paper copies of the submissions will no longer be distributed on the day of proceedings as they are now available electronically on our website.

March 7th was the deadline for filing of supplementary information. We note that presentations have been filed by CNSC staff as well as Bruce Power.

Part 2 of the public hearing is scheduled

for May 30th and 31st, 2018 and will be held at the TownePlace Suites Marriott in Kincardine, Ontario. The public is invited to participate either by oral presentation or written submission at the Part 2 hearing. The deadline for the public to file a request to participate and a written submission is April 16th, 2018.

To assist the new Commission Members, I will ask the presenters and those answering questions to please avoid using acronyms.

Mr. President...?

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

So before we start I think I will recognize a bit later on some members from other departments. I think we have people from Health Canada, from Environment Canada, and Fisheries and Oceans, and I will recognize them after hearing from staff and from Bruce.

**MR. LEBLANC:** And I can confirm, Mr. President, that most of them are already in attendance or already on teleconference, so they will be able to listen in.

**THE PRESIDENT:** Okay. So let's test the system then.

I stand corrected. So we have Mr. Brian Ahier and Dr. Dominique Nsengiyumva -- I'm sorry for the

pronunciation -- from Health Canada. Are you in attendance? Welcome.

We have Ms Nardia Ali and Ms Jesica Moreno. Are you here? Okay. Welcome. They are from Environment and Climate Change Canada.

We also have Mr. Duck Kim via teleconference.

**MR. KIM:** I am here as well, thank you.

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

We also have Ms Jennifer Thomas, Ms Caroline Boros and Ms Andrea Doherty from Fisheries and Oceans. Can you hear us?

**UNIDENTIFIED FEMALE SPEAKER:** Yes, we are on the line.

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

And I understand we are going to have somebody from the Office of the Fire Marshal and Emergency Management. They will be available on demand. What does that mean?

**MR. LEBLANC:** It means we will call them when we get to Emergency Management questions.

**THE PRESIDENT:** Okay, so somebody on standby hopefully.

So let's start with the process by calling on the presentation from Bruce Power, as outlined in



Commission Member Documents 18-H4.1 and 18-H4.1A.

I understand that, Mr. Rencheck, you will make the presentation. Over to you.

**CMD 18-H4.1/18-H4.1A**

**Oral presentation by Bruce Power Inc.**

**MR. RENCHECK:** Good afternoon,  
Mr. President and Members of the Commission.

For the record, my name is Mike Rencheck, President and Chief Executive Officer of Bruce Power. We are pleased to present our application for Bruce Power's operating licence renewal today.

Bruce Power is a privately held company owned by two large investors, unions and our employees. We are the largest operating nuclear site in the world, generating 6400 MW in eight units. We lease the site under a long-term agreement with Ontario Power Generation. And while we operate the facility, we fund all investments and liabilities associated with the facility. We are applying to continue our operating licence for our units over a ten-year renewal period.

We are confident in our ability to operate safely and reliably through our focus on nuclear excellence. Nuclear energy is among the safest industries

in the world and this starts with a safety-first focus in our work and a focus on a strong nuclear safety culture. Our people are engaged, well-trained and we keep plans to ensure that newcomers learn and adopt our values. We say you can count on me every step, every time, every day to uphold a safety-first approach to our work. Our people take great pride in ensuring reliable operations through sound operations, maintenance and engineering practices, through innovations, by ensuring effective environmental performance, analysis and monitoring, and having effective communications, both internal and externally with our regulators and the public.

Our public engagement and involvement is open and transparent and this has yielded a 93 percent approval rating from our recent polling when residents in our region shared their views on the safety of our facility.

This approach has enabled us to produce safe, reliable, clean and low-cost electricity, supplying 30 percent of the electricity for Ontario at 30 percent less than the average cost to generate. We are a low-cost producer.

Our performance has continuously improved from 2014 through 2017 through a focus on operational excellence. Last year we generated over 2 TW hours more

electricity than any year since plant construction and 2 TW hours is enough electricity to supply 208,000 homes. We save lives every day by enabling clean air and by producing cobalt-60 isotopes which are used to sterilize once used medical equipment and to treat brain tumors.

Our efforts have been acknowledged by various public organizations that recognize culture, safety, communications and community engagement. As a private nuclear operator, by operating at high levels of safety and reliability we are able to create the financial stability to invest in our units over the licence renewal period.

At this point I will turn the presentation over to John Soini, who will discuss our investments in the plant and the community.

**MR. SOINI:** Thank you, Mike.

Good afternoon, Mr. President and Members of the Commission.

For the record, my name is John Soini, Executive Vice President Finance and Commercial Services at Bruce Power.

Our business plan is fundamentally about safe, reliable operations. Our plan consists of activities we have done since the company was formed in 2001 and we are building on this success. Our business is able to have

a long-term view because of our role identified in Ontario's Long-Term Energy Plan. The 2017 Long-Term Energy Plan is Ontario's roadmap that spans many years and outlines how the province will meet its electricity supply needs while also balancing a number of factors, including price, reliability and economic indicators, while meeting our climate change targets.

With the provincial Long-Term Energy Plan, Ontario's Independent Electricity System Operator is able to turn this policy into reality and in the case of Bruce Power has achieved this by entering into a long-term agreement with Bruce Power. This agreement provides us the financial certainty over the ten-year licensing period and beyond to make investments and pay for them through a negotiated price for power. Through an agreed price for our output we have the financial framework to make the ongoing investments needed and pay for operations, expenses, fuel, waste disposal expenses and decommissioning costs. We have issued nearly \$2.4 billion in bonds to private investors and we are backed by respected owners with strong balance sheets. However, the business agreement we have with the Independent Electricity System Operator provides for payment of these investments.

We have started work under this agreement in 2016. Since then we have invested nearly \$1 billion in

new equipment, improving plant performance and supporting communities. The work we have done to prepare for activities such as the major component replacement program is well recognized. With the long-term security the province provides, we are able to make the investments necessary to continue safe and reliable operations. This was noted by the International Atomic Energy Agency Operational Safety and Review Team Mission when they visited our site in 2015 and 2017. And I would just note that our entire investment is upwards of \$13 billion in our plant over the long term. And I would also note that over \$1 billion is invested into plant and equipment, specifically outage capital, as we progress our program.

Next slide, Frank.

To continue to deliver safe, reliable operations and deploy the investment necessary, a robust supply chain is critical. In Canada we have a strong nuclear supply chain who are our partners in this program. We are working with our supply chain so they have long-term certainty as well.

Given our geographic location, our suppliers and Bruce Power share a common goal of being local, so they are not only well-integrated into our teams but part of the community.

I will now turn over the presentation to

Mr. Len Clewett, who will discuss our operational performance. Thank you.

**MR. CLEWETT:** Thank you, John.

Good afternoon to the Commission. For the record, my name is Len Clewett, Chief Nuclear Officer.

The foundation of operational excellence in safety and at Bruce Power safety is our number one core value. You can see from our logo, the overriding safety pillar is reactor safety. We invest in safety through people, coaching, training, also through capital investment and also making sure we have industry-leading processes and procedures.

An example of our investment in capital is through our radiation protection. Next slide there, Frank. In area radiation safety we have invested well over \$100 million over the past four or five years to improve the safety of our personnel doing work inside the reactor on primary system inspections. You will see later in a video that our Chief Engineer will show us part of his presentation on a couple of specifics on new tooling that have saved well over 200 rem to our working staff during outages.

Worker practices have also been a focus and as a result we have topped SL performance with personal contamination incidents when you compare ourselves to the

industry.

Industrial safety performance remains very strong, but as a result of a lost time injury in 2017 and a lost time injury in 2016 we took a sitewide initiative that Mr. Rencheck replied to as you can count on me. And it's really the hearts and minds of our workers to make sure that every task every day is done safely. Part of that was a three-day training session for all our first-line managers that supervise the craft and all our union team leaders. Also there was a one-day session for all section managers and above that was completed last year. This year we are completing a one-day session on all other individuals so the entire staff at Bruce Power will have this training.

We have seen some very positive results in the big Unit 6 outage last fall and a large Unit 1 outage at Bruce A this winter where we saw much improved safety performance. So this will be part of our culture and training. We also trained over 100 temporary electrician workers that provided them much more knowledge on the tasks they do and we will continue with some of that specific training to our supplemental staff personnel.

We have an ongoing capital investment that John, Mr. Soini, referred to, called our Asset Management Program. Mr. Newman will add some details, but this started back in 2016 and it's really about the safe and

reliable operations of our staff. This list here shows some of those modifications that have been completed to date and this very thorough, rigorous plan that goes out 40 years into the future to make sure every system, every component will be operated reliably in the future.

Next slide, Frank.

The capital improvements through improved human performance and our people, staff, you can see from this we have had improved generation records in 2013, '14, '15 and '17, and this was accomplished not only through achieving the improved generation but operating the plant safely.

One of the industry indicators that we track along with our industry peers is force loss rate and you can see in the previous three years that we have improved force loss rate in all three of those years. This is really about reducing the challenges to our operators and to do that the big focus has been on our maintenance backlogs and we are proud to say that this year we have achieved industry top decile performance with regards to maintenance backlogs and currently across Bruce A and Bruce B, across our eight units we have just one corrective critical work order in that backlog.

Another thing is for continuous improvement a focus of ours is to make sure we have



independent assessments. On this slide you can see some recent independent assessments we had. We had an OSART visit from the IAEA in 2015 and a follow-up last year. We also every two years have independent assessments from the World Association of Nuclear Operators and then quarterly we have Nuclear Safety Review Boards that are comprised of four industry experts with well over 100 years of experience in senior leadership positions in North America.

And then, four times a year we have an independent project oversight committee also that are comprised of industry experts who have to really focus on our asset management projects and our major component replacement projects.

But this is a very important part to make sure that not only we're internally monitoring our performance, but that we have some industry experts on a routine basis that come in and evaluate our performance so that we can continually drive towards achieving excellence.

And with that, I'll turn it over to Mr. Newman.

MR. NEWMAN: For the record, Gary Newman. I'm the Chief Engineer and Senior Vice-President of Engineering at Bruce Power.

Good afternoon, Mr. President and Commission Members.

So, Bruce Power has put in place a very rigorous programmatic approach to managing our plants, utilizing industry best practices to monitor the life cycle management guidance for our critical structures, systems and components.

This is supplemented with our overall asset management program as already noted which, in turn, is the best strategy for managing our plants through condition assessments, development of bridging and, ultimately replacement strategies.

These plants are, in turn, integrated through our business planning process to ensure appropriate funds are applied at the right time to support continued safe and reliable operation of all of the systems, structures and components.

The major component replacement outage campaigns are specifically designed to focus on key equipment such as fuel channel assemblies, feeders and steam generators. These replacement activities are a subset of the overall plant asset management plans already noted. And although the timeframe for doing -- so it takes a bit longer than a normal outage, the activities are considered very similar to the work that is normally completed within our outage program.

This is a schematic of the major

components that I just mentioned and related systems which are the focus of the major component replacement campaigns. We will in a moment show you a short video which provides some sense of what is involved in these replacement activities.

If we could have that video now.

--- Video Presentation / Présentation vidéo

**MR. NEWMAN:** Thanks.

Okay. Moving on then to fuel channel assembly health and longevity. As we have described in past Commission hearings, we and our industry peers have invested hundreds of millions of dollars and many decades of effort into the development of a sound fitness-for-service protocol to monitor and manage our fuel channel assemblies.

As with our key programs, periodic updates and technical exchanges are provided to CNSC staff for the purpose of conveying key technical progress for their consideration and endorsement. Ultimately, these technical updates are integrated into the appropriate Canadian Standards and become part of our licence condition requirements.

For pressure tube monitoring, or condition monitoring, in more recent times the industry has been focused on accelerated aging research and development

efforts to continue to demonstrate the accuracy of our pressure tubes and specifically from a fracture toughness perspective.

Burst testing work has been completed in support of mechanistic model development which, in turn, are used to demonstrate fitness-for-service of our fuel channel assemblies. As noted in the slide, work has been completed to develop the mechanistic material behaviour models which supports operation out to 3,000 equivalent full power hours and further confirmatory test is currently planned to be completed over the next five years.

Next I want to talk a little bit about some of the state-of-the-art data acquisition and inspection instrumentation. We'll show you another video in a moment here.

As I noted at the beginning of the talk, Bruce Power has developed a number of modern inspection tools, including a state-of-the-art delivery system which removes the need to use fuelling machines to deliver these tools. This allows the fuelling machines to focus on the operating units.

These tools have been developed with a view of minimizing worker dose while broadening and speeding up the data acquisition of condition monitoring information, all of which supports the ongoing

fitness-for-service of our population of fuel channels.

A short video will follow displaying some of this equipment that I believe the Commission Members will find very interesting.

--- Video Presentation / Présentation vidéo

**MR. NEWMAN:** As already noted, we are continuing to do tests to determine fracture toughness and this particular photo shows the Bruce test facility at the Canadian Nuclear Laboratories where we have a test specimen that has been prepped and ready to undergo its testing.

So, fully instrumented. A starter notch is added and then that notch is sharpened through a fatigue process prior to pressuring the specimen to determine the fracture toughness. Please note that there's a protective bell jar that goes over top of this specimen and is fully secured to protect the surrounding hot cell equipment.

As you can see in this slide, this is the sequence of planned major component replacement outages with Unit 6 beginning in 2020, followed by the remaining two Bruce A units and then the balance of the Bruce B units.

Also superimposed on this is the licensing and renewal that is the subject of this Commission hearing.

A final -- oh, pardon me. And, finally, this slide provides the current MCR target dates, both in

calendar dates, equivalent full power hours and the bounding predictive hydrogen concentration at the fuel channel outlet which is the bounding location for each of the units.

I should also note that this bounding concentration continues to be refined on a more accurate basis as we gather more information from each of the units using the tools as described earlier. This surveillance information is obtained using modern reactor inspection tools with the output from these condition assessment tools used to refine, enhance the predictive models to more accurately represent the fleet of pressure tubes currently in service within the Bruce Power reactors.

I'd like to now turn it over to Mr. Frank Saunders.

**MR. SAUNDERS:** Good day. Frank Saunders, Vice-President Nuclear Oversight and Regulatory Affairs, for the record.

I'll talk a little bit about site safety, provide some highlights of the detail that's in our application.

As noted earlier, nuclear plants are one of the safest industries in the world and while there is really no human endeavour that can be said to have zero risk, I think it's fair to say that working at or living

near a nuclear plant is as safe as any human activity and probably safer than many you carry out on a day-to-day basis.

And we work hard to maintain that safety. We understand new things as time goes on to make sure it's appropriate.

And the next slide is an example of that. I provided this slide here just to give you a sense of it. In the application is all the detail. These are the Fukushima enhancements that we've undertaken as part of the experience from 2011. You'll note on the right-hand side that most are complete, all but two will be complete by the end of next year and one of the remaining two is in the MCR for the Unit 6 starting in 2020 and the addition of filtered ventilation is scheduled for -- by 2022 for Bruce A and Bruce B and we'll talk a little bit more about that as I go through the slides.

So, probabilistic safety assessments have been updated. Looking at Fukushima, a major kind of focus was considering the site as a whole, multi-unit effects and what that means. We've included additional external scenarios which were not typically part of the original design basis thing, so assumed that the plant was sited there and these sort of updates have been done, and insulation of a passive container filtering system, we have

included some credit for that in some of the safety assessments, but there will be much more as we finish our design basis for that thing and these things will continue to be updated on a five-year cycle.

This picture is, again, a picture out of our application which shows you essentially where the site sits in terms of whole site risk. The bars at the bottom represent single units, risk per unit per year, and then the bars on top represent the whole station, so all four units accumulated together.

The modelling is very realistic for the out-of-power intervals. PSA is very effective at understanding equipment failures and the probability of those failures. They are more conservative, which is to say we make much more conservative assumptions for fire, seismic, high winds, et cetera because it is not possible at this stage to model them as well as internal events. So, they tend to be somewhat less realistic, but always on the conservative side.

You will notice, of course, that the standout here is fire safety, it's well within the limits. We have in our integrated implementation plan a number of projects aimed specifically at fire safety and we have some broader fire safety work that we will talk about shortly.

This picture is just to indicate that PSA



is but one of many things that we deal with in terms of site safety and this will always continue to be the way. It's a tool and it's very useful to us, but it is not the only thing by any mention.

One of the uses we have for the PSA in a day-to-day way is this tool which you see here. We use this tool when we are looking at planned maintenance or taking equipment out of service to do maintenance or outage work. We can actually put the equipment in, run the tool and it shows you what combinations of equipment out of service create higher risk. So, you can actually plan your work to minimize the risk.

These particular slides actually incorporate safety system tests, so it just shows you how sensitive the tool is. Safety system tests are something that we do all the time. We take a channel out of service to test it, these bumps appear because we've taken that channel out of service. It's a necessary thing. The channel's actually in a field in a safe mode, but the model counts it as out of service anyway. And so, this is the sensitivity of this kind of model.

I talked a bit about fire and some of the things that we're doing in terms of fire. We have in-plant projects that look at a number of physical changes inside the plant. One of the things that we decided to do in fire

was to actually look at a response capability that was state-of-the-art. So, you're seeing a few pictures of flashing through here. This is our new state-of-the-art fire training facility. It is the mock-up of the plant and the various conditions in which the firefighters may well find themselves in the plant. It allows us to do very detailed training for our firefighters, as well as for off-site firefighters who might well, you know, join us in that effort.

We do have actually a full response fire department on site, so we're sort of like a city in that regard. We have a 24/7 scheduled fire response with all the equipment to go with it.

This facility also doubles a bit as a security training facility. You'll have seen some pictures of the OPP team there. We do use it for some security training as well in combination training.

Emergency preparedness has been a major focus since 2011. A lot of work has been done. One of the things that I wanted to point out on the emergency preparedness PC is the way we looked at emergency mitigating equipment. You often see it referred to as EME. Emergency mitigating equipment is equipment that's external to the plant that requires no power from the plant that we can deploy in those situations like Fukushima where the

power to the plant has been totally lost and there's a need for water.

It is by and large very simple equipment. It is by design equipment that we use every day so that we know how to use it and that makes our training and our familiarity with it easier, it gives us a broader range of people who can use it and do it. So, it includes, for example, fire trucks, it includes pay loaders, it includes small generators. These are all equipment which are familiar to us, which are stores mostly just off-site, some are -- a couple are stored on site. We spread them out a little so that no particular event is likely to affect all the equipment.

This particular piece here, we did in this last exercise is test the system for cracking, all this emergency mitigating equipment, and what you see here in the top right-hand side is one of these little tractors that mounts on the equipment, so when we set up our emergency management centre and we turn it on we can see where all the equipment is, we can watch it respond to the event and we know where it is at any particular time.

So, this is a good feature, it makes it easier to track the equipment and be aware of where it is and whether it's delayed in getting to where you want it to get to.

We also now have in place the enhanced clean dispersion modelling which was another commitment from Fukushima which would allow us to examine multi-unit failures and whatnot, determine what it looked like, and that's now fully in service.

Emergency data transmission. One of the big challenges in any emergency is being able to transmit the data to those people that need it. That's important both on site and it's important to the off-site agencies that respond to it.

We have now put in place a data transmission service, fully digital. The data is actually stored off site. It's transmitted – it can be transmitted a number of ways. The fallback position is via satellite through a VSAT set-up. It's independent of all the local power supplies and grids, so we now have one system that'll work for all emergencies. We exchanged staff on one – on one system, and they use only one system.

And it does provide multiple layers, as you'll see here. This is an actual depiction of what you would see on your screen if you logged in to the database. You can click on this picture and see the data from any of those. It does highlight changes, so the coloured -- the coloured blocks on here would be telling you that something has changed in that unit and you can click in there and

look. Gives you a table of all the various data that CNSC and other folks want. You can download that data. You can trend it on the screen. You can do what you wish with it.

And I think I have one more picture here. Again, so if you scroll down deeper, you actually get into the plant systems and you can again put your mouse on a system, click on it, and see the parameters that are appropriate for that system at that given time.

And one final slide here, which is kind of one of the summary slides that you can display the data in many ways. You can configure it as you like. And like I say, it's easily downloadable. The data can be imported or exported into various things.

This slide is just looking at the alternate facilities. Our main emergency management centre is located just off site, about a kilometre from the site. We have two other centres, one in Kincardine and one in Port Elgin, to allow us, you know, geological separation so that we can use those if we need to.

One of the things we did over the last year was look at -- we wanted to look at what difference it made, the emergency mitigating equipment and the overall release to the public in severe accidents. So we commissioned a study which looked at a four-unit severe accident event, simultaneous for four units.

And we did the study without any interaction. We assumed no power in the plant, no operator interaction. And we assumed no -- you know, in the worst-case scenario, we assumed nobody did anything, and the thing just was allowed to percolate along and do its own thing. And then we employed the EME in a very limited fashion, in fact.

And what we found was employing EME, even though, you know, in this case we didn't use the emergency mitigating equipment to actually prevent the event -- we could have, but we didn't want to prevent it for the simulation; we wanted to have the event so we could look at it.

So we employed the emergency mitigating equipment in two ways only. One was moderator makeup two hours after the core was uncovered or started to be uncovered. And the other one was emergency makeup to the shield tank 24 hours after the event started. Those two simple issues brought the dose to the public back to the design basis criteria. So there was no -- no evacuation required, and sheltering was required within the three-kilometre continuous zone and not really beyond that.

So the emergency mitigating equipment has proven to be very, very effective. And in fact, had we employed it in the prevention mode, you would never, ever

have got to the event. But that really wasn't the point. The point of the study was to understand how much difference it would make in the -- in that mode.

And we are installing the passive containment venting system which we discussed. We've included a little bit of that credit in our current PSA, but not very much because our design is not finished. We've done a lot of work in Engineering creating a design that works at very low pressures. We are expecting this to very significantly reduce doses to the public, even in a situation where we would do nothing, because this is a passive system, even if we took no action other than let the system operate, it would again reduce the dose to the public by several orders of magnitude. And those -- that data will be in our next modifications of the PSA and the large release frequency.

Huron Resolve was our last major exercise in 2016. This is the second one we've done. Again, a few pictures scrolling through here, just to show you some of the things we did.

The major purpose of these large exercises is not the deployment of the equipment itself, because we do that all the time, frankly. We know that that can be done. What we're doing here is integrating with all of the various agencies that would be involved in an offsite

emergency. And that's what we're proving.

So we did things here like we moved our emergency management centre to one of the two alternate centres so that we could see how well that would work in real life. We moved the emergency centre in Kincardine to Port Elgin in the middle of the exercise, again just to prove that it could be done and that it would be effective, and various other aspects of that on the municipal side to test it out.

And we also tested some of our new equipment, like the data transfer and that as well.

So now I'd like to hand over to Mr. James Scongack.

**MR. SCONGACK:** Great. Thanks very much, Frank. And for the record, my name's James Scongack. I'm the vice-president of Corporate Affairs and Environment at Bruce Power.

And I'm looking forward to speaking with you today about our commitment to the environment and engagement, which is a pretty critical component of everything we do at Bruce Power and a key component of our licence application before the Commission.

Moving to the first slide, you know, Mr. Clewett alluded to the four pillars of safety. Obviously, environmental safety is one of our four key pillars of



safety.

But one of the things that sometimes in dialogues such as this we forget about is why does nuclear power have the role it has in Ontario. And Mr. Soini talked about that. And Ontario has made a choice. I recognize that's a provincial jurisdiction to do it, but Ontario has made a choice that we do not want coal fire generation in the province of Ontario. It's a decision we made in Ontario. It's now a national policy.

And as a consequence of that decision, we have eight units of operation at the Bruce Power site. Seventy percent of the additional energy needed to phase out coal in Ontario came from our site. So if you're concerned about climate change, like we are, nuclear power is a key part of the solution.

However, our operation does have interaction with the environment as we know. And so our commitment as an organization is to minimize that impact on the environment and play a positive role in everything we do when it comes to environment and sustainability.

Since the last licence renewal hearing in 2015, we've seen continued improvement in our environmental performance, as Mr. Clewett alluded to. And that is something we never take for granted. We're an industry that's focused on continuous improvement. And so

continuing to drive higher levels of environmental performances is something that Bruce Power remains committed to.

We have a very robust environmental management system. Just last year, Bruce Power was reregistered to the new ISO 14001 standard. And that's a standard that has been updated in recent years to try to drive organizations to factor in beyond a lot of the various technical elements to elements such as leadership, elements such as sustainability. So your environmental management system in large organizations, the new standard, isn't just meeting your environmental compliance. It's about what focus does leadership put on environmental performance and what are -- what is a strong environmental performer doing beyond its site boundaries. And we're proud to have been reregistered on that basis.

And below that reregistration is a suite of very comprehensive environmental programs we have. Of course those environmental programs incorporate items such as our movement towards new CSA standards. It obviously incorporates our meeting our regulatory standards. But more importantly, it's looking at a range of other items. How do we take our performance to excellence? How do we continuously improve? And also when we engage with the public, when we engage with Indigenous communities, are we

taking that feedback into account when it comes to not only our environmental monitoring, but how we're engaging with the community, how we're engaging with the public to give them confidence that we are making a positive contribution to the environment.

It will come as no surprise to members of staff and the Commission who have followed Bruce Power since our inception in 2001 that, you know, we have a range of environmental issues that we also carry out off site. That includes our Environment and Sustainability Fund and literally engagement with dozens and dozens of groups throughout the community. We're recognized as part of the community; we're an intricate part of the community.

And the responsibility that goes along with that is to the extent there are environmental concerns in the community outside of Bruce Power that don't directly -- aren't directly associated with our operation, we're all living in the same environment and we all have a commitment to achieving excellence there. We engage on that at the regional level, but we also engage on that at the national level, working with organizations like the Asthma Society, Pollution Probe, the Council of the Great Lakes Regions. We'll talk a little bit more about research and development later. But these are all things that are expected of leaders in the energy sector who want to be in

business, and we certainly do want to be in business for many years to come.

One of the other questions we often get when we talk to members of the public is recognizing we are a clean producer. There's also an expectation that we place on ourselves and others place on us around minimizing our waste footprint through the generation of electricity using nuclear power.

We do generate waste. We generate low-level waste. We generate medium intermediate-level waste, and we do generate spent fuel. And so we have an obligation and continue to deliver on that to minimize those waste volumes as much as possible through what we're doing, and we've shown tremendous progress on that since the 2015 relicensing.

In fact, you'll note in the annual report that since the licence renewal hearings in 2015, Bruce Power was one of the first plants, both at Bruce A and B, to be upgraded to fully satisfactory in the environmental -- in the area of waste management. We're very proud of that.

But there's more to do. So it's not only about minimizing waste. We have to full fund the cost of the waste we produce. As Mr. Rencheck noted earlier, we are an operator at a site, but that just doesn't mean that

we don't have an obligation to fund that long-term requirement. And we have an arrangement in place with OPG to fully fund that requirement, both for the waste we generate -- you know, some may not call spent fuel waste. Some may talk about it as energy for the future. But for all intents and purposes, from a funding perspective, that's how we treat it. We fund the final waste and the final decommissioning.

And when we look at all those activities in aggregate, and if we go back to recent studies, whether it's by Hatch, whether it's through the University of Wisconsin-Madison in 2005, on a life cycle basis, nuclear is at par with hydro and wind and far below solar when it comes to life cycle greenhouse gas emissions. That's something we're very proud of. And it's really central to our role moving forward.

I want to talk a little bit about our environmental risk assessment, which is part of our licence application. You know, you'll see words in the CMD put forward by Bruce Power, confirmed and agreed to by CNSC staff, that our environmental risk is low to negligible. In previous assessments that some of you may have followed, you heard terms like "no significant adverse impacts" when we carried out previous environmental assessments.

And I think the real key message that we

want to leave for Members of the Commission and frankly for members of the public who are interested in this hearing and watching it is, you know, there was a perception earlier on in this process when we started having a dialogue with people about this licence renewal back in 2016 that there was this myth that we wouldn't be carrying out an environmental assessment related to this 10-year licence application because CEA had changed in 2012.

One of the things that we really like to remind people, and it's noted in a lot of your written materials, is that the environmental risk assessment included as part of this is really an environmental assessment under the *Nuclear Safety and Control Act*. That environmental assessment builds on 15 years of knowledge we have at Bruce Power.

We completed an environmental assessment on the restart of Units 1 and 2, that included the kind of activities that were alluded to earlier related to major component replacement, and it also looked at continuing operations.

In every single one of those assessments that we've done, and they're numerous and varied, the conclusion in every single one of the assessments was that we did not have a significant adverse impact on the environment or, as we say today, low to negligible.

So that doesn't mean we're not doing everything we can to further reduce that impact, but we've gone through multiple processes over and over. What I really like about the environmental risk assessment process is that this is a continued process. So every time we're going through this licensing process we're going to continue to update that.

But fundamentally, when all is said and done, as much as we put new inputs into the models, we carryout a new environmental risk assessment like we did, it goes back to the core principle; we don't have a significant adverse impact on the environment. That's a really critical takeaway. We're also carrying out a robust environmental review as part of this.

So, as the slide says, there's no work being carried out on Bruce Power in the future over the 10-year licensing period that has not been previously characterized, assessed and confirmed to not have an adverse impact.

I think that's really important. We're not coming forward to the Commission asking to do something new, we're coming forward for a continuation of previously established, previously confirmed items. Then our job from there as a nuclear operator committed to environmental excellence is with that to operate at a far more stringent

standard to ourselves, a higher bar that we operate to.

I'd like to now move onto key issues. I'm going to talk about a little bit later, we've had a very extensive public engagement program, we've had very extensive engagement with Indigenous communities. There's some very common themes that we hear in that dialogue. Really the key issues that continue to come, I like to summarize them in really four key themes.

The first is the issue of climate change is obviously an important issue, and I don't need to elaborate more on that. But really when we talk about radiological emissions, you know, CNSC has their own independent monitoring program, we have our own radiological emissions program. I almost said REMP, because we're really bad with acronyms. For those new Commissioners around the table, we actually have an acronym dictionary, if you'd like it.

But, you know, we produce all sorts of very good data when it comes to radiological emissions. In the CMD you'll note some very good pictorials that talk about where is our actual radiological emissions to where our own standards are from action levels and regulatory issues? This is something we continue to hear from the public.

You know, there's a level of confidence,



as Mr. Rencheck noted, in the safety of our facility, but we've heard very strong feedback from people that when we're talking about radiological emissions we have to put it in terms that people can understand. Those are simple things like if you live at the fence of the Bruce Power site and you drink the water and you hunt and you fish and you eat from the fence of the Bruce Power site, your exposure is around one banana a month. That's the kind of feedback and that's the kind of context that people want.

We have really good scientific data, but we have to talk about it in a way that people understand. That's been a key focus for us as part of this licence renewal period.

We obviously have an interaction with Lake Huron through our operation, through that interaction that is something we spend a lot of time, a lot of resource, a lot of effort, a lot of research and development to understand what that interaction is and what it means to Lake Huron.

So, again, putting that within a context is really important. You know, given the fact that we've talked about this for many years, there continues to be a growing confidence.

Moving on, in terms of anticipating the future, a lot of this is really in your CMD, but this is

really about strategic investments that we're making beyond what is considered from a regulatory perspective, working with academia, working with independent organizations, whether it's McMaster University, University of Saskatchewan, Northern Ontario School of Medicine, Council of the Great Lakes Region, whether it's the work we're doing with the CANDU Owners Group who are looking at long-term impacts of climate change, who are looking at environmental monitoring, the nuclear industry is at the forefront of environmental excellence and research and development.

This doesn't only have a benefit to the nuclear industry, it frankly has a benefit to any kind of large operation that has an interaction with a body of water, in particular the Great Lakes.

Moving on, in terms of public support. You know, you'll have the opportunity to visit our community in Kincardine later in May and you'll have the chance to see for yourself but, you know, we are very fortunate in the Bruce Region to have a lot of confidence from the local community.

When we talk about the local community, you know, we're not just talking about organizations or individuals who live within a short radius of the site. When we talk about the local region, we're talking about

three counties, approximately 200,000 people, hour and a half drive around, hour to an hour and a half, so a very large area. We recently carried out polling that continued to confirm that.

The other thing I say is there continues to be a myth that nuclear power is not popular in Ontario. That's just not true. Polling that we consistently do as an industry and as a company shows that approximately, give or take, eight out of 10 Ontarians support the role of Bruce Power and the continued refurbishment. You know, eight out of 10 is a pretty good number any day of the week.

That's not something we take for granted though, it's something that we take very seriously and that we work as hard as we can everyday to continue to earn that confidence.

I now want to talk a little bit about our Indigenous Relations Program. It's a very important component of what we do. We work as hard as we can to build a positive relationship with local Indigenous communities. Building a stronger relationship is about better understanding of rights and interests. It's about understanding and engaging in traditional knowledge, and it's about talking about the aspirations that these communities have for the future and how we can work

together and where we can find common ground.

Our site is located on the traditional territories of Indigenous people, the Saugeen Ojibway Nation, the Métis Nation of Ontario, and the historic Saugeen Métis. With each of these communities we have formal protocol agreements in place.

Essentially, what these protocol agreements are designed to do is to provide each of these communities capacity, capacity so they can engage in Bruce Power, whether that's on a day-to-day basis or an ongoing basis, and also to provide mechanisms for incremental capacity when we have items like this licence application or we have other regulatory matters that we need to engage on.

So these communities can have access to the capacity to have their own independent review of these materials and have a thoughtful dialogue with Bruce Power.

In addition to regulatory matters, these protocol agreements also look at what are the other things we can do together, whether that's enhancing employment, which is something we're committed to. Whether it's making education opportunities available, business development opportunities, economic development, community investment.

Those are all things that are very important to Indigenous communities and we are firmly

committed as a company and I'm very proud of our track record.

In terms of the specific progress that we've made on this front since 2015, since we were before you last, we were thrilled this year to be recertified through the Canadian Council for Aboriginal Business, Progressive Aboriginal Relations Program as a gold member of this program. I'd just like to take a minute and just explain what this program is.

Mr. Clewett talked earlier about how the nuclear industry, how we work with organizations like WANO or IAEA or work we do within the industry is really a peer review so we understand what are those gaps to excellence. That's what the CCAB is. They come through this program, the gold level is the highest level or rating you can get, and they carryout an independent assessment of your programs. They engage with the community and they look at what are you doing in employment, community engagement, business opportunities and all of those various items.

We're honoured that we're one of 17 companies in Canada who's been recertified yet again at this high level. So that really tells us that we're on the right track. There's always more to do in this area.

There's more that we want to do, and those are things like, starting in 2018, we're opening an office

later this month, we've launched an Indigenous Relations Suppliers Network. So all of those organizations that Mr. Soini spoke about, some of the organizations that were in Mr. Newman's video, those are all organizations that are relocating to our area. We're committed and they're committed to working with Indigenous communities as partners and to determine where there is common ground.

There's also our Indigenous Community Investment Fund, which is an annual commitment that we make where we work with all three of these communities to determine what are the key issues important in their communities? What are the programs and items that need that extra support? That's going to continue to be a key area for us moving forward.

Then, finally, we have an Indigenous Employees Network, and that's really a network that can provide advice to us. You know, since our last licence renewal hearing, I remember previous Commissioners were asking us what was our total Indigenous employment at Bruce Power.

You know, we've worked really hard by putting new positions in place that are solely dedicated to working with Indigenous communities to breakdown barriers and have more work placements at Bruce Power. Over the last three years we've secured 66 additional positions at

Bruce Power for Indigenous peoples, and that's something we look forward to building on in the months and the years to come.

In conclusion, I want to end talking a little bit about some of the broader engagement that we've done on this licence renewal, and I'll continue on the theme of the work we've done with Indigenous communities.

So one of the lessons learned coming out of the 2015 license renewal hearings that we heard from Indigenous communities was while there is an inability through our protocol agreements to plan for the long term, Indigenous communities as you know, receive a lot of -- have a lot of engagement from various proponents. And so we decided jointly in 2015, or committed to, rather, to provide a five-year look ahead.

And so we've been reaching out offering opportunities for engagement and capacity since December 2015, and through this license renewal process and through the dialogue, through the work that we've done, where we have received comments, where we have received input, we have been respectful and engaged to incorporate that feedback into many of the documents that you've seen, and many of the documents that staff had reviewed.

One of the things that we decided, consistent with the CNSC REGDOC, on this front, was develop

a series of community interest documents. There is one community interest document for each of the three communities that we work with where we have worked to incorporate in feedback we received. Either that's feedback we have received through the dialogue that we have been able to have, or it's feedback that we have been able to find through other proceedings. You know, we're a site that has other individuals where it's all Ontario Power Generation. There is a long history of various regulatory hearings and approvals on the site. So we have sought to incorporate all of that in.

And similar to my previous comment that I made with respect to our strong environmental performance and our continued confidence in that, you know, we have carried out a review of established or asserted treaty rights and we are confident there is not an appreciable and, at most, a minimal effect. That dialogue is something we are keen to continue. We respect the fact that -- you know, and as I'll talk a little bit about later, that we have had an active dialogue with the broader non-Indigenous community as well, dating back to August.

And moving to the next slide, Frank, that includes webinars, fact sheets, public inquiries, community sessions. We had 4,400 people visit our visitor centre last year and do site bus tours. I mean we have worked as



hard as we could to engage the community, talk to the community broadly about this.

And you know, I recognize we are just at the part one stage of this process. The process isn't complete till part two, and following part two. And so over the course of the coming months we plan to build on this, whether it's with Indigenous communities or non-Indigenous communities and are going to encourage all those folks to continue to either engage with us, engage with the CNSC, engage in the process.

You know, we are -- one of the pieces of feedback that we -- that I commonly get -- I can share with you personally. When I discuss with people whether it's a municipal leadership level, or people who come to many of our functions, is that you know, the nuclear industry is a very transparent industry, and CNSC is a very transparent commission with a public process. It provides for the opportunity for communities to engage.

We are going to continue to encourage people to engage in that process. Where we can, we're happy to enable that to whatever extent is practical or reasonable.

So I appreciate the opportunity to share with you our commitment to the environment and engagement and look forward to your questions later.

I'll now turn it back over to Mr. Saunders to conclude.

**MR. SAUNDERS:** Yeah, Frank Saunders.

Our conclusions, of course, are that -- just a repetition of our "ask", which is a 10-year operating licence. We believe that we have met the requirements, and are now available to answer any of your questions.

**THE PRESIDENT:** Thank you.

--- Pause

**THE PRESIDENT:** Okay, just checking, just checking.

So I would like to move now to the presentation from CNSC staff, as outlined in CMD 18-H4 and 18-H4.A.

I understand, Mr. Frappier, you'll make the presentation, and you may proceed

**CMD 18-H4/18-H4.A**

**Oral presentation by CNSC staff**

**MR. FRAPPIER:** Thank you. Thank you, and good afternoon, Mr. President, and Members of the Commission.

Staff would like to welcome the new

Commission Members. You can rest assured our job is to ensure that you have all the information you need to make a decision. So if we're not doing that, please fill in the blanks with questions. We are quite keen on that.

As I said, my name is Gerry Frappier, and I am the Director General of the Directorate of Power Reactor Regulations at the CNSC. With me today are Mr. Luc Sigouin, Director, Bruce Regulatory Program Division, and Mr. Ken Lun, Senior Regulatory Program Officer of the same division.

As well, we have regulatory and technical staff from the CNSC, who are present and available to answer any questions the Commission might have.

This presentation provides information in relation to the renewal of the Bruce A and B Power Reactor Operating Licence. It provides a summary as well as highlights from the CNSC staff's written submission found in CMD 18-H4.

As you can see from the outline, this presentation focuses on CNSC staff's regulatory oversight and assessments of Bruce Power's performance. I will go over the purpose of the hearing and provide a brief background of Bruce A and B.

The Commission granted Bruce Power its first licence to operate the Bruce A and B stations in

2001. Before this the station has been operated by Ontario Hydro under licences from the AECB. The most recent hearing was conducted by the Commission in 2015. This hearing represents the sixth licence renewal request to the Commission.

In June 2017, Bruce Power submitted a request to the Commission to renew its Power Reactor Operating Licence for a period of 10 years, which encompasses operation, as well as activities related to refurbishment, which Bruce Power refers to as Major Component Replacement or MCR.

In support of the licence application and activities associated with refurbishment, Bruce Power has also completed a Periodic Safety Review, or PSR, in accordance with the CNSC Regulatory Document, REGDOC-2.3.3, on periodic safety reviews.

In its application, Bruce Power is requesting the Commission to approve operations of Bruce A and B up to a maximum of 300,000 equivalent full power hours. The current licence allows for operations up to 247,000 EFPH. Bruce Power is also requesting the Commission to accept the scope of the refurbishment project, as identified in the integrated implementation plan.

Lastly, Bruce Power is requesting the

consolidation of the Class II Nuclear Facilities and Nuclear Substances and Radiation Devices licences for them to be folded into the power reactor operating licence.

Very quick little bit of background. I know Bruce already did some but we'll just go over a couple of slides from our perspective.

Bruce Power is located in the Municipality of Kincardine, in the County of Bruce, Ontario. The Bruce A and B stations are part of the Bruce Nuclear Power Development site on the shores of Lake Huron.

While Ontario Power Generation owns the Bruce A and B stations, Bruce Power operates these stations under a lease agreement with the Ontario Power Generation.

The Bruce A station consists of four 750-megawatt CANDU reactors which came into service between 1977 and 1979. The Bruce B station consists of four 817-megawatt CANDU reactors which came into force or into service between 1984 and 1987.

All eight units are currently operational. Bruce A Units 1 and 2 were refurbished and returned to service in 2012.

In 2015, the Commission issued a combined licence for Bruce A and B. The current Bruce A and B operating licence expire on May 31, 2020.

As previously mentioned, Bruce Power has

requested a 10-year licence. The proposed 10-year licensing period encompasses operation, as well as activities related to refurbishment, which is planned to begin in 2020. In order to ensure that the scope of the refurbishment activities are defined prior to the beginning of the first outage, Bruce Power has requested to update the licensing basis in 2018 - two years ahead of the expiry of the current licence.

Commission Member Document CMD 18-H4, provides CNSC staff's conclusions and recommendations to support the Commission's decision on the licence renewal application.

The CMD provides information in all 14 of CNSC safety and control areas, with focused highlights on CNSC staff's environmental assessment under the *Nuclear Safety and Control Act*, Bruce Power's environmental risk assessment and predictive environmental risk assessment, the refurbishment program itself, the periodic safety review, fitness for service for major components, an update on the Fukushima action items, and engagement with Indigenous groups.

CNSC staff's conclusions and recommendations are based on the assessment of Bruce Power's submitted licence application and the supporting information, the licensee's past performance in

all 14 safety and control areas,  
Other matters of regulatory interest such as the *Fisheries*  
Act authorization, licensee's public information program,  
and Indigenous people's consultation and engagement  
activities.

I will now pass the presentation over to  
Mr. Sigouin who will discuss CNSC's regulatory oversight,  
Bruce Power's periodic safety review and major component  
replacement project, and an overview of Bruce Power's  
performance assessment in the 14 safety and control areas.

**MR. SIGOUIN:** Thank you, Mr. Frappier.

Mr. President and Members of the  
Commission, my name is Luc Sigouin. I am the Director of  
the Bruce Regulatory Program Division here at the CNSC.

The CNSC has a clear and robust regulatory  
framework in place to ensure the continued safe operation  
of nuclear facilities.

Regulatory oversight is maintained to ensure that licensees  
operate in a safe manner,

Regular inspections and evaluations verify  
that licensees are complying with the applicable laws and  
regulations, as well as the conditions of their licence.

The link between the licence and the  
licence conditions handbook will be discussed later in the  
presentation.

The CNSC compliance verification approach includes activities to assess and verify compliance, as well as graduated enforcement actions to address instances of non-compliance. As such, action items raised by CNSC staff require licensees to implement corrective actions to address items of non-compliance.

Licensees are required to report events in accordance with REGDOC-3.1.1 "Reporting Requirements for Nuclear Power Plants".

The types of reports submitted by Bruce Power include, for example, quarterly reports on safety performance indicators, an annual report on environmental protection, an annual report on fuel monitoring and inspection, and unplanned event reports.

CNSC staff review all events, compliance and performance reports, as well as results of ongoing monitoring activities. The results of the reviews are reported to the Commission through the annual Regulatory Oversight Report for nuclear power plants as well as during regular status updates at Commission meetings and hearings.

CNSC staff conduct compliance activities which include reviews, walkdowns and inspections. In addition, routine surveillance and monitoring activities are conducted above and beyond the walkdowns and inspections to provide further verification that the plant



is operating in accordance with regulatory requirements. Surveillance and monitoring consist of on-site activities such as attending licensee meetings, reviewing logs, reviewing problem identification databases, and having formal and informal discussions with licensee staff.

Any deficiencies or areas of improvements identified by CNSC staff were addressed by Bruce Power. Bruce Power maintains a robust management system that includes a problem identification and corrective action program. Problems or issues identified are documented in Bruce Power's station condition record system, or SCR, to ensure that appropriate actions are taken. CNSC staff perform routine reviews of the station condition record system. Most of the station condition records identified were of low risk significance and do not require a formal corrective action plan to resolve the issue.

Directives, action notices or recommendations raised by CNSC staff from reviews or inspections are tracked to completion by staff. The results of inspections indicated that Bruce Power has made adequate provisions for the protection of the environment and the health of persons.

Bruce Power is responsible for ensuring safe operation of the stations and CNSC staff independently verify Bruce Power's performance. CNSC site inspectors

carry out daily walkdowns as well as inspections with specialist staff from Ottawa, following the CNSC risk informed baseline compliance program. The regulatory efforts can be adjusted depending on the performance of the licensee as well as the need to oversee special project such as refurbishment.

As shown in this table, the compliance verification activities by CNSC site inspectors during the current licensing period were comprised of REGDOC-3.1.1 event report reviews, walkdowns and inspections. These activities represent an average of 1700 person days of effort per year at the Bruce site, with over 5000 total person days of effort per year spent on all Bruce regulatory compliance activities. The reported numbers in 2015 were lower at site compared to other years as CNSC site staff efforts were shifted towards activities required to support the 2015 licence renewal.

CNSC did not identify any significant findings as a result of the compliance activities that were performed at Bruce A and B.

I will now go over the periodic safety review that Bruce Power conducted in support of its licence application.

CNSC REGDOC-2.3.3 on Periodic Safety Review contains CNSC's regulatory expectations for

conducting a periodic safety review, or a PSR. A periodic safety review is a comprehensive evaluation of the design, condition and operation of a nuclear power plant. A PSR involves an assessment of the current state of the plant as well as plant performance to determine the extent to which the NPP conforms to modern standards and best practices and to identify any factors that would limit safe long-term operation. This enables the determination of reasonable and practical modifications that should be made to the plant or programs to enhance the safety of the facility to a level approaching that of a new NPP and to allow for safe long-term operation.

In accordance with international practice, 10 years is considered an appropriate interval between PSRs.

CNSC REGDOC-2.3.3. provides the four phases of conducting a periodic safety review.

The first phase is the PSR Basis Document which documents the agreement between the regulator and the licensee on how the PSR will be conducted.

The second phase is to prepare safety factor reports which contain the detailed technical assessments that compare the plant and programs to the modern standards.

In the third phase, the Global Assessment

Report summarizes the findings of the safety factor reports to provide an overall assessment of the safety of the plant and identify practical actions that can be implemented to improve the plant.

As the final step, these safety improvement actions are then included in the Integrated Implementation Plan.

The conduct of a PSR is intended to be a requirement that can be aligned and repeated with licence renewal and form part of a licensing basis for regulated facility.

In 2014 Bruce Power began its work on PSR with a focus on Bruce A. In 2015, when Bruce Power reached an agreement with the Ontario government for refurbishment, the scope was expanded to include Bruce B. Bruce Power's work on PSR took place over a three-year period, with the final Integrated Improvement Plan submitted to CNSC staff in 2017.

The Bruce Power PSR addressed 64 modern standards. The list of modern standards and practices submitted in the PSR were assessed and accepted by CNSC staff through the approval of the PSR Basis Document.

CNSC staff have concluded that Bruce Power identified all the strengths and gaps in the safety factor reports, that the results of the safety factor review were

incorporated into the Global Assessment Report, and that the improvements needed to address the gaps are all identified in the Integrated Implementation Plan.

The Integrated Implementation Plan, or IIP, presents the proposed safety improvements and includes timeframes for implementation. Bruce Power identified 191 improvements in the implementation plan, with defined completion dates. The IIP was accepted by CNSC staff in September 2015.

Some examples of the major activities identified in the IIP include the replacement of major components such as fuel channels, steam generators and feeders, the installation of a containment filtered venting system to address lessons learned from the Fukushima accident, and upgrades to fire protection systems, including detection, fire water supply and sprinkler systems.

The 191 identified improvements will be implemented during scheduled maintenance outages or during extended refurbishment outages. Staff conclude that Bruce Power has identified corrective actions and improvements to improve the level of safety over the next licensing period. The proposed safety improvements have all been captured in the IIP.

In concluding the PSR discussion, CNSC

staff reviewed and submitted information and determined that Bruce Power's PSR met the requirements of REGDOC-2.3.3 on Periodic Safety Review. Bruce Power has systematically reviewed the current state of the plant against modern standards and practices and has identified the improvements that need to be made to Bruce A and Bruce B. CNSC staff will report annually on the status of all IIP commitments to the Commission through the Annual Regulatory Oversight Report for NPPs.

I will now go over CNSC staff's review of the Bruce Power refurbishment project.

As you have already heard from Bruce Power, the refurbishment work differs slightly from previous projects in that work is divided into two categories: major component replacement work and asset management work.

The major component work includes the replacement of fuel channels, steam generators and feeders. The replacement of these major components requires significant field time and requires the reactor to be placed in a defuelled and dewatered state.

Asset management work includes the replacement of other components and is generally not considered to be on the critical path of refurbishment activities. The work can be completed during a scheduled

outage or when the unit is online or during an extended MCR outage. Some examples of asset management work include inspections of calandria vessels, replacement of maintenance cooling heat exchangers and replacement of some electrical components.

As previously stated, Bruce Power reached an agreement with the Province of Ontario on refurbishment in 2015. This slide provides the approximate timeframe for refurbishment of the Bruce units. Starting with Bruce B Unit 6 in 2020, refurbishment would continue until 2033, with Unit 8 being the final unit. The current requested licence period would expire in 2028. Pending the licensing decision by the Commission, Bruce Power would need to submit a new application prior to the start of refurbishments of Units 7 and 8.

Following refurbishment of a unit, the licensee is required to perform commissioning tests to demonstrate that the reactor facility can operate in the modes for which it has been designed. Bruce Power is required to demonstrate that the associated work meets specified requirements and to ensure that documentation has been updated appropriately.

Similar to other refurbishment projects, CNSC staff identified four regulatory hold points for the return to service of each unit undergoing refurbishment

work. These hold points include prior to fuel load, prior to removal of guaranteed shutdown state, prior to exceeding 1 percent full power, and prior to exceeding 35 percent full power. These hold points would serve as regulatory verification to ensure that all commitments have been met for staged increases in reactor power. Prerequisite commitments for each regulatory hold point are included in the draft License Conditions Handbook.

CNSC staff are recommending that the approval to remove regulatory hold points be delegated to the Executive Vice President and Chief Regulatory Operations Officer of the CNSC. For reference, a similar delegation of authority was previously granted for the Darlington refurbishment, the Point Lepreau refurbishment, and also for the Bruce Power Units 1 and 2 refurbishment projects.

Bruce Power's Asset Management Program is a living program which will play a key role in managing the aging of the facility. It includes safety system tests, periodic inspections, system and component health monitoring, and lifecycle management plans. The aging assessments of assets will be performed on a periodic basis and will consider inputs such as equipment failures, maintenance backlogs, performance trends and obsolescence issues.



Asset management is an adaptive approach which allows adjustments to be made in the maintenance strategies based on the condition of structures, systems and components. If inspection results show faster than expected degradation, then a replacement may take place earlier than initially planned and inspection frequencies can be increased. If the inspection results show that degradation effects are minor, then the replacement may be made at a later date.

CNSC staff have reviewed the Asset Management Program as part of the Periodic Safety Review and the implementation of the asset management program has been included in the Integrated Improvement Plan. CNSC staff determined that the conditions of structures, systems and components were adequately assessed and that plans are in place to manage the conditions of structures, systems and components, including aging-related degradation mechanisms.

In concluding the refurbishment discussion, CNSC staff did not identify factors which would limit safe operation over the next licence period. In addition to major component replacement, the Asset Management Program will support long-term planning for the continued operation of Bruce A and B pending future licensing decisions by the Commission.

Bruce Power has programs and processes in place to safely manage refurbishment work. CNSC staff will maintain oversight of the programs by conducting detailed refurbishment reviews and inspections. The reviews and inspections will focus on topics such as project execution, contractor and project management, and training programs.

Regulatory hold points will ensure operational readiness of structures, systems and components for the return to full power operation. The hold points would serve as regulatory verification to ensure prerequisite commitments have been met for staged increases in reactor power.

Given that the refurbishment work will span several years, CNSC staff will provide updates to the Commission on the status of the project through the Annual Regulatory Oversight Report for NPPs and the Status Updates on Power Reactors.

I will now provide an overview of CNSC staff's performance assessment of Bruce Power in the 14 safety and control areas.

This slide provides a summary of the Bruce A and B plant ratings over the current licence period for the 14 safety and control areas. It should be noted that the 2014 ratings are included in the slide for trending purposes.

CNSC staff continues to report on the performance of Bruce A and B separately, even after the licences were combined into a single licence in 2015. Although many of the programs, processes and procedures are shared between Bruce A and B, each station has its own separate work crews and the stations differ in design, as Bruce B was built seven years after Bruce A.

The ratings for 2017 are not available at this time as CNSC staff are still working on compiling the findings. Based on preliminary results however, CNSC staff do not expect the ratings to change in 2017.

This slide provides some of the highlights on Bruce Power's performance over the current licensing period.

Bruce Power meets regulatory requirements in all SCAs and received a satisfactory rating or higher in each safety and control area. No workers or members of the public received radiation doses in excess of the regulatory limits and all radiological releases were well below regulatory limits. Releases of nuclear and hazardous substances are assessed, controlled and monitored. Licensee programs are implemented and maintained effectively and in accordance with regulatory requirements. Safety enhancements and improvements continued to be made during the current licensing period.

As previously mentioned, the regulatory focus areas include the 14 safety and control areas as well as other matters of regulatory interest. In assessing the licence application, all safety and control areas were assessed. CMD 18-H4 presents CNSC staff's assessment for each of the areas in detail. For the purpose of the presentation we will focus on seven safety and control areas in particular.

I will now pass the presentation on to Mr. Lun, who will provide focused highlights on these seven areas as identified in the slide.

**MR. LUN:** Thank you, Mr. Sigouin.

Mr. President and Members of the Commission, my name is Ken Lun. I am the Senior Regulatory Program Officer of the Bruce Regulatory Program Division.

The human performance management SCA covers activities to ensure that workers have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties. Minimum shift complement was maintained at Bruce A and B.

Following the return to service of Bruce A Units 1 and 2 in 2012, additional certified staff were required to operate those units. While minimum complement was maintained at Bruce A, some positions were occasionally required to exceed the limits of hours of work. This kind

can have a potential impact on worker fatigue and could lead to the impairment of the performance of workers who are performing safety-sensitive work. As a result, Bruce Power made enhancements to its processes to manage worker fatigue. In addition, Bruce Power continued to hire and train more qualified operators. In 2017 the number of limits of hours of work exceedance was reduced compared to previous years.

The safety analysis SCA covers the maintenance of safety analysis that supports the overall safety case for the facility. Bruce Power effectively managed deterministic and probabilistic safety analysis programs. I will provide highlights on the probabilistic aspects in the next few slides.

Probabilistic safety assessment, or PSA, complements the deterministic safety analysis by integrating information about plant design, operations, component reliability and human actions. It includes the assessment of the adequacy of the protection of the plant against internal and external hazards such as internal fire or flood, seismic event or high winds.

The 2014 PSA results which form part of the current licensing basis were reviewed and accepted by CNSC staff. The results showed safety goal limits for Bruce A and B were met for both severe core damage

frequency and large release frequency.

In the 2017 licence application, Bruce Power provided estimated PSA data which include planned improvements to enhance the safety of the plant. The estimated PSA data was provided for information only and showed improved numbers for large release frequency. CNSC staff will review the detailed modelling of the planned station improvements as part of the next PSA update expected to be submitted in 2019.

The PSA results are reviewed and updated on a five-year basis. It is also being updated as part of the implementation of REGDOC-2.4.2 on probabilistic safety assessment. It will supersede the 2014 PSA upon acceptance by CNSC staff.

In CNSC staff's written CMD it is stated that Bruce Power will develop a process to consider if further enhancements should be made if the PSA results are between safety goal limits and safety goal target. The process has now been developed. CNSC staff performed a high-level review of the document and determined that the process is consistent with industry's practice. An example of planned enhancements includes upgrades to the fire protection system to improve the internal fire event PSA results.

In this slide the existing 2014 PSA

results are shown in the two left-hand columns. The estimated data with planned improvements are shown in the two right-hand columns. The estimated data showed improved large release frequency results, taking plant improvements into consideration.

To summarize, the 2014 PSA results have been reviewed and accepted by CNSC staff. The safety goal limits for severe core damage frequency and large release frequency were met. Bruce Power will submit the new PSA results in 2019 that include station enhancement as part of the implementation of REGDOC-2.4.2 on probabilistic safety assessment.

The fitness for service SCA covers activities that impact on the physical condition of structures, systems and components, or SSCs, to ensure that they remain effective over time. Bruce Power has programs in place to manage aging SSCs in accordance with REGDOC-2.6.3 on aging management. Managing the aging of major components is integral in ensuring safe long-term operations.

Specifically, Bruce Power developed lifecycle management plans to manage the aging of major components. The plans include items such as evaluation of the component's aging degradation mechanisms, inspection methods, and repairs or replacement strategies. For

example, feeders can be replaced if they do not meet structural margins prior to refurbishment.

Aspects related to aging management of fuel channels to allow continued operation up to 300,000 equivalent full power hour will be discussed later on in the presentation.

Conventional health and safety SCA covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.

Two worker injury events at Bruce B were reported to the Commission in the current licensing period. The first event was related to a hydrogen flash which occurred in 2016, while the second event was related to an electrical burn in 2017. The events resulted in the SCA rating being downgraded in 2016 to satisfactory and will remain satisfactory in 2017.

The events are described in further detail in CNSC staff's written CMD. In both cases CNSC staff conducted focused inspections to ensure that Bruce Power took corrective actions to prevent the recurrence of the events. Despite these injuries, the accident frequency rate at Bruce Power remained low compared to the Canadian industry.

The environmental protection SCA covers programs that identify, control and monitor all releases of



radioactive and hazardous substances, and effects on the environment from facilities. To ensure the protection of the environment and health of persons, the CNSC conducts an environmental assessment under the NSCA for all projects within its mandate.

CNSC staff completed an Environmental Assessment Report which was included in CNSC staff's written CMD. The Environmental Assessment Report considers current operations and future activities which include refurbishment. The report was produced using a number of different sources which are shown in the right-hand side of this slide.

CNSC staff concluded that the potential risk from physical stressors as well as radiological and non-radiological releases to the environment are generally low to negligible. In addition, Bruce Power's Environmental Risk Assessment is consistent with the methodology described in CSA N288.6 on Environmental Risk Assessment.

The Emergency Management and Fire Protection SCA covers emergency plans and emergency preparedness programs.

Bruce Power has the capability to respond effectively to any emergency. Bruce Power's Emergency Response Plan covers both nuclear emergencies and

conventional emergencies such as fire. An adequate nuclear emergency plan is in place. This plan is tested on a regular basis which includes conducting large-scale exercises. CNSC staff determined that Bruce Power demonstrated its response capability in their Huron Resolve exercise, which was discussed in Bruce Power's presentation.

As part of the Huron Resolve exercise, Bruce Power tested out a D-LAN system to provide plant information to CNSC Emergency Operations Centre. CNSC staff require prompt and accurate plant information to independently understand the on-site situation and to predict the potential for radiological releases during emergencies. The D-LAN system currently relies on human intervention to enter the data. A feasibility study is being undertaken by Bruce Power in 2018 to determine how this function can be automated.

Bruce Power met regulatory requirements in the security SCA. However, in 2016 Bruce A and Bruce B SCA ratings were downgraded to satisfactory based on challenges faced within areas of security practices, and drills and exercise. There have been no safety significant issues experienced with security equipment at Bruce A and B.

Bruce Power demonstrated its ability to respond to security threats through a force on force

exercise in 2016. There are measures in place to protect against cyber attacks. Bruce Power continued the implementation of CSA N290.7 on cyber security. The implementation will improve cybersecurity measures, including obtaining more cybersecurity assets.

In addition to the performance assessment of SCAs, CNSC staff identified other matters that are of regulatory interest. The next two slides focus on some of those matters.

CNSC staff determined that Bruce Power has made significant progress in addressing Fukushima Action Items. A correction should be made to CNSC staff's written CMD, where only three of the 13 stations' specific action items remain open. The external event hazard assessment that was identified as being open should be closed as Bruce Power performed the required assessment. All remaining actions are expected to be completed by end of 2022 as some of the improvements can only be made during a station outage.

The earlier presentation by Bruce Power provided a brief summary of the Operation Safety Review Team, or OSART, mission in 2015 and a follow-up mission in 2017. Eighteen of the 19 improvements are considered closed.

The remaining improvement is related to

drug and alcohol testing of key staff and safety in important roles, which was not a regulatory requirement in 2015. In March 2018 Bruce Power will submit an implementation plan on meeting this requirement.

In 2006 a follow-up monitoring program was developed to verify the accuracy of the environmental assessment predictions of no significant adverse environmental effects from the Bruce A refurbishment project and to verify the effectiveness of mitigation measures. In 2016 CNSC staff reviewed the final follow-up monitoring program report and determined that the follow-up monitoring program for Bruce A refurbishment project was concluded. Bruce Power will continue to perform environmental monitoring and assess future impacts such as thermal plume effects and entrainment of Deepwater Sculpin as part of the environmental risk assessment.

Bruce Power has a well-established public information and disclosure program. The program ensures that information about health, safety and security of persons and the environment were communicated to the public. The program demonstrates an open and transparent dialogue with the target audiences and stakeholders.

In 2015 the Department of Fisheries and Oceans, or DFO, determined that there is a need for an authorization under the *Fisheries Act*. The *Fisheries Act*

uses a different test than the environmental protection requirements of the NSCA and the *Canadian Environmental Assessment Act of 2012*. The process for obtaining a *Fisheries Act* authorization is separate from that of CNSC licence renewal as they are covered by different legislation.

In 2013, a Memorandum of Understanding was signed between CNSC and the DFO outlining areas for cooperation and administration of the *Fisheries Act*. The CNSC will be responsible for the assessment and monitoring of the environmental impacts on fish, while the DFO remains accountable for issuing *Fisheries Act* authorization, including the offset measures. In essence, the DFO will determine the adequacy of the proposed offset projects.

Bruce Power expects that the application will be ready to be submitted to DFO in the latter part of 2018, pending outcomes of the continuing discussions with the CNSC and the DFO.

I will now discuss Bruce Power's specific requests made in its licence application.

The first request deals with the consolidation of other CNSC licences with the power reactor operating licence. These licences include the consolidated use of nuclear substance for laboratories and radiation devices, industrial radiography for non-destructive

testing, and irradiator facility for instrument calibration. Bruce Power requested the consolidation because these activities result directly from and provide support for licensed activities at Bruce A and B. CNSC staff concluded that the proposed consolidation will not remove any regulatory requirements and will allow for more efficient regulatory oversight. All requirements from these licences have been incorporated in the proposed power reactor operating licence. There is no reduction to the requirements or oversight as a result of the licence consolidation.

Now on to the second request. In its application, Bruce Power requested Commission approval to operate the units up to a maximum of 300,000 equivalent full power hour, or EFPH. Bruce Power is currently licensed to operate Bruce A and B up to a maximum of 247,000 equivalent full power hour and hydrogen equivalent concentration, or HEQ, of 120 ppm. These two limits are currently being met by Bruce Power. In order to meet refurbishment schedule, some units will be required to operate beyond the current EFPH and HEQ values. I will talk about HEQ in the next slide.

To demonstrate fitness for service of fuel channels, Bruce Power provides lifecycle management plans to manage the aging of components, inspection results from

periodic inspection programs, control room procedures and protocols, which include information on how control room staff monitor the heat transport system for leakage, and industry operating experience and research. The licensee must also evaluate the effects of flaws and operating conditions on pressure tubes to confirm that licensing basis margins are maintained and demonstrate through safety analysis evaluation that the failure of a pressure tube will not impact the ability to safely shut down the reactor and prevent core damage. To summarize, there are adequate regulatory controls in place for ongoing confirmation of fitness for service for fuel channels.

Before I go into detail on the work Bruce Power is performing to support operation up to 300,000 equivalent full power hour I want to summarize the key points from the technical update CNSC staff provided to the Commission on fuel channel fitness for service in Canadian NPPs, specifically on pressure tube fracture toughness.

During operation pressure tubes experience high temperature, high pressure and neutron irradiation. They are also subject to corrosion and deuterium ingress effects. Of all the stressors, the dominant contributor to risk of pressure tube failure is increasing deuterium concentration, which has an impact on pressure tube fracture toughness.

Deuterium concentration is measured in hydrogen equivalent concentration, or HEQ. Adequate fracture toughness is required to prevent a pressure tube rupture if a crack developed.

Currently, Bruce Power, along with the Canadian industry, developed two fracture toughness models for HEQ levels up to 120 ppm. These models are used in Bruce Power's assessment to demonstrate safe operation of pressure tubes in the unlikely event that a crack initiates and propagates through a wall of the pressure tube. Bruce Power has indicated that HEQ is estimated to reach approximately 150 ppm prior to refurbishment, which is beyond the limits of the current model. Bruce Power has a plan in place to continue the development with the fracture toughness model up to HEQ of 160 ppm. In addition, Bruce Power will perform ongoing monitoring of hydrogen content of pressure tubes. Finally, research and development work such as pressure tube burst tests will continue. Bruce Power must demonstrate to the CNSC that sufficient safety margins remain for the fracture toughness model for HEQ of 160 ppm.

This table was presented by Bruce Power earlier. It is important to note that Units 5, 7 and 8 will go beyond HEQ levels of 120 ppm prior to the refurbishment dates. These units will not be allowed to



operate unless fracture toughness model in excess of HEQ of 120 ppm is developed. The estimated HEQ levels at the time of the MCR outage are within the bounds of the new model at HEQ levels up to 160 ppm.

Irrespective of the EFPH value, Bruce Power must demonstrate to the CNSC that fuel channels are fit for service to allow the continued safe operation of the units. CNSC staff recommend that the Commission approve operation of Bruce A and B up to a maximum of 300,000 equivalent full power hour based on, number one, Bruce Power will continue to operate its units within the licensing basis and maintain adequate safety margins; two, degradation mechanism of pressure tubes are well known; and three, Bruce Power has an acceptable inspection and monitoring program in place specifically to monitor the HEQ levels. An established regulatory process oversight process is in place to ensure that Bruce Power will meet its commitments.

CNSC staff's recommendation is contingent on Bruce Power developing a fracture toughness model for HEQ in excess of 120 ppm.

Even though there is adequate regulatory oversight of this issue, for better transparency and to provide the licensee with clear acceptance criteria, CNSC staff are recommending a licence condition be placed on

Bruce Power to maintain pressure tube fracture toughness sufficient for safe operation.

The acceptance criteria for demonstration of fracture toughness are defined in the License Conditions Handbook. The criteria clearly define the work that Bruce Power is required to perform as well as defined dates on when the work has to be completed. Bruce Power must meet the acceptance criteria. Otherwise, the units will not be authorized to operate. Bruce Power is also required to provide a semi-annual update to the CNSC staff on the work progress. Finally, CNSC staff will report to the Commission on the status of work through the Annual Regulatory Oversight Report for NPPs.

I will now pass the presentation back to Mr. Sigouin to go over other activities that CNSC staff were involved in since the last licence renewal.

**MR. SIGOUIN:** Thank you, Mr. Lun.

Once again, it's Luc Sigouin, for the record.

The CNSC's Independent Environmental Monitoring Program, or IEMP, was implemented to verify that public health and the environment are not adversely affected by releases around CNSC regulated facilities. This verification is achieved through independent sampling and analysis by CNSC staff. The previous sampling campaign

related to Bruce Power was carried out in 2016, with the next campaign scheduled for 2019. Detailed results of the CNSC analysis are consistent with the results submitted by Bruce Power and these are available on the CNSC's public website.

As an agent of the Crown, the CNSC understands the importance of building relationships and consulting with Aboriginal peoples in Canada. The CNSC ensures that all its licensing decisions under the *Nuclear Safety and Control Act* uphold the honour of the Crown and consider potential or established Aboriginal and treaty rights. The Bruce site lies within the traditional territories of the Chippewas of Nawash Unceded First Nation and Saugeen First Nation, who together form Saugeen Ojibway Nation (SON), as well as the Métis Nation of Ontario (MNO), and the Historic Saugeen Métis (HSM).

In September 2017 CNSC staff sent letters of notification to the Saugeen Ojibway Nation, the Métis Nation of Ontario and the Historic Saugeen Métis, in addition to the Union of Ontario Indians and the Chiefs of Ontario. CNSC staff met with SON, the MNO and HSM to discuss the application, the process for getting involved and to better understand their concerns related to the Bruce site. Follow-up information, including the licence renewal CMD and the EA report, was sent to the groups in

February 2018.

CNSC staff have not identified any potential novel off-site impacts resulting from this licence renewal application but recognize that concerns related to impacts on fish have been raised by SON and the MNO.

CNSC staff and Bruce Power have continually engaged with SON, the MNO and the HSM, both individually and jointly, and will continue to do so throughout the lifecycle of the facility. Bruce Power has a formal relationship with each of the groups through established protocol agreements. These agreements provide the framework for the continued collaboration between Bruce Power and each group.

All of the identified indigenous groups have been encouraged to participate in the review process and in the public hearings to advise the Commission directly of any concerns they may have in relation to this licence application. The CNSC also continues to meet with indigenous groups to encourage and maintain productive and respectful relationships.

Finally, participant funding was provided to SON and the MNO for meetings to work through issues of interest such as the discussions on issues related to licence renewal, refurbishment and impacts of operations of

the nuclear power plants on fish population.

When hearing dates were announced, a total of \$100,000 was made available under the Participant Funding Program to assist members of the public, indigenous groups and other stakeholders to participate in the review of the licence application. Participant funding allows for the provision of new, distinctive and valuable information to the Commission through informed and topic-specific interventions. A Funding Review Committee that is independent from the CNSC was established to review the funding applications received. Eight applicants were awarded PFP funds to the amount of \$76,500. These recipients will be providing interventions for Part 2 of these proceedings.

CNSC staff conducted multiple outreach activities in the local Bruce communities. The activities included providing information on the CNSC licensing process and on Bruce Power's refurbishment project.

The Bruce licence renewal public hearing was communicated to members of the public. This included posting the Notice of Public Hearings on the CNSC website, sending information to subscribers, and posting ads in digital and print media.

CNSC staff made presentations to the local town councils, which included Bruce County, Kincardine and

Saugeen Shores. Discussions with the councils included, for example, the licence renewal process, Participant Funding Program, and key topics of interest for the Bruce licensing process.

I will now briefly discuss the proposed licence and Licence Conditions Handbook. It should be noted that these documents are considered draft and are subject to change prior to Part 2 of the Commission hearing.

CNSC staff are recommending a 10-year licence period. This is based on the following two factors. First, CNSC staff are recommending that Bruce Power be required to conduct a periodic safety review on a 10-year frequency. This aligns with international practice for PSRs. And second, Bruce Power has demonstrated continued satisfactory performance and a commitment to continue to improve performance in all safety and control areas.

Annual reporting in the Regulatory Oversight Report for Nuclear Power Plants to the Commission provides the public with frequent updates regarding CNSC regulatory oversight activities and Bruce Power's operation. The public has been invited to participate in these proceedings to present their views on the performance of the licensees.

The wording of the licence conditions for the 14 safety and control areas are standardized to allow consistent use across all Class 1 nuclear facilities. Each licensee will have additional licence conditions which set out the requirements that are specific to the operation of that facility. For example, during the 2015 licence renewal hearing, a licence condition was imposed on Bruce Power requiring the licensee to inform the Commission of any plan to refurbish a reactor or replace a major component of the nuclear facility.

The licensees are required to implement and maintain programs as approved by the Commission which are referenced in the Licence Conditions Handbook and they are required to operate within the bounds of the licensee basis set by the Commission.

The licence condition does not explicitly prohibit changes with a neutral or positive impact on safety. The changes shall be within the licensing basis and shall be made in accordance with the licensee's management program.

There are currently a total of 26 CNSC regulatory documents referenced in the proposed Licence Conditions Handbook as compliance verification criteria. The full list of regulatory documents are found in the Appendix section of the proposed Licence Conditions

Handbook.

Twenty CNSC regulatory documents remain unchanged since last licence renewal. A total of six new or revised CNSC regulatory documents have been added.

In addition to the CNSC regulatory documents, there are currently a total of 25 CSA standards referenced in the Draft Licence Conditions Handbook. Fourteen standards remain unchanged, one was updated and 10 new standards are added in the proposed Licence Conditions Handbook.

The Licence Conditions Handbook, or LCH, also contains additional regulatory documents and standards which are used by the licensee as guidance documents. There has been no reduction in regulatory requirements since the last licence renewal.

I will now pass the presentation back to Mr. Frappier for CNSC staff's conclusions and recommendations.

**MR. FRAPPIER:** Thank you, Mr. Sigouin.

Gerry Frappier, for the record.

Based on the assessment of the Bruce Power safety performance, CNSC staff conclude that as per section 24(4) of the *Nuclear Safety and Control Act* Bruce Power is qualified to carry out the activities authorized by the licence and in carrying out the licence activities Bruce



Power has made and will continue to make adequate provisions for the protection of the environment, the health and safety of persons, the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

CNSC staff recommend that the Commission accept the conclusions and recommendations presented in CMD 18-H4 and exercise its authority under the *Nuclear Safety and Control Act* to renew the licence and to authorize Bruce Power to continue to operate the Bruce A and B nuclear generating station for a period of 10 years from September 1st, 2018 to August 31st, 2028.

CNSC staff also recommend that the Commission consolidate the licence for industrial radiography, the Class 2 irradiator facility, and the consolidated use of nuclear substances into the power reactor operating licence.

Finally, CNSC staff recommend the Commission to authorize Bruce Power to operate Bruce A and B up to a maximum of 300,000 equivalent full power hours.

Furthermore, CNSC staff recommend that the Commission place the following conditions on Bruce Power as part of the licence renewal:

Implement the integrated implementation plan resulting from the periodic safety reviews supporting

this licence renewal application;

Demonstrate that the reduction in fracture toughness of the pressure tubes does not impact safe operations;

Implement a return to service plan for refurbishment activities;

Obtain authorization from the Commission or a delegate to remove regulatory hold points during the return to service; and finally,

Conduct another periodic safety review as part of the next licence renewal in 2028.

CNSC staff also recommend that the Commission authorize the delegation of authority as indicated in two proposed licence conditions on this slide. The first is licence condition 3.2 for restart after serious process failure, and the second is licence condition 15.5 for the removal of regulatory hold points related to return to service.

The Commission may delegate authority to CNSC staff with respect to the administration of licence conditions or portions thereof and CNSC recommends that the authority be delegated to the Executive Vice-President of the Regulatory Operations Branch. This is the same as what has been delegated for other power reactor operating licences, such as Point Lepreau and Darlington.

Again, CNSC staff recommend that the Commission accept CNSC staff's conclusions and recommendations presented in CMD 18-H4 and exercise its authority under the *Nuclear Safety and Control Act* to renew the licence and to authorize Bruce Power to continue to operate the Bruce A and B nuclear generating station.

Thank you, Mr. President, Members of the Commission. We're prepared to respond to any questions you may have.

**THE PRESIDENT:** Okay. I think it's a good time to take a break for about 15 minutes. We'll start the question period right after that.

Thank you.

--- Upon recessing at 3:17 p.m. /

Suspension à 15 h 17

--- Upon resuming at 3:34 p.m. /

Reprise à 15 h 34

**THE PRESIDENT:** Okay, we are ready to proceed.

And just to remind everybody that we have representatives here from Environment Canada and Climate Change, from Health Canada, from Fisheries and Oceans, and we -- if we really need to, we can get some people from the

Office of the Fire Marshal and Emergency Management.

So let's jump right into the question period, starting with Ms Velshi.

**MEMBER VELSHI:** Thank you, Mr. President.

For Bruce Power. I think it would be helpful for day 2 or part 2 if you include an organization chart with your MCR and asset management included in there. As I said, it will be helpful.

So turning over to slide 11 of your presentation on the pillars of nuclear safety, where you've got the four identified in there, where does nuclear security fit in? Is it one of the nuclear safety pillars?

**MR. CLEWETT:** Yes, so you referred to our four pillars of nuclear safety on our slide, which comprise reactor safety, industrial safety, rad safety, and environmental safety.

**MEMBER VELSHI:** That's correct.

**MR. CLEWETT:** Nuclear safety --

**MEMBER VELSHI:** Nuclear security.

**MR. CLEWETT:** Nuclear security is also part of our program. And we have discussed -- it's really an industry standard, four pillars. We have discussed altering it to include nuclear security, but certainly a very important part of our program that we have very close monitoring, including independent assessments by Nuclear

Safety Review Board and other entities.

**MR. RENCHECK:** Yeah, this is Mike Rencheck.

Security is a key part of reactor safety and also radiation safety as well as our emergency response services. So though it may not be listed like many other departments we have within our organization, they are part and parcel to this trefoil or quadfoil that we use to represent safety.

**MEMBER VELSHI:** And I raise it for a couple of reasons. One is it's an area where your performance, according to the CNSC staff assessment, has declined. And again, it was more to say, hey, is this part or a key area of focus. And then something else for discussion tomorrow around safety culture where they've got nuclear security is part and parcel of that, I just wondered whether the move was now to articulate it as quite distinctly as part of nuclear safety.

Staff, any comments on that?

**MR. FRAPPIER:** Gerry Frappier, for the record.

So certainly Bruce Power has a very extensive security program. So while it may not be in this chart listed, it's certainly front of mind for Bruce. And similarly, staff have quite a compliance program where we

go about ensuring that the security program they have meets all requirements.

**MEMBER VELSHI:** Right, but that wasn't quite my question. My question was when one talks about nuclear safety, should one distinctly show nuclear security as one of the key elements of it.

**MR. FRAPPIER:** Gerry Frappier, for the record.

I think that there's a -- as you mentioned, we can talk a lot about that tomorrow. There has been certainly some views that security culture is quite different than safety culture, but here in Canada we're very explicit about saying we want the two of them to be combined and to be considered in an integrated fashion. So probably would be better if we had security listed in the chart when we're talking about the overall compliance program.

**MR. SAUNDERS:** Frank Saunders, for the record too.

I should point out that in 2016, our safety culture assessment also included a security culture assessment, so that's the first time it's been done to my knowledge. So we do in fact include the two of them in the same thought. We generally think of security as one of those factors that affects reactor safety. But it is a

consideration to make it more explicit, yeah.

**THE PRESIDENT:** I think --

**MR. RENCHECK:** Mike Rencheck, for the record.

We actually conduct regular drills with staff on this line to also shelter in place as well as other types of exercises with the global population in terms of how we look at nuclear safety.

**THE PRESIDENT:** But I think if the industry adopt the REGDOC that now put the safety and security culture, you may want to consider purely as nuclear safety and security as kind of the overarching kind of vision. Again, we'll be talking about this tomorrow.

Dr. Demeter.

**MEMBER DEMETER:** Thank you.

I wanted to get some clarity and perhaps some practical understanding. There'll be an increase in operating hours and then the hydrogen equivalent will be 120 until it's -- until fracture toughness is demonstrated. And Bruce said in one of their slides, slide 27, said that tests of up to 204 ppm have been conducted.

The demonstration of fracture toughness at higher  $H_{eq}$  levels, is that -- how are we going to achieve a level of confidence? Is it a model thing on paper? Is it a computer model? Or is it an in-lab applied application?

How do we get to that level of confidence that we can exceed 120? Because your document's quite clear, we shall not operate above 120. So how do we prove that we can operate above 120? Maybe industry and then the regulator.

**MR. NEWMAN:** For the record, Gary Newman.

So great question. The model is currently comprised -- we actually have a model that exists today. It's comprised of two portions, one that deals with operating conditions and one that deals with as you heat up the unit to the operating conditions or cool it down.

The area of focus where we had mentioned we had tested 204 ppm is in that upper shelf regime. So we've demonstrated where we spend about 99 percent of our time we don't see any problems up there with what we're predicting versus what we're using.

Where we have a second piece to the model, which is in the lower temperature, anywhere, say, from 30 degrees up to about, you know, 200, 225 degrees when you're heating the unit up -- where we have a model it does predict the behaviour. But we're continuing to validate that model that sits down in there. And that's I think where the area of focus has turned to now that we've done the upper shelf region where we spend about 99 percent of the time. Because you don't spent much time heating up and cooling down.



**MEMBER DEMETER:** And just to reflect based on previous discussion on pressure tubes and that this is somewhat cutting edge in that we're the first industry to try to go beyond a certain point. So we're sort of leading it. It begs the question from the regulator if this is -- if there's no sort of international standard, how we get there, how would we have confidence that their tests are validated.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So as Mr. Newman mentioned, there are ongoing developments to improve the model, to extend the model. And I think your question was from the regulator's perspective, how are we going to know that safety margins are maintained. And so for that, I would ask Mr. Glen McDougall to give a little bit of what the criteria we're going to be looking at as we progress further.

**MR. McDOUGALL:** Glen McDougall, for the record.

I'm a specialist in the Operational Engineering Assessment division. And we concern ourselves with pressure tubes, in particular fracture toughness.

Just to follow up on the original question, if I understood it correctly, you were asking by what means staff will be monitoring the progression towards

these higher hydrogen equivalent states and the possibility of reduced fracture toughness.

There are three primary ways that we'll be doing that. Staff mentioned in the presentation that we gave in January one of the key predictors of declining fracture toughness is the hydrogen level. And you've heard much about the different levels that are being projected going forward.

First point I'd like to make is that those are projections, but neither we nor Bruce Power relies on those projections to actually demonstrate the safe operation of their units. What they do instead is in accordance with the CSA standard, they make routine measurements of the hydrogen levels in their pressure tubes and they use those to validate models which they can predict hydrogen levels into the future, say one or two years. It is those hydrogen levels that are actually used to -- they're plugged into a predictive model to give you what the estimates of fracture toughness are in pressure tubes.

I say that we have to predict fracture toughness because, unlike a lot of other pressure tube properties, you can't actually measure it in the reactor. You can only measure toughness when you remove the pressure tubes from the reactor. And there's an enormous number of

pressure tubes at the Bruce units.

So therefore, they rely on a complex -- two complex models, actually. So you put the hydrogen equivalent value in that you've determined from in-service measurements of the operating pressure tubes. It will give you a range of fracture toughness values that are in the core.

And so this is where the -- the second thing that CNSC staff monitor. We monitor what the licensees do with those fracture toughness values, because the actual values themselves are not the key safety issue that we concern ourselves with. It's what the licensee does with the fracture toughness values.

They take those values and they input them into pressure tube safety assessments to allow you to get a sense of the risk that is hiding out there in the uninspected pressure tubes in the core. And there are CSA standards that explain how those assessments are to be done. And as a regulator, we look at whether the results of those risk assessments meet CSA acceptance criteria.

**THE PRESIDENT:** Can I piggyback on this?

So first of all, good news. The deck that staff presented in January on this subject is now posted on our website, so everybody can see some of the empirical evidence you were talking about.

But I have a different question. If memory serves, didn't you do -- didn't you laboratory test on bursts that actually determine how far you go before the pipe breaks? Doesn't that give you some insight as to how far you can go with this? And didn't you use the NRU? And don't you need the NRU? You got only two weeks to go with the NRU. So what am I missing here?

**MR. NEWMAN:** For the record, Gary Newman.

So we don't need the NRU. What we do is we have -- as already noted by Mr. McDougall, we actually remove pressure tubes from service through our surveillance program and for other reasons. We then take those and we test them as found, if you like. We burst some of those.

What we also do is we -- and I've mentioned it, accelerated aging -- we add hydrogen to those specimens to whatever the target amount we want to test. So if we want to test to 150 ppm, we'll add hydrogen to it to get to that level. And then we take it to your point and we burst it in -- typically in Chalk River.

And that was one of the photographs I showed earlier. It was actually the test specimen. It was all prepared, instrumented, a bell jar comes down, and you pressurize it, burst it, and then determine exactly what the fracture toughness was from that.

Mr. McDougall mentioned that in fact that

data point then gets inserted into the fitness for service assessment, using the model that we're using for that. And we do various assessments in accordance with CSA standards.

**THE PRESIDENT:** What's the highest level for the hydrogen equivalent before it bursts? Do you have any -- I mean is there nothing --

**MR. NEWMAN:** There really hasn't been a limit that -- like for example, we mentioned in the upper shelf region we've tested a specimen to 204 ppm. So in that regime, it was only a couple of tests done up there, so we're further validating, but we've done one at 144 ppm, and one at 204. But we need to do more confirmatory work up there.

**THE PRESIDENT:** Thank you.

Ms Penney.

**MEMBER PENNEY:** Thanks.

Figuring out how to turn it on is important. Thank you, Mr. Chairman.

Continuing on that line of questioning, because I know how important it is, so what I understand, in my layman's terms, is that you do -- you do some bench tests where you break, and then you take measurements from those tests and you feed them into models.

And so my question is for the CNSC staff is how confident are you? Is there a statistical

significance around those models where you can base your decision that you're going to release the regulatory points?

**MR. FRAPPIER:** Gerry Frappier for the record.

So we're very confident with the models up to about 120 parts per million.

As Bruce Power has indicated, they're continuing to develop those to go beyond that, and they need to go beyond that eventually. And in a few years from now they'll have some units that'll start creeping up to that level. And therefore we have to ensure that the safety margins are still going to be there at those upper reaches.

Those models we believe still need some verification data for that upper range. And as mentioned, there is a program in place that's doing it. There's a timeline that we understand. We're very linked with it through our technical staff. And so that gives us confidence that we're going to get there. But we're not quite there yet.

With respect to the specific sort of statistical, if you like, good or not good, I'd ask Mr. McDougall to explain a little bit more on that.

**MR. McDOUGALL:** Glen McDougall, for the

record.

There are actually three areas that staff focuses on in terms of establishing our confidence in that the Bruce Power's pressure tubes are demonstrating sufficient fracture toughness.

The first area is the theoretical understanding of what's happening. Because that often guides the development of the licensee's models and helps them to decide which pressure tubes from their reactor that they should be taking out and burst testing.

The second part -- and this is the most important one, and it's the reason that staff is proposing a licence condition to the Commission -- and that's the development of the model itself. Because since one of the fracture toughness models was first introduced in 2013, industry has identified a number of subtleties in the toughness behaviour of tubes. And they're trying to use new RND information to take on board those subtleties in a revised version of their model which they hope to use to demonstrate safe operation of tubes as they proceed past 120 parts per million.

The third area where industry is making some changes is in terms of the analysis methods that use the fracture toughness values to actually tell you how safe your pressure tubes are. And industry is making

improvements on two of those assessment methodologies, and staff is currently engaged with industry. We're watching carefully the type of improvements that they want to make and deciding where the balance lies between novelty and safety.

**MEMBER PENNEY:** Again I'm figuring out how to turn it on.

Thanks very much for that. So just a quick follow-up question.

Given that the CNSC staff is going to have regulatory hold points in place before you allow Bruce Power to move forward in this area, how much time do you need to be able to evaluate these models that are being developed, the measurements that are being taken, that sort of thing?

**MR. FRAPPIER:** Gerry Frappier, for the record.

So as we mentioned, we're very close to the program that industry is doing, not just Bruce Power, with respect to both the research side of things and also the model development and reviewing the results of that model.

So it's the plan right now, the schedule, I'll have to ask somebody else for the details on the schedule. But they are planning on getting those research



results and the model developed in such a time that there would be certainly sufficient time for us to do our evaluation and ensure that the safety margins are maintained for them to be able to move past that 120 parts per million.

With respect to the dates, I don't want to take a chance, so I won't -- I don't know if Glen knows them or you know, Gary, but as to when you believe the model will be sufficiently validated to go beyond the sort of 120 ppm.

And it's a subtle thing, because you can go beyond the 120 a little bit. It's let's say getting to the 160 that we would like to see them get to.

**MEMBER PENNEY:** Thank you.

**MR. NEWMAN:** For the record, Gary Newman. Maybe just to add to what Mr. Frappier indicated there.

We have been doing a number of burst tests as we go. And it's important to understand how these models are created. They're actually a mechanistic model. In other words, you don't -- it's not an empirical fit to observe data points. It's actually a fracture mechanics based model that you then compare to data that you generate through the burst test program. So it has a fundamental mechanistic relationship with the way that materials break

down and fracture that don't rely on observations *per se*. They observations, though, are compared against it. And this kind of goes to the question you asked about statistics.

And now, what you may have is changing conditions in various locations in the pressure tube, and that's the additional testing we're doing. We may have to refine if we find there are certain subtleties, as Mr. McDougall indicated, but right now the models are being created or verified, I guess, against burst test results that are occurring as we speak. So those tests are underway.

We expect to have those revised models probably ready for use maybe mid-year, towards the fall of this year.

**MR. FRAPPIER:** Gerry Frappier.

Sorry if I could just add, because it just handed -- so right now what we're looking for is sort of June of 2019 there'd be a very definitive plan that would come through to us. What we are looking to have a requirement for reporting that would be done at least on a semi-annual basis as to where they are and what the data is indicating.

As I mentioned, we're also close to the results from research, all the research that's been

undertaken. We see it immediately and start looking at the review to determine the significance of it, if you like, in our overall assessment.

**THE PRESIDENT:** But just so we understand, no authorization will be given for you to proceed until you can demonstrate that you can get to the 160 part per million. And I assume that you're ready to accept if you can't demonstrate it, it's not going to happen.

**MR. SAUNDERS:** Yes. Frank Saunders, for the record.

Yes, of course, that's the deal. We have the schedule all laid out and the tests well laid out.

I should point out that we've done 32 of these tests already, and we have several more scheduled over the next two years, so we're highly confident in the model, of course, or we wouldn't be proposing it --

**THE PRESIDENT:** Well, the model I see is unit 6, I think, that'll get to 2020 is the one -- according to your schedule -- that will --

**MR. SAUNDERS:** That's --

**THE PRESIDENT:** The first --

**MR. SAUNDERS:** Yeah, that's correct. And that's when we shut --

**THE PRESIDENT:** Right.

**MR. SAUNDERS:** And that's when we shut

unit 6 down for the MCR, right, so --

**THE PRESIDENT:** Yeah.

**MR. SAUNDER:** -- so for unit 6, we're good, because it's not running beyond there --

**THE PRESIDENT:** So it's -- okay, so unit 5, then, you'll have to demonstrate this.

**MR. SAUNDERS:** That's correct, unit 5 will be the first one that reaches that transition somewhere towards the end of 2020 would be my --

**THE PRESIDENT:** So again, since this is a fundamental issue, you know, I like to always ask on a doomsday scenario. So you get approval for 300,000 hours. And so and things go bad and it's still fractured. So you still have a pretty good robust leak before break? I'm trying to understand, because if I understand correctly, as you go higher and higher, it become less and less robust. What happened to this whole idea of leak before break? Will it continue to be something that we're confident in?

**MR. SAUNDERS:** Yes, leak before break is part of the defence in depth strategy, and that continues to be valid. And part of the --

**THE PRESIDENT:** Is it being eroded a bit as you go higher and higher?

**MR. SAUNDERS:** No, part of the purpose of the models, and there's -- you know, as Mr. Newman

mentioned, there's a number of different analyses that we do based on the data we get from the tubes when we have each outage.

So one of that bit of analysis is leak before break. So we confirm after each outage that the leak before break methodology still provides the defence of depth protection that we require until at least the next outage. So that is based on the data that you're taking out of the outage based -- and you've seen in our video of the tools that we're using to actually gather that data. That data is used to then do the leak before break analysis. So and one of the analyses we submit to CNSC is that leak before break. So that remains valid throughout, and that would be the intent. If it didn't, then of course you would have issues as well.

So there are several factors related to pressure tubes, fracture toughness being one, and others which we must demonstrate after each outage that are still compliant and still get us safely to the next outage without any problems. Yeah.

**THE PRESIDENT:** Staff, you wanted to add something to this?

**MR. McDOUGALL:** Glen McDougall, for the record.

I believe your original question was about

erosion of safety margins.

There are two different types of assessments that Bruce Power produces and that staff routinely assesses. There is the leak before break assessment. There's a second assessment called fracture protection of pressure tubes. And one key feature of both of these assessment methods is they allow for the licensee to compensate for decreases in fracture toughness with time.

The challenge that licensees eventually face, rather than the doomsday scenario that you were asking about, so rather than having pressure tubes rupture, these assessments eventually force the licensee to make changes in the way that they operate the reactor. And so what you tend to get is a situation where it becomes economically unviable to operate certain pressure tubes, because their fracture toughness is low enough that they simply cannot operate the reactor in such a way to demonstrate that safety margins are present.

The minute that a licensee can't demonstrate leak before break or fracture protection in accordance with CSA requirements then they have a problem on their hands

**MR. FRAPPIER:** Gerry Frappier, for the record. So just to conclude, we do have a very strong set

of both standards and understanding of how to ensure that both leak before break and fracture protection are in place today and going to be in place for the next little while. The erosions or the degradation mechanisms are well-known.

From the regulator's perspective, if we have a certain safety margin that must be maintained, we have a way of determining whether that is true, and as long as that is true the pressure tube's okay. If not, then they cannot operate with those pressure tubes. They have choices with respect to replacing pressure tubes, operating slightly differently, or shutting down. That's a business decision at that point.

**THE PRESIDENT:** Thank you. Mr. Berube.

**MEMBER BERUBE:** Yes, good afternoon. My curiosity is with the MCR outage updates in terms of the time windows. You're asking for a 300,000-hour grant on the pressure tubes, and looking at 7 and 8 here, we're going to run very very close to the wire on this.

So the question I have is specifically about the timing of the MCR and how confident you are in actually achieving these windows for doing the updates on the units themselves?

**MR. SAUNDERS:** Frank Saunders, for the record. We've been involved now for a couple years on very detailed planning and, in fact, they're just wrapping up

that detail planning this year. So we're highly confident and we've put a lot of effort into getting that confidence, not only for reactor safety reasons, but for business planning reasons and other things.

So, yes, we believe that we can meet those. In fact, we may even do better than that. But at any rate, there are several options if something interferes, you know, you can move overlaps, you can do other things. So you are not stuck with exactly the dates you have there, that's our planning dates.

If for some reason something causes us to move a date, we will be in a position to do that. As you can see, we've left quite a lot of room to accommodate all of that. So we're pretty confident that we can do all of that, for sure.

**MR. RENCHECK:** Mike Rencheck, for the record. In terms of your question, the very first unit that would be of consideration in that vein really gets out to Unit 5 in 2026. That represents quite a planning window where we are in the final phases of planning our first MCR on Unit 6 and moving into an execution model with construction contracting and final estimates this summer.

We've all just kicked off Unit 3's planning effort. The efforts aren't that different from unit to unit in terms of the planning and set-up. So, as



Frank stated, we have a very good handle on how to go about doing the major component replacements as we get started here on our first one.

**THE PRESIDENT:** So do you have the same deal that OPG had about, if you don't deliver the first unit on time on budget, deal off, even though you are a private company? Did you get the same kind of clause?

**MR. RENCHECK:** Bruce Power has negotiated with the Independent Electric System Operator on agreement where we have a fixed price for power. Within that context, we have to turn in estimates for our major component replacements.

Should the estimates be above where we started from with the agreement, the IESO can initiate an off-ramp based on a 30 per cent cost deviation from the original estimates. If it goes to 50 per cent, our owners can taken an off-ramp. So, yes, there are provisions within our contract such that we are able to invest and maintain our plants.

But also, should we have cost concerns, the risk is on the owners, not on the province to be able to ensure that the major component replacement is funded and will go forward in a like manner.

**THE PRESIDENT:** Are you using the mock-up in OPG or is it completely different, and why don't you

have a mock-up? I'm always curious to understand the value of a mock-up.

**MR. RENCHECK:** Mike Rencheck, for the record. We collaborate with OPG extensively. We actually have individuals working right now within their refurbishment, and we have a great relationship with OPG. Every two weeks we have more or less a joint staff meeting between OPG and Bruce Power at my level and Jeff Lyash's level.

We are walking through a number of issues across all of our refurbishments, but not just the refurbishments, but also in terms of how we organize and operate our plants, and we have about 30 action items that we have underway between the units.

We are developing now at Bruce Power the mock-ups that you see, they'll be similar to what OPG has developed, not exact because we do get information from OPG's tooling and OPG's mock-up. But we'll be doing those also for ourselves in terms of training our staff and training our technicians as they get ready to go into construction.

So that building is now under construction in Kincardine, it's one of community development efforts. We should have about 300 to 500 people in that location, and they'll be also moving and living in the area. So

we're using it not only for ensuring that we have the ability to execute the major component replacement, but we're also using these aspects for outreach and community development.

For example, we built a tool integration test facility at ATS that's making our tools in Cambridge. That's not all, the economic development pieces aren't isolated to our region, they're also spreading further. So as we take tools into prototype we can go right into factory testing in an integrated manner, and once it is completed there then it'll be shipped to the building that's in Kincardine. We will set-up on a face mock-up and start training crews.

We have quite an extensive program laid out, and a lot of these buildings will complete in 2018, early-2019.

**THE PRESIDENT:** Thank you.

Ms Velshi.

**MEMBER VELSHI:** Thank you. So before we leave that fracture toughness Model 1, I just wondered what the licence condition handbook says about it. Because I think, as I read it, it said -- I should just pull it out. It said, "Maintain pressure tube fracture toughness efficient for safe operation."

I wondered whether you needed stronger

language to say that there's a high confidence or the regulator has high confidence that there is indeed that. That's one part.

The second part, I know you talk about updates as part of the annual regulatory oversight report. But given that this particular area is so critical and it's almost uncharted territory, and I suspect there is a lot of concerns out there with certain parts of our stakeholder community, is that perhaps meriting having a meeting to talk about this once Bruce Power has submitted, its staff has had a chance to review it?

**MR. FRAPPIER:** Gerry Frappier, for the record. So the licence condition, as you mentioned, makes it very clear that the fracture toughness must be maintained sufficient for safe operation. The licence condition handbook has a bit more criteria around that because it's about developing the model and ensuring that there's the confidence needed that it should be in place. So we believe it does capture it sort of pretty well.

Also, as was casually mentioned, but I think it's worth really hitting on, is that we also have a whole bunch of other regulatory oversight tools. So certainly there is a periodic inspection program. As was mentioned, at the end of every outage there is a very definitive set of data that comes through with respect to

the fitness for service of the pressure tubes. So there's already a program in place.

This is to give extra focus to the issue of fracture toughness. We thought it would be appropriate to have an additional licence condition.

With respect to meetings, we had a really good one I would say in January. We really laid out a lot of the technical aspects of the pressure tubes, and we have the reference to the CMD and, as the President mentioned, the actual presentation is posted now for stakeholders that want to get a little bit more in-depth understanding of it. Certainly, there's an opportunity to update the Commission whenever the Commission would wish to have that, but we're saying, as a minimum, on an annual basis when we do our annual report.

**MEMBER VELSHI:** But do you see value in doing that at that particular juncture? Again, we'll see on Part 2 how much concern or interest there is in this, but more probably a heads up, and there may be, you know, allowing participant funding for people who want to get a third party to have a look at it, again because it's such a significant move to get to 300,000 full-power hours.

Anyway, something to think about.

**THE PRESIDENT:** Thank you.

**MEMBER DEMETER:** Thank you. First, a

suggestion for Bruce. Communicating human health risks from radiation is a complicated matter and the units themselves are quite confusing. So twice in your presentation you use units of REM, which would be fine for an American audience, but for a Canadian audience who's trying to grasp what a sievert is or a millisievert, then it creates another whole layer of complexity. So just a suggestion to perhaps stick with the nomenclature that we try to communicate with.

So the question I have. Throughout the whole document there's a sense that Bruce A and Bruce B are different operations, some of them have different SCA standards, some of have different emissions, they have different minimal staff compliments. Some of that was described by, you know, they have different design.

But the one thing that doesn't make sense, if I look at the environmental assessment report from staff, on page 23 of 85, I'm looking at derived release limits. So derived release limits are designed based on the receptor --

**THE PRESIDENT:** Hold on, all of you digitally aware here --

**MEMBER DEMETER:** So page 23 of 85 of the EA.

**THE PRESIDENT:** Okay. So, first, we've

got to find the EA, and then we've got to find the page.

--- Laughter / Rires

**MEMBER DEMETER:** Okay, I'll let you find that.

**THE PRESIDENT:** Right. So everybody's on the same page.

**MEMBER DEMETER:** I'll wait.

**THE PRESIDENT:** We've got to start getting used to this digital universe.

**MEMBER DEMETER:** So derived release limits are -- the methodology for deciding them are usually based on the receptor outside. What is the release limit that would achieve a certain dose limit or a certain hazard in a receptor? So someone looking at this from the outside would say you've got two plants, A and B, which are close together, but the same receptor outside the fence.

Why are there different derived release limits for A and B for tritium, noble gases, iodine? They're trivial differences, they're not orders of magnitude differences, they're trivial differences. But it would make one think that why wasn't the same methodology used and why didn't you get the same results?

It gets to a certain sense of the confidence of, well, how did you figure one out and then the other? Wasn't the same methodology used? The question

is, why are there slightly different derived release limits if it's based on the outside factor, not on the release from the plant itself?

**MR. FRAPPIER:** Gerry Frappier, for the record. That's an excellent question, and I'm sure we have a very good answer from Mr. Mike Rinker.

**MR. RINKER:** My name's Mike Rinker, and I'm the Director General for the Directorate of Environmental and Radiation Protection and Assessment.

So you're right, it is based on critical receptor, the same model was used, it's a CSA standard that describes what approach to use, transfer factors, how emissions from a facility would be transferred through the environment, and ultimately to an individual.

In this case, if you consider Bruce A and Bruce B are about two kilometres apart, so they're not the same point source, and so one aspect would be the distance to the receptor is not the same. Something else that's different about the two plants is the flow rate of the stack is different.

So air emissions going up the stack from Bruce A are different than air emissions going up the stack in Bruce B. So the loading of radionuclides from Bruce A and Bruce B is different to the air, similarly to the water, the release rates by an effluent are not the same,



there's different flow rates from the different facilities.

So by using the same model but you have facilities that are located at different places and their releases are different in terms of flow rates. So you end up with a different value.

If I could just bring it back to what we're trying to determine with the DRL, is what is the amount of a radionuclide that could be released that would result in a dose of 1 millisievert in a year? So we're looking at how much radiation would be released from a facility and arriving at that individual. So those different parameters of those different facilities affect that.

**MEMBER DEMETER:** That's good. Thank you.  
Thank you very much.

**THE PRESIDENT:** Thank you.

Ms Penney.

**MEMBER PENNEY:** Referring to document CMD 18-H4, which is basically Bruce Power's performance review dated June 2017. It's around the bringing on and use of contractors for the MCR program.

Somewhere in the documents I read that you're going to have an increase in exposure hours, a considerable number of contractors on site. Looking at page B31, it talks about the complication around which

safety system or quality management system your contractors work on. It says, "A clear definition is required between work executed under Bruce Power's management system and under supplier quality programs."

So my question first for Bruce Power is, how do you manage that challenge? Then my question for CNSC is, are you satisfied?

**MR. SAUNDERS:** Frank Saunders, for the record. So the first point is that all the work on site must meet the Bruce Power management system requirements. The question about clarification then is when you're hiring contractors to do work and so forth, how do you ensure in fact that that's what they're going to do?

So, you know, as an operating unit we certainly have a set of procedures that does that. Our conclusion was for the MCR, because of the volume of work and that, we had to review those and clarify them and make sure that they do in fact provide very clear direction on what the requirements are.

That's really all that refers to, and that work is part of the planning work we're doing for the MCR.

Did you want to add something there, Mike?

**MR. RENCHECK:** Yeah. Mike Rencheck, for the record. It's very consistent with what we presently do today. We have 4,000 full-time employees and at any point

in time when we're performing our extended outages or maintenance, we could have anywhere from 1,000 to 2,000 contractors on site.

**MEMBER PENNEY:** So just a follow-up question. Does that mean, what I hear you saying is all contractors on site work under Bruce Power's quality management safety management system, is that what I heard you say?

**MR. SAUNDERS:** What I'm saying is they all must meet our safety management system, and that can be done in a couple ways. They can work directly under our system, under our supervision, which sometimes is the case, or through our contractor validation process, actually go out and audit and assess their system to show that it meets the requirements of ours.

So we call that vendor qualification, so vendors have to be qualified to the level of work that they are doing, and that is part of a normal process we have. All we're trying to do here is adjust for the increased volume that we expect to see.

**THE PRESIDENT:** OPG knows all of this and has the same quality assurance and they got in an office they had to shutdown because, I think, of the safety culture was not shared by the new contractors.

We're not talking about OPG here, but we

just heard a very recent lesson about what happens when you increase your workforce who are not used to working under the nuclear regime.

How do you ensure that they come on board understanding what safety culture in a nuclear environment means?

**MR. SAUNDERS:** So two aspects to this: the first one we talked about was qualification of vendors and contractors; the second aspect is contractor oversight, which we think is a Bruce Power responsibility, so that contractor oversight will be spelled out in the execution plans and we will provide that oversight to make sure that the contractors are in fact meeting the contract conditions that we placed on them.

So they're two very related, but slightly different things: first, qualify their processes; and then, second, make sure they're actually following their processes through your own oversight process. There's a lot of reasons why we should do that, and certainly we have a robust way of doing it.

As I say, we're enhancing it and part of the work we're doing right today actually is reviewing those procedures and working through the MCR group to make sure that they're all well-connected and defined so that when we get to the execution phase it is both

straightforward, and part of the issue is our business can get very complicated if you're not careful and a complication can work against you.

So we're looking both to simplify those procedures so they're clear for everybody to use, and we will have a robust independent oversight group, which happens to work for me at the moment, but who will be observing that work, and of course the management team will also be overseeing the contracts to make sure the work is executed properly.

**MR. RENCHECK:** Mike Rencheck, for the record. This is one of the collaboration items that we talk about every few weeks. We have sent some of our quality assurance people to OPG to see whether it is working for them, and what we can learn from where they're experiencing some difficulties, potentially. That information's being brought back and factored into our processes as we ramp up.

I'll turn it over to Len Clewett to talk about how we've managed the 1,000 to 2,000 that we presently have working outages and how we ensure they meet our safety culture.

**MR. CLEWETT:** Len Clewett, for the record. Related to the work stoppage you referred to, Mr. President, we've taken actions for our outage work that we

do presently and we ensure that all of our major vendors have human performance programs.

We have frequent meetings with the senior leadership of these supplemental vendors that do work, and we rate them according to a standard, we track their error rate and make sure, if there is an adverse trend in performance we, you know, address it in a timely manner. So very close oversight on human performance programs with our vendors, and that'll be part of the major component replacement program also.

**THE PRESIDENT:** Thank you.

Mr. Berube.

**MEMBER BERUBE:** So my question pertains to the pertains to the handling of waste. Obviously with the MCR program that's proposed, you're going to generate quite a bit of waste.

The claim was of course you're looking to minimize this, I'd be interested in hearing how you intend to do that, and also from our staff whether they're satisfied with those provisions.

**MR. SCONGACK:** Sure. James Scongack, for the record. So you're correct, we really have two forms of waste generation on site. There's obviously our routine operational waste, which I spoke about in the presentation and, you're right, through the major component replacement

program we'll be removing pressure tubes, calandria tubes, feeders and steam generators, and that material will be -- we are working out a final arrangement with Ontario Power Generation who is the custodian of that.

Throughout the entire MCR project working with our vendors, there'll be a very extensive oversight program in terms of how do we reduce those waste volumes. Mr. Clewett spoke earlier about a lot of our outage work underway.

Outage work, when we think about it, a lot of that asset management work that's going on, a lot of work that typically used to be done in what we called the traditional refurbishment through all of our outage windows, we're piloting that program right now and seeing very significant reductions in waste. That can be everything from suits to mop heads.

When we look at the larger components, which are stored in either retube waste containers or steam generators, the tooling that's being developed will essentially compress these feeder tubes and the pressure tubes into actually credit card-size pieces that will fit in retube waste container.

So as we're developing the tooling that will remove these components, obviously we want to minimize also from a logistics perspective the amount of retube

waste containers, which also drives you to of course look at the physical equipment that you're using to reduce those volumes. Those retube waste containers will be sealed up in our reactor vault and sent to Ontario Power Generation.

However, we think it's important to -- you know, we talk about these large components, and when we think about waste from a lifecycle perspective, you know, there's very very small volumes of waste when we look at it over the volume of energy.

I don't know if I am allowed to bring a prop, but I brought a prop because a lot of people tend to ask us, "So how much waste are you talking about here?" And so we always like to say if you got 100 percent of your electricity from nuclear power for a year -- by the way, this is from my iPhone. It wasn't -- but this is a cue we developed -- that's 100 percent of your electricity for a year. We take into account spent fuel, refurbishment waste, operational waste. It would fit in this.

So yes, we have a responsibility to continue to reduce it. I think the tooling innovations we're carrying out through MCR will help that, especially through the D2 retube window.

But I would say the most significant area of opportunity that we have been able to derive is on that routine waste just of workers, you know, taking gloves off,



sorting waste properly. If you have -- you know, you have a tremendous amount of different vendors and organizations doing work in the plant. When a package of material comes into the plant, is it in a box where the box is unpacked, or is it in a Tupperware bin that can get reused over and over? So while we like to focus on the major components, the biggest prize is actually onto that routine waste.

I don't know, sir, if that answers your question.

**MR. RENCHECK:** Mike Rencheck, for the record.

We also have a financial incentive to do that as a private company. We pay Ontario Power Generation to take our waste. They charge us very heavily for that. So we are motivated and incentivized to make sure we are doing everything we can to minimize and get better at how we are generating waste products.

**MR. FRAPPIER:** Gerry Frappier, for the record.

I would ask Jeff Stevenson to comment on the waste reduction program.

**MR. STEVENSON:** Jeff Stevenson. I am a Senior Site Inspector for the CNSC at the Bruce site.

CNSC staff does routine inspections on the waste management practices at Bruce Power throughout

regular operations and we have never identified any major issues. Obviously, it's in Bruce Power's best interest to do waste minimization practices to manage their business, but in terms of the safety aspects we have had no concerns over the past period.

Going forward, as part of the MCR outage, we have a refurbishment baseline compliance plan where refurbishment waste management practices are built into that oversight that we will be doing, going forward.

So the expectation from CNSC staff is that Bruce Power continues the CSA standards and continues to implement their practices that they have in place.

**MR. RENCHECK:** Thank you for that.

**THE PRESIDENT:** Thank you.

Ms Velshi...?

**MEMBER VELSHI:** Thank you.

Some clarification on terms:

refurbishment, IIP, asset management; MCR, and I am not sure whether they were used consistently or whether I just didn't get them. So I thought I heard that MCR is a subset of asset management, correct; right? Do I -- I'm not quite sure whether I heard staff, because in your presentations you show them as two distinct ones. But regardless, I think it's important that we all understand that.

Is refurbishment anything different or is

that just a term that you have just not -- don't want to use anymore?

**MR. SAUNDERS:** Frank Saunders, for the record.

In terms of the plant we look at managing the assets as an overall thing. So asset management applies in general to all the technology in the plant and all the equipment and we look after it. Major component replacement is, in fact, a subset of that and it is stuff that requires longer outages and more work to prepare and to plan. So your original assumption, yes, one is a subset of the other.

And we don't use "refurbishment" at the current time because it is a bit of an old term. It was a different way of looking at the world. In our view, you continuously manage the asset. You don't do it in distinctive chunks every 30 or 40 years, right. You do a continuous asset management.

So that's why we don't use the term, but similar activities are involved in all of it.

**MEMBER VELSHI:** And then if I looked at what was -- what's involved in the integrate improvement plan, the IIP, does that capture the full scope of work over this period of time, so it would include everything under asset management, or is there something more in there

or something that's not in there?

**MR. SAUNDERS:** The IIP captures all major chunks of work and it also captures the asset management program itself. So as you heard described by CNSC staff, the asset management program is a living program. You're always assessing where the state is, and so dates and times may shift on various things.

But what the IIP captures is that we need to maintain the program and we need to actually maintain the equipment based on the requirements of that program. The bigger components, the bigger safety components than that are individually included, as you're seeing. So it's a mix of both.

In fact, you know, asset management is thousands of components, so if we tried to list them all in the IIP over eight units, we would have an awfully long IIP. It is not consistent with the way you manage the business.

**MEMBER VELSHI:** And of your whatever -- it's just about 200 improvement initiatives in the IAP -- from a level of effort or from a dollar perspective, how much of that is for MCR?

**MR. RENCHECK:** I can talk about that and I'll start back.

Our agreement with the -- so it's called a

Bruce Power refurbishment investment agreement -- we implement that through three mechanisms. It's the inspections programs. It's the asset management and then the major component replacement. So that's kind of the origin of the terms. It's all tied to our financial contract and how we allocate funds.

So for -- or under the contract, we will invest as Bruce Power, \$8 billion, roughly, into the major component replacements, and about \$5 billion into the asset management program.

**MEMBER VELSHI:** Thank you. And what is the expected extension of life as a result of this? Is it another 40 years of operation? Is there a range?

**MR. SAUNDERS:** Yeah, the expected extension is, you know, based on the overall assessment, but what we say is that this will take us to about 2064. But of course that's a living thing and it's a living review.

So we would anticipate in that range, but it depends on how well we maintain the plant and that we, you know, complete all this work as planned. So it will extend the life. But just as well, it could easily be that somewhere getting toward the end of that there could be another decision to upgrade and replace components and extend beyond that.

So it's not a hard number. It's really a commitment to do the work, to make sure that the plants can operate safely and reliably. We would expect that if we do all that work as we plan it, that we would at least be thinking of something in the range of 2064.

**MEMBER VELSHI:** And I see in the slides that Bruce Units 1 and 2 are not mentioned at all. So from an asset management perspective, is there a scope of work that needs to be done there and how is that being addressed?

**MR. SAUNDERS:** Yes, there is asset management, and yes, it is in the IIP.

**MR. FRAPPIER:** Gerry Frappier, for the record.

I just want to give a bit of our point on that because there is a lot of names out there and some of them are just names that are picked for whatever reason, and others have some real meaning.

So as mentioned, refurb is perhaps an old terminology or perhaps it's still the same thing, but basically typically talking about replacing tubes, maybe steam generators, major work.

The IIP is the one that from our perspective is a key word because that now is a licensing terminology. So the Integrated Implementation Plan is part

of the licence. It's a requirement on Bruce Power to be doing it. Within it, it does make references to some terminology that is meaningful to Bruce because that's how they manage their work, so the MCR, the asset management. You will not see those words used at Darlington, but they are doing similar sort of work. They have a different set of names that they have applied to them.

But from our perspective, it's really about having -- the IIP. It will always be there and that is a licensing requirement. Within there we may use slightly different words to fit better with the terminology that the licensee is using.

**MEMBER VELSHI:** Thank you. That is very helpful. And from a regulatory perspective, is the six months very critical as well, that something that requires more than six months is really -- now falls in a different category?

**MR. FRAPPIER:** Gerry Frappier.

No, not at all. For us, the key thing that is different is, as mentioned, is the asset management is an ongoing process. They have quite a bit of, you know, computer inventories of things they are doing and it's a pretty dynamic program. So from a compliance perspective, our inspectors onsite have to sort of roll with the plan a little bit.

The MCR, what's important about it, it is a major planned activity and it has to be a major planned activity for ourselves as well because we have a whole bunch of inspections that have to be done during that MCR, and it has to be done at the right period of time. Otherwise, we missed the window to do the inspection or we're delaying the project for no good reasons.

So the MCR is different for us, not so much because it's six months or more but because it's a very intensely planned operation that we have to have our planning in place as well.

**MR. RENCHECK:** Mike Rencheck, for the record.

We started on January 1st of 2016. We have roughly 230 projects or so, in flight right now, being installed in the plants. We've already invested upwards of a billion dollars.

**THE PRESIDENT:** Thank you.

Dr. Demeter...?

**MEMBER DEMETER:** Thank you. This is the second in my tenure, whether I'm this side of the fence or the other one, but the second large refurbishment activity you've gone through.

The first one resulted in an alpha release incident which led to a lot of discussion. I'm not trying



to rehash the discussion, but led to an external review.

The question I have is: Based on lessons learned from that, is there a summary of lessons learned and a summary of operating procedures to mitigate that, for this time around, both from Bruce -- is that sort of all padded and available for someone to see what you learned from it, what you are going to change and how you are going to monitor and PPE and the whole bit?

And from the staff point of view, do you believe that to be existent, because that will be obviously a question that will come up is this happened then. How are you going to prevent it from happening this time?

**MR. SAUNDERS:** Yeah, Frank Saunders, for the record.

It is, in fact, very well documented in our radiation protection program. We do consider at this point that we probably have one of the best alpha programs for the world, given our experience Unit 1 and 2, and we do utilize it even during ongoing work for certain activities like fuel handling and other things.

So that program is quite sophisticated and we have equipment today that we didn't have then, a lot of it to monitor that.

I don't know if you want to add anything there, Len?

**MR. CLEWETT:** Len Clewett, for the record.

As Frank referred to, we do have the program. It is well established through training and increased equipment for monitoring. Particularly during outages, there is activities that during like a single fuel channel removal, some fuel handling activities that we do monitor. And at times we have seen very low levels that we stopped, took corrective actions, and corrected the situation before we moved.

So we have actually tested our new program numerous times during our regular plant outages.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So certainly a lot of lessons learned in that incident, and we have applied those lessons learned in both our programs that industry is doing and our oversight approaches.

And I would ask Caroline Purvis to give perhaps a bit more detail on that.

**MS PURVIS:** Good afternoon. I'm Caroline Purvis. I am the Director of the Radiation Protection Division.

Without going into a great deal of detail, what I would say is that from our perspective, as a regulator, certainly we have ensured that all licensees

that undertake this kind of work, or face health hazards in the workplace are -- have integrated into their programs the appropriate measures to ensure that the contaminants are detected, that the workers are protected, and that there are provisions in their work planning to identify those hazards.

From a lessons learned point of view, I think it's fair to say that a little earlier there was a discussion about our generic refurbishment plans and integrating reviews of different safety and control areas during the execution of a refurbishment activity like this where there is the potential for different kinds of hazards to be encountered.

So we have taken lessons learned from the previous events and others that have occurred that other licensees have faced, and ensured that we are -- we are providing that oversight at the right time through -- through our inspection guides, through our desktop reviews of ALARA plans, for example, for some of those big outage activities.

Thank you.

**MR. SAUNDERS:** Frank Saunders. I should add one more point.

We do also operate a random bioassay program for anybody with the potential for exposure to

alpha. So that is our validation that our program is working, is individuals who were involved in anything that might have had alpha exposure are randomly selected and do a bioassay. And that confirms for us that, you know, that the program is successful and they are not going to get any uptakes.

**THE PRESIDENT:** And yet, with all the lessons learned, we've got an event now. I don't want to discuss it here. I don't think we should discuss it. We'll discuss it tomorrow about all the lessons should have been taken, understood, and why that things happen anyhow.

So I think the point here is that we will be watching what program you are going to be putting into place through the refurbishment.

**MEMBER DEMETER:** Just a clarifying follow-up.

Is there -- if someone wanted to review your alpha radiation protection program, is there a standard document, a REGDOC, or a CSA document they could refer to and say these are the alpha monitoring radiation protection program under these particularly circumstances?

I'm still looking for someone external looking at it and saying, you know, can I critique it, but what are we critiquing, because it seems to be a little ephemeral.

**MR. FRAPPIER:** Gerry Frappier, for the record.

I would ask Caroline Purvis to talk a bit about the -- I would also point out that, as Bruce is mentioning, they are doing detailed planning right now. Part of that planning will be that they will have to submit to us things like ALARA plans. There will be sort of here is the radiation protection program plan, detailed plans for the operation, and we will then have an inspection program around that that would lead to us inspecting to ensure that they are meeting that program.

But with respect to standards on how to ensure you have a world-class alpha program, Caroline, I don't know if you want to add to that?

**MS PURVIS:** Caroline Purvis, for the record.

In August 2010, the CNSC issued a request for all licensees to enhance their radiation protection programs to integrate best practices, with respect to alpha monitoring and control.

So it's not a standalone program, in one sense. All -- the detection of alpha contaminants, the work planning, the instrumentation necessary to detect it -- and there are many other elements, training, et cetera, they have all been fully integrated into the

nuclear power plant licensees' radiation protection programs.

Furthermore, CNSC staff inspect against those programs and include verification that the licensees are properly implementing all aspects of their program, including alpha monitoring and control.

The requirements that we identified in 2010 were based on the electric power research institute, or the EPRI guidelines. I would say that's probably one of the best benchmarks. I would say that currently, from what I have seen, Canada probably is a leader in terms of alpha monitoring control programs worldwide.

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

**MR. SAUNDERS:** In terms of the specifics, part of the license application process require us to submit our nuclear power plant licensees radiation protection program to CNSC review, which includes alpha amongst all the other radionuclides. So that program meeting various external requirements is submitted as part of this licence application for review. Any changes in that program we have to notify CNSC when we make them.

**MEMBER DEMETER:** Yeah, I was trying to confirm that CNSC had an external third-party validated tool to assess your proposed program, rather than having 15 different applicants giving 15 different. You have to have

some sort of standard to address all those programs that are coming to them, and that's what I heard.

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

Ms Penney...?

**MEMBER PENNEY:** I actually have a question for the Department of Fisheries and Oceans, if they're still on the line.

**THE PRESIDENT:** Is anybody --

**UNIDENTIFIED SPEAKER:** Yes, sorry.

Fisheries and Oceans is still on the line.

**MEMBER PENNEY:** Okay. Sorry about that.

We should have probably --

**UNIDENTIFIED SPEAKER:** It took me a while to find the mute button.

**MEMBER PENNEY:** Okay, should have given you a heads-up.

So yeah, in the CMD 18-H4 documents, both from the CNSC staff and from Bruce Power, there is an update on the *Fisheries Act* authorization process. And of course, I understand it's separate from what we're reviewing here. However, it's of importance to this and to the parties.

So my question for DFO was -- I guess it's a little bit of a surprise to me that the requirement for a *Fisheries Act* authorization came up only a couple of years

ago or, should I say, didn't come up a long time ago. So my question is about what changed that would require an authorization now? And are the parties confident that as part of the MCR process there isn't going to be any more impingement or entrainment of fish that would result in a change to the authorization at a later date?

**THE PRESIDENT:** So who do we want to start with? Staff, Fisheries and Oceans?

**MEMBER PENNEY:** I think we should start with the Fisheries and Oceans. It's their act.

**THE PRESIDENT:** Okay.

Fisheries and Oceans, go ahead.

**MS DOHERTY:** Sorry. Andrea Doherty, for the record.

The *Fisheries Act* authorization, we are in the process of working through the memorandum of understanding with CNSC to receive the applications, and we are working forward to be able to issue an authorization.

**THE PRESIDENT:** Staff, you better put in a little bit more -- from Bruce Power and staff, where in the process are we right now?

**MR. FRAPPIER:** Gerry Frappier, for the record.

I'd ask Caroline Ducros to add to that, please.



**DR. DUCROS:** Dr. Caroline Ducros. I am the Director of the Environmental Assessment Division, for the record.

Where are we in the process right now is, we are working quite collaboratively with DFO and with Bruce Power and also seeking input from Indigenous communities on what has been submitted so far. There are some technical information pieces that we still need to work on, and we are going to be meeting in one room with Bruce Power, CNSC, DFO. In addition, the communities have been invited to that meeting on March 22nd to close those technical aspects.

I guess I'd like to put it in context of the question. One of the reasons why the MOU was put in place in the first place was because the *Fisheries Act* was amended in 2013 and some of the terminology was changed to include serious harm to fish. That's the death of fish and other aspects, but in our situation we had an MOU and we are appearing in front of the Commission.

So we worked with MPPs to abide by the new rules of the *Fisheries Act*, which included a duty to notify if there were any deaths of fish, and that sort of started the impetus for getting into compliance with the *Fisheries Act* authorization.

So where are we in the process? We're

hoping -- I could pass it to Bruce Power to find more solidity on the timelines.

**MEMBER PENNEY:** I guess the second part of my question was around the MCR program. Is it going to result in any more impingement and entrainment and, therefore, at a later date result in having to revise the authorization?

**DR. DUCROS:** Well, I can begin to speak to that, and DFO may want to complement what I say.

The authorization is based on the expected numbers of fish that are being in impingement and entrained, and offset measures are to be put in place as part of the application that are commensurate with the number of fish that are impingement and entrained.

From the proposal that we reviewed, we don't expect those numbers to change. However, an authorization that would be issued by the Minister of Fisheries and Oceans would have a time span associated with it, and monitoring, so that if there were -- if the predictions changed, if the monitoring showed that the offsets weren't commensurate with the number of fish being authorized, then DFO has measures that they can speak to, to deal with that.

**MR. SCONGACK:** James Scongack, for the record, for Bruce Power.

Maybe I could add just a few additional thoughts to this, Commissioner, if that's okay with you?

So I really think there are two or three separate elements that I think your question brings out and I think it's a helpful dialogue to spend a second on.

So your initial question was -- I believe what you are asking was given that we are entering into a refurbishment window and that refurbishment window will be after we get an authorization in the near term -- and I can give you an update on our planning on the next submission -- will that change the assumptions and the authorization that we are getting in the interim, and the answer from our perspective is no, because all of the work that we have done with environmental assessments, with all of our impingement entrainment work, it's bounded by eight units of operation. So essentially when a unit comes offline for MCR, or one or two units at a time, we have less condenser cooling water flow. So our expectation would be, all other things being equal, that during the MCR window you should experience less impingement and entrainment. Our DFO application, which we will be resubmitting very shortly, we think will more than bound that for the foreseeable future.

You know, as I think DFO and CNSC staff alluded to, this has been a very active dialogue. From our

perspective, the time that it has taken, in addition to indigenous consultation, has really been about how do you develop the methodology to -- I think that's the stage right now -- how do you develop the methodology around the monitoring of the offset? So from our perspective we are actually moving ahead right now, we are doing it at risk, with implementing offset projects right now, and for all intents and purposes we believe that based on our current assumptions on what impingement and entrainment are, from eight units of operation that are bounding, we believe the offset projects that we are going to be identifying in our application, which are two projects in total, will be many multiples more of offset than we reach. So we believe we are very well bounded.

In addition to the two offset projects that we will be submitting in our application, there are also 15 different offset projects that we are advancing through our Environmental and Sustainability Fund. The reason why we are not including them in the application is, number one, because we don't need to, and, number two, because the monitoring costs of these projects is many multiples of what the project is. So just to give you an example, what we will be submitting in our application, we will have about \$600,000-\$700,000 in costs to do the offset, whether that is a dam removal or river

rehabilitation. We will spend \$3 million monitoring that to determine that we got the offset. So, Commissioner, you know, it's a key issue for us, we know it's important to SON, but it's actually very important to a lot of these environmental groups we are working with because they are actually the ones that are helping us implement the projects.

**MEMBER PENNEY:** One more question and this one is for CNSC staff or DFO. Which agency is responsible for the follow-up monitoring?

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

Under the MOU, CNSC have agreed to monitor. We have site staff who do walk-throughs or walkabouts and are in a really good position to see anything and to speak directly with Bruce Power staff. If there are any non-concurrences or anything that we are worried about though, we report those to DFO in accordance with the MOU and it's DFO who is responsible for the compliance and enforcement piece.

**THE PRESIDENT:** Oh, maybe it's a good time to bring in the Department of Environment and Climate Change. Any of those kind of activities on the thermal plume that goes into the lake, is that now something that you can get the view from the Environment Department?

**MS ALI:** Nardia Ali, Environment and Climate Change Canada, for the record.

So Environment and Climate Change Canada have been involved in the review of the ecological risk assessment. Based on our review and numerous meetings with the CNSC and Bruce Power in which we have gone back and forth with our comments, and Bruce Power has been quite cooperative in addressing most of them, it is our -- we believe that in terms of thermal the level of risk is quite low, mainly -- and the risk is there because the local habitat is used by thermally sensitive species like whitefish. So there are a few little uncertainties that we are sort of working out, but it wouldn't sort of change our overall conclusion that the level of risk is low. The sort of work that we are doing is more to better quantify that risk. We don't expect a change with the MCR replacement.

**THE PRESIDENT:** While we have the two departments in front of us, does anybody have any additional questions to them? I'm sure there will be lots in Part 2. Go ahead.

**MEMBER PENNEY:** I guess I'm confused. Are you with the province or the feds?

**MS ALI:** Federal Department of Environment and Climate Change.

**MEMBER PENNEY:** Right. And so your

mandate would be around section 36?

**MS ALI:** Section 36 of the *Fisheries Act*.

**MEMBER PENNEY:** Right, okay. Okay. Okay.  
I understand now.

**THE PRESIDENT:** But that's a good point.  
The Ministry of Environment of Ontario have an interest in them also and they may appear also because they have to get information on any unforeseen emissions, et cetera, et cetera.

**MR. SCONGACK:** Yes. James Scongack, for the record.

Just for the record, I think it's an important point. So obviously all of the CNSC and federal reviews cover this as well, but in order to operate our facility, separate of this licence proceeding, we operate under an environmental compliance approval at both Bruce A and B which also monitors station temperatures and we continue to operate well within that parameter.

**MEMBER PENNEY:** From the province?

**MR. SCONGACK:** From the Environment and Climate Change, yes, Ontario, that's correct.

**MEMBER PENNEY:** Yes.

**THE PRESIDENT:** And if that's not enough, I think even Health Canada is monitoring the thing, but I think we will talk to Health Canada when we talk about

emergency management.

So anything else for them?

**DR. DUCROS:** I thought I would just supplement my answer to your question when you asked who is responsible for the follow-up. In terms of compliance verification CNSC is responsible, but in terms of verifying the productivity of the offsets in the monitoring plan, those -- Bruce Power would be sending those reports directly to DFO and they are responsible to ensure that those are effective.

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

Mr. Berube...?

**MEMBER BERUBE:** So moving on I have a question about emergency management, in particular the leadership of emergency management, which is critical of course to the health and well-being of people around Bruce.

**THE PRESIDENT:** So before you start, let me ask, the Office of the Fire Marshal and Emergency Management, are you online?

**MR. NODWELL:** Hi. Good afternoon. Dave Nodwell, Office of the Fire Marshal and Emergency Management here.

**THE PRESIDENT:** Okay. Welcome. Go ahead.

**MR. NODWELL:** Thank you.

**MEMBER BERUBE:** So my question is



specifically -- you have these large-scale exercises periodically. One of the questions I have is how often do you conduct these things? And, second of all, how do you actually trap the outcomes from these exercises and use lessons learned from that to improve response in subsequent exercises to get closer to a realistic scenario type environment?

**MR. NODWELL:** Thank you for that. Dave Nodwell again, for the record.

We are involved in an assortment of exercises and drills. The rate at which we have been involved in the large full-scale exercises has been approximately one every year and a half or so. These have been associated with the larger exercises conducted by both OPG and Bruce Power primarily. So we have been an active player in those. We have also been involved in numerous other full-scale exercises which actually continue to enhance our capabilities, whether it's a nuclear response or not.

The lessons learned from exercises are captured in an After Action Report which are then monitored in terms of their implementation. And I think a very good example of that was some of these lessons learned from the Bruce exercise about a year and a half ago I believe it was and there were lessons learned related to the science

section in the provincial Emergency Operations Centre. So those specific lessons learned have been implemented in terms of the science section procedures which are being updated, similarly in terms of the use of technology in the science section and the adoption of the URI program which replaced the ERP program that had been in use for many years.

So capturing lessons learned is a very important part of that. That's really the reason that we are doing these exercises in the first place, is to try and find gaps, try to find areas of improvement. And then of course the other side of that is the implementation of those lessons learned, so that's monitored. We are always learning. Whether it's an exercise, whether it's an activation dealing with an emergency happening within the Province of Ontario, it's the same process.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So certainly that's from the province's perspective. There are very strict requirements that are placed on the licensees from the CNSC for a whole raft of emergency management type activities, from small drills to making sure you have a fire team in place, up to and including these major drills that are included in REGDOC-2.10.1.

But perhaps to give a more complete picture I would ask Mr. Richard Tennant if he could talk a bit about what the requirements are on the licensees on this.

**MR. TENNANT:** Richard Tennant, for the record, Emergency Management Programs Division.

Yes, as Mr. Frappier referred to, we have requirement on the licensee to conduct full-scale exercises once every three years. We actively participate in those exercises as well to show support as a government department that would be responding, as would Health Canada and other government departments that would come through based on the federal government plans through the FERP and the Federal Nuclear Emergency Plan.

With respect to After Action Report, the licensee has a requirement to report to us. We want to monitor and see if they are capturing the corrective actions and improvement that they can implement into their plans and we do the same thing as well. So the cycle for a full-scale exercise is currently once every three years on our licensees.

I don't know if Health Canada wants to come and speak to the FNEP.

**THE PRESIDENT:** I think it's a good time to hear from Health Canada on the federal level emergency

planning and the big exercise that is being planned for 2019 I believe.

**MR. AHIER:** Yes, thank you. Brian Ahier, Health Canada, for the record.

Certainly from the point of view of the Federal Nuclear Emergency Plan, which I think some of you are aware is a plan that is led by Health Canada and integrates with Public Safety's overarching Federal Emergency Response Plan, we have in that plan a requirement or at least a guideline to exercise a full-scale -- to implement a full-scale exercise involving all jurisdictions every 2 to 3 years. The last time that we have had -- the last really large-scale exercise involving a whole of government federal response was in 2014. That was Exercise Unified Response. Since that time there have been many other nuclear exercises that have taken place. They haven't all had the same level of federal government involvement as we did back in 2014. Nonetheless, we have been able to test important objectives, particularly the support that we provide to the provinces, particularly through either the science sections or the technical assessment groups that they might have down in the provinces.

In terms of capturing lessons learned and acting on lessons learned, we will also write up a federal

level After Action Report and put in place management response action plans in order to track the lessons learned and ensure that they are implemented.

What we consider to be our next really large-scale exercise is the one that President Binder just referenced, which is an international emergency preparedness review that we are planning to take place in 2019 and that will involve an expert team that will be assembled by the International Atomic Energy Agency that will come to Canada in 2019 and undertake a review of nuclear emergency preparedness arrangements across all jurisdictions. That will be an end-to-end review that we consider to be our next large exercise that will involve all jurisdictions and then of course that will result in a report and identification of both best practices and potential areas -- opportunities for improvement that would then be acted on as well.

**MEMBER BERUBE:** Just to add to that question, is there a mechanism for benchmarking at this point or scoring on these type of exercises or are they still more or less subjective at this point?

**MR. FRAPPIER:** Gerry Frappier, for the record.

Again, I think it's important to -- so that's sort of the major exercises that we are talking

about here involving multiple government departments, mostly being done outside the fence, if you like, as far as how all those interactions are. I will let them talk about the scoring.

But again, from a licensee's requirements perspective they have multiple drills and exercises that have to be done regularly throughout the year. They must do a sitewide exercise every year and those are reviewed and rated, if you like, or evaluated, inspected I guess may be the right word, by our own inspection staff.

With respect to scorecards on the larger ones, I'm not sure if either Richard Tennant or Brian Ahier would like to comment on that.

**MR. AHIER:** Brian Ahier, for the record.

I think it's important to note that when we go in and plan exercises it's always important to be very clear on what the exercise objectives will be. We can establish different tiers of objectives depending upon how detailed they are and then all of those objectives will be specifically evaluated as part of the exercise conduct and they will be rated whether they were fully met, partially met, not met, and that of course allows -- and that will be accompanied by the observations that will back up that particular rating, which will then influence the recommendations and after actions.

**THE PRESIDENT:** I think it's a good opportunity for anybody who has a question for the Office of the Fire Marshal and our staff and Health Canada.

My question is for Mr. Nodwell. One of the accusations of the PNERP was that it wasn't -- you guys didn't take into account a Fukushima scale like accidents. I would like staff to talk to that and maybe you tell me what's your reaction to that criticism.

**MR. NODWELL:** Dave Nodwell, for the record.

We did look as a part of the PNERP review and the work that has been done over the last 12 months in particular, look at a host of accidents, including a severe accident that was based on some PSAs that were unmitigated accidents that involved no operator intervention for a period of 12 hours, so a fairly severe accident. Similarly, that work was presented to the advisory group as a part of the public consultation that was conducted last summer and the advisory group did question the study, but they did find that the planning's own sizes were very appropriate for a single unit unmitigated accident or multi-unit events where there were some -- and I repeat the word "some", not all -- post-Fukushima improvements being credited into the source term calculation.

One of the recommendations coming from the

advisory group that made recommendations to our Minister was to conduct a detailed technical study and this would look at a number of things, including enhanced meteorological data covering a full 12 months. It would also include reviewing local topographical features and so forth.

So we continue to look at that, but based on the work that was done we feel that we did deal with a severe accident based on the CANDU reactor technology. I hope that addresses your question.

**THE PRESIDENT:** Yes, it does. Anybody else want to add?

**MR. FRAPPIER:** Gerry Frappier, for the record.

So staff would agree with that assessment that was done. We did work with the province with respect to source terms and things of that nature that were appropriate for our CANDU technology.

**MR. SAUNDERS:** I think I would just point out as well that the application of the containment filtered ventilation system, the passive systems which will be installed, will actually further reduce the potential for any kind of a spread of contamination outside the site. Those aren't factored in yet and so in some ways we welcome the studies because we will want to factor all these



changes into the study when we look at it.

**MEMBER VELSHI:** Mr. Nodwell, are you folks putting together a response to the report issued yesterday by the Ontario Clean Air Alliance for Pickering and what a Fukushima-like accident would mean for the City of Toronto and the surrounding areas? It's a really doom-and-gloom picture.

**MR. NODWELL:** Yes. Dave Nodwell, for the record. I did review the article in the Toronto Star and the study that the article was largely based on, I believe it was the Clean Air Alliance. We are not planning a response to that at this time. However, we will be presenting a major update in terms of emergency management and the work being done with the PNERP to the Commission on April the 4th. So we will have a chance to kind of discuss that, you know, doom-and-gloom perspective I think at that time.

**MEMBER VELSHI:** Thank you.

And my other question to you, and I know in reading the CMDs from Bruce Power and staff that as far as PNERP's impact on Bruce Power, it was negligible, you just need to change some procedures to make reference to it. But what about the municipalities and their preparedness? What is your comment on that?

**MR. NODWELL:** Thank you.

Yes, we did look at what the burden would be on all responding organizations but particularly the municipalities that are responsible for a lot of the very local detailed planning. Based on that assessment, and we certainly had discussions with Kincardine, Saugeen Shores and other designated municipalities, the feeling was that there is not a financial burden per se on them as a result of the new PNERP. However, there are some responsibilities that would impact the allocation of staff resources. So there is certainly some extra planning that needs to be done within the municipalities.

A case in point would be the addition of a new planning zone called the contingency planning zone and, as you can imagine, there has been a great deal of discussion related to exactly what that means, what are the responsibilities of the municipalities in terms of their planning and impact. Again, the assessment is not that it's not a financial burden on the municipality but rather one of just the allocation of staff time. And I would add to that as well, in terms of the detailed technical study that is currently being initiated, that a part of that review would take a look at municipal impacts as well. So that is certainly being considered throughout the process.

**MEMBER VELSHI:** Thank you.

Bruce Power, did you have anything to add

to that?

**MR. SCONGACK:** Yes. James Scongack, for the record. I think Mr. Saunders also has something to add as well.

So in response to your question about the impact on municipalities, both Saugeen Shores and Kincardine, and I would also add to that dynamic to the engagement with hospital corporations, the hospitals in the region who, whether it's in the event of an emergency or through our drills, we expect a lot of our healthcare professionals and first responders. So in 2015 Bruce Power has entered into Memorandums of Understanding with both of those organizations, so the municipalities and hospital corporations, and we have an ongoing dialogue with those entities about, you know, how can we work together, how can we share information. Bruce Power provided some targeted funding for example to the hospital corporations for work that they could undertake to enhance the training of first responders, how they could enhance the facilities in terms of a contaminated casualty as an example.

And at the municipal level there is a -- I would agree with the comment of the Office of the Fire Marshal in terms of an allocation of staff, but as anybody knows, an allocation of staff is a cost to a municipality and so we have put arrangements in place with Saugeen

Shores and Kincardine in particular as to how can we accommodate some of that funding. But also keep in mind these are relatively small organizations, so the collaborative relationship for them to have access to all of our staff at Bruce Power, all that expertise, even though it is a municipal responsibility as it would be officially designated, we work with them. You know, things like our potassium iodide redistribution program, we work closely with the municipalities on that, community safety guides that we send to 60,000 households. So, you know, we recognize that given the fact we are in a small rural area we don't have the same population density and by extension the same size of governments and hospital corporations, we have a responsibility to play there.

Actually, yes, Mr. Rencheck is just reminding me. And another key area obviously, access to healthcare services is important for our employees and the community broadly, but it's also important from an emergency preparedness point of view. So the Southampton, which is in the municipality of Saugeen Shores, recently opened a new emergency room; Kincardine, the Municipality of Kincardine is going through a redevelopment project for their hospital; and we actually, through a co-funded arrangement with both municipalities, carry out a physician recruitment program. So we feel, you know, in small town

Ontario we are all in it together and that's really the dynamic we are taking through this.

I think Mr. Saunders had something to add as well.

**MR. SAUNDERS:** Yes. Not much, you covered most of it, other than to say that we are already engaged with the local communities to help them do that work and we are also engaged with them on the interoperability plans, which benefits us of course in the case of a response but also just generally benefits emergency response across the community. So this is something that we participate in all the time and we have been working towards getting that in place.

**MEMBER VELSHI:** And this whole area of emergency management has always been a very hot topic and issue and it wasn't one that you identified in the key issues in your public outreach, but are you anticipating heavy debate on this in day two?

**MR. SCONGACK:** James Scongack, for the record.

These are issues we take very seriously. We engage actively and we make sure all our I's are dotted and T's crossed, but to be frank, it's not an issue we hear concern about. In addition to public opinion polling, we do what we call public attitude research. We don't see it

there. In 2015 when we did door-to-door potassium iodide tablet redistribution we did not get significant concerns. So I would be surprised if from local folks you hear that concern.

**THE PRESIDENT:** Well, if memory serves, you mentioned hospitals, but don't forget school boards.

**MR. SCONGACK:** Correct.

**THE PRESIDENT:** You are going to get school board issues --

**MR. SCONGACK:** Yes.

**THE PRESIDENT:** -- if you are not attentive.

**MR. SCONGACK:** Yes. James Scongack, for the record. That's a great point. So as part of this we have an active dialogue with the school boards. They were involved in the potassium iodide tablet redistribution. We have worked with them to support where necessary what plans they need to put in place and so certainly you can probe on that more in Part 2 and I would imagine you will get the same answer that I provided. I hope you do.

**THE PRESIDENT:** Anybody has questions for the parties here?

Any additional from Health Canada?  
Everything -- you know, I never asked Health Canada whether you like the PNERP.

--- Laughter / Rires

**THE PRESIDENT:** So that's a federal-provincial relationship. PNERP, if I understand correctly, is supposed to be an appendix to the FNEP, plus all the municipalities in there. So any views? Any comments?

**MR. AHIER:** Yes. Brian Ahier, for the record.

The PNERP is a standalone plan. We have an interface between the Federal Nuclear Emergency Plan and the provincial plan through a FNEP Ontario Annex and I think that might be what you are referring to. That Annex really describes the specific interface between the federal technical support and how we will support the province and in large part the science or technical groups in the province, including provision of various types of assets or resources to support characterization of the situation and inform decision-making. So from our point of view the PNERP is a sound plan.

We are now in the process of supporting the Province of Ontario in developing some of the other plans, including the Environmental Radiation and Assurance Monitoring Group, which is composed of both provincial and federal components. So there is a lot of collaboration that happens between Health Canada and the Office of the

Fire Marshal and Emergency Management, both bilaterally and within the larger scope of both our FNEP -- the FNEP scope and the PNERP scope.

And one thing that's worth mentioning is that we do maintain a Federal-Provincial Radiological Nuclear Emergency Management Coordinating Committee that allows us to meet periodically and look at coordination issues that support the arrangements of the FNEP, in particular the interfaces down to the province. That committee met most recently about two weeks ago to discuss issues of relevance to all parties.

**THE PRESIDENT:** Thank you.

Between staff and Bruce Power, when is the -- I know they have this very impressive D-LAN process, but it's still not connected to CNSC emergency offices; right?

**MR. SAUNDERS:** No, that's not correct. It is connected to the CNSC, it's connected to everybody. The issue is simply about the automatic transition of data directly from systems versus through any manual intervention.

**THE PRESIDENT:** Well, that's what I meant.

**MR. SAUNDERS:** Yes. It isn't connected there and, quite frankly, it wasn't the highest priority in the process. The highest priority was to have a system



that will actually transmit the data throughout the circumstances we need it. We built that and we think it's one of the more advanced systems that we have come across at this point. So we will be doing the feasibility study this year. Now that we have it placed in the control room area, that's where the actual -- we call it VSAT, but it's a satellite uplink capability in essence. We will do a feasibility study now to see if we can make the automatic connection and delivery of the data that way. It actually serves our purpose as well as yours if we can do it that way. There is some data of course which our plants are not set up to provide automatically, so there will always be some manual interface, at least for the foreseeable future. And the issue with automatic data is that you can never guarantee automatic data flow will happen in all cases and therefore you will always have to have a manual input backup, and the system is designed to accommodate both of those. So a feasibility study this year and then we will provide what happens next.

**THE PRESIDENT:** Staff...?

**MR. FRAPPIER:** Gerry Frappier, for the record.

So just to confirm, yes, we do have access to D-LAN. So the LAN if you like, once the information is onto that network, we have very good visibility, there is

excellent exchanges and ability to do trending and things of that nature. For us the concern is that that data has to get onto that system and with it being manual, in true accident scenarios or situations, you know, people get committed to doing other things as well. So we would like to see the automatic connection. We take the point that that obviously has to be verified and there is still going to be certainly people that have to come into the system, but it would be nice if a lot of that data, most of that data was just coming through, nobody had to worry about it, it's there and accessible to people.

But as far as the system that they have put together, the D-LAN, it's a very robust system and we have good connectivity to it.

**THE PRESIDENT:** I thought one of the lessons on emergency management was the manual system, the blockage for the flow of information. So I'm not buying it because I know OPG -- if I understand correctly, OPG already fixed that and so did Point Lepreau. Am I right?

**MR. FRAPPIER:** Gerry Frappier, for the record.

You are correct. So they have taken a different approach. So their approach was to work on that front-end business exactly as mentioned, let's get the automatic data being transmitted without the need for a

human in the loop if you like, but they have not put their systems as robust as what the D-LAN at Bruce is. So it's a question of what priority you put on different things. Both have work yet to do.

**MR. SAUNDERS:** Yes. Frank Saunders, for the record. I guess I would put it this way. If you are prioritizing emergency response data, you have to have a list of the things that you want to achieve first. We started back in 2012 with the off-site radiation monitors. We used a very similar criteria that the transmission of data without local infrastructure was absolutely critical, that if you take into account the accidents at Fukushima and that you cannot rely on local infrastructure to provide data. So automatic is great, but if it relies on systems that you know will not be there in some accidents, it's simply not sufficient. You can't have emergency crews trained and trying to operate on three and four different systems depending on what's working, you need to have a system that will work for all circumstances. So the first focus was to develop that system that works, transmits data, stores the data offsite so it's not at all related to local disturbances, in fact stores it in two places, one about 200 kilometres away and the other one 1000 or so kilometres away, to make sure that that disturbance is not there. Both the province, us, and your folks, Health

Canada, Environment Canada and others can access that database remotely, get all that data. Now, that's in place and in our view that was the highest priority. Accurate, timely data is a high priority and that's what we are providing. If it's manually input, okay in the short term. Obviously from our point of view of managing the emergency, we would rather not tie up staff doing that, so we will look to provide that automatic transfer, but we are trying to do it in a way that will work in all accident scenarios, in all events and won't add extra burden onto our response staff.

**THE PRESIDENT:** I don't want to belabour the issue, but in an era when even CRTC finally will provide the service we have all been waiting for on emergency management, the fact that there is going to be an emergency is going to be instantaneously known to everybody and then the question will become what's the data, how serious it is, et cetera. So a manual system will not do. I hope you guys are going to fix it in my lifetime, which is very short.

**MR. SAUNDERS:** I would simply say no data won't do either and in some circumstances that is what you will have, right? So you need a system that works first. A system that gives you automatic data is a second priority for sure. I don't disagree, I think we are talking about

which one you want to do first.

**THE PRESIDENT:** It's time to move to -- okay, we are taking a 10-minute break.

**MEMBER DEMETER:** Okay. I had a Health Canada question but --

**THE PRESIDENT:** I'm sorry, you had a Health Canada...?

**MEMBER DEMETER:** This is very quick, if I may.

**THE PRESIDENT:** Go ahead. Sorry, I should have said any final questions.

**MEMBER DEMETER:** It was raised that you were going -- Bruce, you raised that you are recruiting physicians. One of the skill sets of a physician in Kincardine would be to deal with radiation emergencies and I personally took my training through the DOE in Oak Ridge, Tennessee on emergency management of potentially exposed or contaminated individuals, very good training. Is there a Canadian equivalent? Is there a way of training your emerg docs in your hospitals to be able to assess, receive, triage, take the appropriate actions if someone is potentially contaminated, because it's a different approach to patients? Is there any physician training that you have that deals with this level of expertise?

**MR. AHIER:** I'm sorry, I thought you had

directed that question to Bruce. Brian Ahier, for the record.

Health Canada offers a course, it's called Medical Emergency Treatment for Exposures to Radiation, it's called METER. It is similar to the course that's offered -- or the services offered by REACT. In fact, there have been consultations with them to develop the course content and we deliver that course typically 1 to 2 times per year depending upon request and available resources. The course was offered to the hospitals in the Kincardine region just prior to Exercise Human Resolve and we in fact used the exercise as an opportunity to observe how the first receivers were handling the simulated contaminated individuals during the exercise.

**MEMBER DEMETER:** Okay. That's very good to hear. I knew about the METER program, I just didn't -- I just wanted to see if it had arisen in this situation. But thank you.

**THE PRESIDENT:** So any other questions to Health Canada or to the Office of the Fire Marshal? We don't want to keep them here if there are not going to be any more questions. And the same thing for Fisheries and Oceans and Environment Canada, thank you for being here and I assume you will be with us in Part 2.

So now we are going to take a break for

10 minutes. Ten minutes. Thank you.

--- Upon recessing at 5:26 p.m. /

Suspension à 17 h 26

--- Upon resuming at 5:40 p.m. /

Reprise à 17 h 40

**THE PRESIDENT:** Okay, we are back and ready to go and we are back to Ms Velshi.

**MEMBER VELSHI:** Thank you.

I would like to talk about a probabilistic safety assessment briefly. So one of the things I think that will be helpful is if there was a slide that showed the results compared to the limit and the target and I don't think we showed that. So if I looked at -- I think it's slide 33 in the staff CMD presentation, but regardless of whether that's the slide, you are nodding so you know what I'm getting at, I know you did say that whatever the result was is less than the limit, but what I also did not see in any of the information presented is what the aggregate amount is. So you have it by unit but not by station. I don't know if it's just a sum of them, but we have done that in the past. So I think all of that would be kind of useful.

And the second part was -- and I think,

Bruce Power, you have said that only those EMEs that are implemented have been taken into consideration in that probabilistic safety assessment; am I correct in that?

So maybe I will start off with staff first on just the chart that shows the aggregate amount, compares that to the limit and the target, and then we can ask about the EME inclusion.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So, as you suggest, slide 33 of our presentation has results certainly for the LRF. I think in the CMD we have the results for the others as well.

And then with respect to how that compares to the goals -- sorry, to the safety goals, I would ask Yolande Akl to perhaps put all that into perspective.

**MS AKL:** Good afternoon. Yolande Akl, for the record, Director of the Probabilistic Safety Assessment and Reliability Division.

So these numbers that you see in this slide on the left columns are the same numbers that you have seen before during the submission of 2014 and they were presented to you in 2015, a presentation by us, CNSC, the regulator, and as well by Bruce Power. The ones on the right are the ones that Bruce Power also showed in their summary report which was published in the White Paper in



which they put some estimate and some refinement to the numbers, including the EMEs. So these numbers were not submitted to us yet. We reviewed the ones of 2014 because that was the time to submit based on REGDOC-2.9.4.

As for the numbers on the right side, these are preliminary numbers, they were still working on them, but actually the update is not due to us before 2019. So they are still working on it. It's a normal thing for a PSA to keep -- if there are improvements to include them, but they would not submit it to us as models to review yet, which we are not still due to ask. Like it's a requirement every five years. So we have not reviewed these yet. So maybe Bruce Power can talk about them.

But actually I wanted to say that even when we aggregate these numbers they meet the safety goal limits. So they are within the requirements of the licensing basis.

**MEMBER VELSHI:** Yes, fair enough. So what I was getting at -- there are two things. One is it would be helpful if you showed what the aggregate was, and even if you said it's just a simplistic addition --

**MS AKL:** Yes.

**MEMBER VELSHI:** -- I mean I don't know if you folks agree to that, but we have done that in the past -- and then on the same chart show both the limits and

the targets, because this falls somewhere in between those two; right?

**MS AKL:** That's correct.

**MEMBER VELSHI:** And then the second part, which is the two columns on the right, which is Bruce Power's updated information which you folks have not validated, when I see, well, these have not been submitted to the CNSC, almost seems to imply that Bruce Power is holding something back. That's not the case --

**MS AKL:** No.

**MS VELSHI:** -- it's just the timing, the cycle is such that they are not. But that's fine, I mean you can talk to that. But as I said, on the chart if you can show the limit and the target -- what are they called -- goal limits and goal targets, right?

**MS AKL:** Yes.

**THE PRESIDENT:** No, but if memory serves, Bruce never accepted the need to have targets. I thought that was the discussion in 2015, if memory serves right, and we had a long discussion about this. Correct me if I'm wrong.

**MR. SAUNDERS:** Yes. No, not quite the truth. If I could get a little password help here I could show you that the chart I showed you actually has all of that on there and our submission has a lot of detail on it.

I just have the one chart, but unfortunately I have forgotten the password in the length of time, so I need a little help getting the chart back up again.

**THE PRESIDENT:** You have good security then.

--- Laughter / Rires

--- Pause

**MR. SAUNDERS:** So where am I down here?

**THE PRESIDENT:** While you're looking at this, just remind me, did we ever -- did the CNSC ever put somewhere the requirement to have both limits and targets?

**MR. FRAPPIER:** Gerry Frappier, for the record. I would ask Luc Sigouin to explain how that was done.

**MR. SIGOUIN:** Luc Sigouin, for the record. So in the Licence Conditions Handbook, the section on the safety and control area for safety analysis includes a specific licence condition for Bruce Power to develop a policy or process on how to deal with PSA results that fall between the limit and the target. So that is included in the Licence Conditions Handbook as a requirement.

**MEMBER VELSHI:** Was that not an outcome from our last hearing where the Commission required that?

**MR. SIGOUIN:** Luc Sigouin, for the record.

Yes, that is correct, Ms Velshi. **MR.**

**SAUNDERS:** So, I brought this chart up. So, in fact, we've always had limits and goals or goals and targets and we've called them different things between different groups in the industry. So, we have renamed that and, as was discussed earlier, we have issued a specific procedure which defines it exactly.

So, if you look at this chart, and in our application there's actually a bunch of data that goes with this, but this is a summary chart. So, in this thing for a large release frequency, which is what this is, at the top of the chart there, times 10 to the minus 5, that is the goal, that's where you need to be for sure; at the bottom of the chart, 10 to the minus 6 is what we call an administrative control which means that's where you'd like to be.

So, you can see here the distribution. And in these charts, for example, I use a fire one because it's the biggest. The light blue at the bottom is the individual unit, so that is the value of the unit. If you take the top one at the top and add it in, that is the aggregation for the station.

So, you got both the unit ones and the station aggregation. And you can see the key there that takes you through that.

**MEMBER VELSHI:** So, what's still missing, you told me, it's not evident on the chart that the top line, one to the --

**MR. SAUNDERS:** Yes.

**MEMBER VELSHI:** --  $e^{-5}$  is what, the goal is. I mean, it is somewhere, it's elsewhere in that slide deck. I thought it would be helpful to have it on one.

What you've also not aggregated -- and, again, I know there was a whole lot of discussion on that -- if you add fire plus seismic plus high winds, what is the total risk and how does that compare with the limit and the target?

**MR. SAUNDERS:** The issue is, though, the limits are not actually intended for that purpose. So, if we wanted to start adding in all these external events, we would have to define a new set of limits.

There are very different circumstances between the at power events in terms of the confidence level on that information compared to the external events, and that's when we say that that modelling is realistic for internal events, that means it's quite accurate, we can define it very well, there's proven methodologies for doing it; it starts to become much fuzzier as you go out.

And what happens is the error in seismic and high winds will dwarf what's in the at power stuff.

So, you're trying to add things together that just don't add together.

So, as an industry we worked on this to try and present the picture so people could see it and understand it, rather than give you a number that doesn't actually make mathematical sense. So, this is how we picture the whole site risk, we look at it this way.

As to the question about whether we've included emergency mitigating equipment or not, the answer is yes, we've included it to some degree. There is still, though, a lack of sophistication about how to include human interactions in probabilistic safety analysis. We still make the assumption that essentially one time in 10 human beings will make an error and won't be effective, even though in these circumstances there's many hours to do it, there's many people and so things could be corrected and the like.

So, we're just actually installing at site this month a simulation program which runs thousands of simulations on different weather patterns and that and predicts our ability to deploy EME based on that, our emergency mitigating equipment. And so, we're starting to develop the sophistication which I think will eventually allow us to integrate this more fully, but as of yet, as is very typical in an industry we're super conservative, so if

we can't prove it, we don't claim it; right. So, right now we're claiming an error rate for emergency mitigating equipment that's still quite high. In reality they would be much lower than that in real life.

So, there's some work to do to really integrate the emergency mitigating equipment in a more thorough fashion, but what you have is a very conservative look.

And, as I said earlier, you know, things in the range of 10 to the minus 5, 10 to the minus 6 might not be zero, but they're awfully close to zero; right, when it comes to risk and there's very few things in the world that can give you this kind of risk.

**MEMBER VELSHI:** Thank you. And my other question was, you have not taken into consideration any of the EMEs that have not been implemented as yet; right, in this assessment?

**MR. SAUNDERS:** Actually we have included the emergency mitigating equipment because it's in different units in different ways. So, some units are done, some units aren't done.

So, we have made the assumption and in the detail in our application it will tell you where we made those assumptions. Where we have made the assumptions, in some cases that EME is installed and this will officially

go to CNSC with the 2019 update and at that point in time all of the emergency mitigating equipment will actually be operational.

So, we've included it -- show the picture where it is. It's only, quite frankly, marginally different from the 2014 one. So, as you can see the difference between, the staff showed you the 2014 and the current one, the difference that emergency mitigating equipment makes on the PSA when you consider larger rates and human interactions is relatively small.

The difference it makes on the amount of radioactivity that is released is marginally large, and so there's two different functions to this, right; the fact that you have an event, the frequency may not change that much, the consequence of that event changes dramatically and it will take another couple years to be able to get more sophisticated in how we bring all that together and give you an accurate picture of what it looks like.

This is accurate in the sense it's conservative. It's no worse than this for sure, but in my view, it's significantly better than this and we just need to have the methodology to prove it.

**MEMBER VELSHI:** But it begs the question, I mean, you're fair enough to say it's more conservative, but if you've added in stuff that still is not in place



that's not conservative and it just raises more questions. And is that where you want to be?

**MR. SAUNDERS:** The both sets of data are there; right, so what previously didn't include any of emergency mitigating equipment and where it's going, because the question we got asked is what difference does it make. So, we're trying to show both sides of the world.

Now, in this case I'm giving you one picture here in my presentation, but the application has a lot more information in it about this.

So, we're trying to paint the two pictures so that you can see both where we're going with emergency mitigating equipment, much of which is already there, and in fact the prevention part of the emergency mitigating equipment is, in fact, all installed. So, the emergency makeup water, the steam generators and those things which is the predominance of the difference in the periodic safety assessment is, in fact, installed and operable today.

The other side I should mention is, aside from that, we also have accident management kits. we call them. So, we have two ways of doing this. One way is a quick connect, so you just come in with a fire hose, you snap it on and it's hooked and you go; the other way is a kit which says you go and you unscrew a valve or you do

something, you hook up to it and then you hook up the fire hose. The only difference between the two is timing, that's quicker with a quick connect and it simplifies life if you're in an accident scenario.

So, the SAMG kits are all in place, everybody is trained, so we have a means of doing it for all of these things. So, it would not actually change the outcome, it's just we have not officially submitted it to CNSC yet. We are in the middle of that update and we just submitted the one in 2014 'til the next five years, June, 2019. The requirement under the licence is if we do something to make it worse, we have to tell you now; if we make it better, we tell you every five years.

**THE PRESIDENT:** No, no, no. The 2019 is the minimum requirement. You could update your PSA any time you want. Really, in fact -- in fact, the policy says that if there's any change you should update it anyhow. So, if you put in some EMEs and you want to change it, I don't see why you wouldn't do it.

What I was surprised is, here we are, this is 2018, and still some Fukushima commitment has not been implemented. And the one, the EME connection to the plenary heat transport and the installation of the shield tank and the filter containment; why are they not done yet?

**MR. SAUNDERS:** Frank Saunders, for the

record.

So, first I should point out, this is according to the schedule; right, so they are on time, they are being delivered as promised.

You've got eight units, each one of those units requires an outage and a modification to install this equipment. So, as we go through -- first you design it, then you go through each unit outage and you do the installations, it takes a period of time to get it done, which is why there is a backup to the SAMG kits.

So, there's more than one way to accomplish the goal. The quick connects are just the faster way of doing it. So, there is already in place a provision.

Prioritization as agreed with CNSC staff and the Commission at the time was on prevention, so the first round of changes were to get the prevention in place, so this was the makeups to the fuel pools, makeup to the steam generators because if you do those things properly you don't ever need the mitigation events. So, first is prevention, next step mitigation and we're about halfway through the mitigation effort now, be finished by 2019.

The filtered ventilation system was an action taken to examine that. We did the examination, we found we had to do a considerable amount of design

assistance to get pressures that we felt would actually be successful and we've gotten through that and we've got it done, so we've made the conviction for 2020.

**THE PRESIDENT:** So, it may be me, but -- maybe stuff. I thought we've been arguing that the Fukushima action plans has been done, implemented, complete. That's why I was surprised with that, particularly since we've been saying probably that under any severe accident because you're now can supply water directly to the core there would not be an issue, we can make sure the thing shuts down properly.

But if you still have some mitigation to do, we cannot say that, or what am I not getting here?

**MR. FRAPPIER:** Gerry Frappier, for the record.

So, you are correct, we say all the Fukushima action items are closed and, in fact, they are. There are station-specific action items that are still going on and they're on schedule and we want to make sure they stay on schedule.

The reason we can say that, though, may be not as clear as it could be. So, as you say, one of the key things is being able -- that came up in Fukushima was we wanted to make sure that we could get water to the core or at least to the moderator under a whole bunch of

different circumstances and Bruce Power can do that now. The piece that was part of their plan that isn't completed yet is how quickly they can do it.

So if you look at the list of what they have as to what's completed and what's not completed, you have to look at the SAMG kit that they make, so the S-A-M-G kit is essentially the same function as the one that hasn't been completed. As Mr. Saunders was explaining, they want to make it so that it's much easier, which we would agree with. But they do have that capability right now at all the units. What they don't have is the faster capability, so the improvement, the enhancement, if you like, to it.

The containment filtered venting is important. As was mentioned, it's not trivial in the configuration at Bruce to be able to design such a system that would be totally passive. But they do have a system in place, but it requires power. And so they have looked at improving the capability of it, making sure there's backup power for those systems so that they can do filtered venting, but they need to have power to do that. And that's not sufficient for us. We'd like to see it go into total passive. But it is a challenge to design that for the Bruce system.

**THE PRESIDENT:** So still back on the PSA, just to follow on Ms Velshi comments, for part 2, you got

to clarify even if it's an estimate, because, you know, some of the people are criticizing whole craft of PSA by using your own data. And if you don't come up with an aggregate, they will do the addition. And if you don't -- and if that's not enough, they're going to do it on the whole eight units. So we all know about how complicated that is.

So I don't know what the answer is, but that -- some of those table were not clear, given the discussion we had in the past about going from limits to targets.

**MR. SAUNDERS:** Yeah, I think -- I mean it is a difficult concept to explain to people in general, right, it's a complex calculation. The chart that we're showing you is in fact our best effort to date to explain it more clearly. We certainly can indicate where the lines are on it so that it's more clear. I thought it was fairly clear on the chart where the aggregations were and where they weren't, but we can do what we can to enhance that and make it more obvious.

Truth is, I mean, in reality these are extremely good numbers. And that is the message that we're trying to convey, is there's nothing -- there is nothing dangerous in these numbers.

So and in fact, you know, they

ultimately -- as we improve with the filtered ventilation, you know, our expectation is that many things will not even reach large release frequencies. So these numbers will change fairly dramatically at that stage. But as you said, that's not the kind of credit you want to take two years before we actually get around to doing the installation. But we are saying we expect a significant change based on those numbers.

We will finish that design -- it's pretty much finished now -- and once the design is done, we would expect to be able to incorporate our expected outcomes in the next review of the PSA. And I agree with you, we can update the PSA any time, but it's two years worth of work to do a PSA, so trying to do it faster than five years is pretty tough. It's -- in fact, we have submitted the methodology already to CNSC staff for their concurrence with -- for the PSA work that we're planning to do for 2019.

**THE PRESIDENT:** Okay. I got to move on.  
Dr. Demeter.

**MEMBER DEMETER:** Thank you. This is more of a housekeeping question to help me understand.

I'm on CMD 18-H4, the staff CMD. And I'm on page 191, which is table 18. And I'm looking at the first row where it talked about existing proposed licence

activity and proposed ... it talks about operation of nuclear generating stations A to B, units 1 to 8. And this is maybe more for staff, actually. And then the first -- then it says -- the first one is:

"possess, transfer, use, package, manage and store nuclear substances that are required for, associated with, or arise from the activities ... except for booster fuel assemblies."

And then booster fuel assemblies is separately mentioned below, on the second-last row. And then cobalt is separate from there as well.

I just don't know, is there any operational link to why that's been moved from there but then the reference for cobalt goes back to the same -- if you look at the reason for change it refers back to the first row as well. So I don't -- it was kind of confusing, that's all. And I don't know what the implications are, if any. Maybe it's just housekeeping.

**MR. FRAPPIER:** Gerry Frappier, for the record.

I'd ask Luc Sigouin to explain the details there.

**MR. SIGOUIN:** Luc Sigouin, for the record.



Part of the issue here, Dr. Demeter, is associated to the integration of the nuclear substance licences. And what we tried to lay out in the table is what was in the existing power reactor operating licence and how the nuclear substance licence requirements would be incorporated into them.

So if in one example, in the nuclear substance licence it says, you know, authorized to possess and transfer something in -- associated with the activities of that licence. Now that we're integrating it into the power reactor operating licence, there may be nuclear substances or activities that are not authorized specifically for the power reactor licence, but they were authorized for the nuclear substance licence. So that's why some of those are broken out.

What you will see is a reference in general to operation of the Bruce site and conditions associated to that, and then anything that is specific to either nuclear substance or to Bruce A or Bruce B in the case of booster fuel and cobalt are laid out separately.

**MEMBER DEMETER:** Okay, thank you. That helps. That's all I wondered, thank you.

**THE PRESIDENT:** Ms Penney.

**MEMBER PENNEY:** I'm going to ask CNSC staff now a question about the environmental effects

assessment. It's in CMD 18-H4. And I'm looking at page 255 of 457, if that helps.

The way I understand what I'm looking at is is there's a description, and this is an environmental assessment description, so it's at a high level and it's --

**THE PRESIDENT:** Sorry.

**MEMBER PENNEY:** Sorry?

**THE PRESIDENT:** Your machine --

**MEMBER PENNEY:** Yes?

**THE PRESIDENT:** -- put some new page numbers on them. That's nothing to do with that.

**MEMBER PENNEY:** It is page 53 of 85.

**THE PRESIDENT:** That's better.

**MEMBER PENNIER:** And it's me, yeah.

Apologies. Well, it really is page 255 of 457.

**THE PRESIDENT:** Yeah, that's that number, I think [indiscernible - speaking at the same time] --

**MEMBER PENNEY:** So this is an environmental assessment report by the CNSC staff. And it's reliant on the ERA, which I'm assuming prepared by Bruce Power. And so the first part of the report is explaining to me in quantified terms the emissions and discharges associated with the operations. And I got that.

When I come to the environmental effects assessment for the MCR activities, we turn to a qualitative

assessment.

So my question is to CNSC staff. Is there something that I just haven't gotten to read yet which actually quantifies the emissions and the discharges associated with MCR activities so that then you can look at and assess the effect on the environment?

**MR. FRAPPIER:** Gerry Frappier, for the record.

I'd ask Caroline Ducros to respond -- or yeah, Caroline I think first.

**DR. DUCROS:** So I'm looking at the page.

The environmental risk assessment for the continued operations was supplemented by what's termed a predictive environmental risk assessment, or a PEA, which is an N288-compliant, according to the Canadian Standards Association, environmental risk assessment. So it's not purely qualitative. It's based on predictive values. And I will pass it on to Mr. McAllister.

**MR. McALLISTER:** Thank you.

Just to complement Dr. Ducros' answer, certainly the existing operations' environmental risk assessment is data-heavy, for lack of a better term. They've generated that information. In doing the predictive effects assessment, there is data, there is quantification there. They've been able to use the results

of the refurbishment that was done for the -- couple of the Bruce A units using air emissions as an example. There were predictions done around that, because there are slight differences around the air emission profile compared to normal operations. They looked at those predictions. They compared them to the limits that are in place and determined that, you know, human health and people are protected.

So I would say not as -- for the quantifiable part, though it did focus on those deltas, those changes from the current operations to a major component replacement, where there wasn't deemed to be a change, it was indicated as such.

**MEMBER PENNEY:** So day 3 on the job for me. So what I hear you saying is there's a PEA that I haven't read, predictive and risk analysis, a PRA? Is that authored by Bruce Power? And so I'd find it on your website because your website has all these documents? Is that what I'm hearing?

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

The environmental risk assessment that was submitted included the MCR activities as -- sorry, the predictive effects. And it's part of the submission. So you should have all that information.

But just to supplement as well, the environmental assessment report that you're looking at does heavily rely on the environmental risk assessment, but it also relies on all the other factors that we look at as a life cycle regulator. So they continue as monitoring the reporting, the environmental -- the -- sorry, the independent environmental monitoring program, it doesn't rely solely on the ERA, although the environmental risk assessment is a large part, as you stated.

**MEMBER PENNEY:** So if I go back to the ERA and look at the predictive effects section, I'll find the quantitative analysis of emissions and discharges associated with the MCR that I'm looking for?

**MS DOWSLEY:** Barb Dowsley, environmental risk assessment specialist, for the record.

I think the confusion may be because the June 2017 version of the environmental risk assessment had the predictive environmental risk assessment with it. There's a revision to the current operations risk assessment that was submitted in October 2017 which does not have the predictive environmental risk assessment attached to it. So you would have to go back to the June version.

**MEMBER PENNEY:** Yeah, I'm just -- it's obvious to me that I haven't found this quantitative

assessment yet. And I'm just trying to identify where I go look for it. It's in the June version.

**MR. SCONGACK:** So James Scongack, for the record.

It's a fair question. The simple answer's yes. It's included in all the material that was submitted mid-last year. So when we're talking about this from an external point of view, sharing it with stakeholders, all that information was included.

But maybe I can just provide you a little bit of colour to your point on the quantitative piece on that. The reason why there may not appear to be a lot of quantitative components as much as in the operations side is because there isn't that many environmental effects, to be frank.

So when we look at this, we look at it on the basis of before we carried out the refurbishment on 1 and 2, we made a prediction in our environmental assessment, said what are the effects of refurbishment. Then we carry out monitoring. We complete the EA follow-up program. So all of a sudden, now we're not doing predictions. Now we have actuals.

So all we've effectively done is taken the actuals, which are actually far better than the predictive effects, and rolled it into this ERA.

So if you go on our website, everything that was posted in June, July of 2018, it is all there and is very clear. But as I said, don't want to suggest that it's subjective in nature. Where there is a quantitative piece, it's very clearly captured. But there isn't a lot of quantitative items to measure with MCR.

**MEMBER PENNEY:** Before part 2 or -- I will have read it. Thanks.

**MR. SCONGACK:** Sure.

**MR. FRAPPIER:** Gerry Frappier, for the record.

Just because it's a bit of confusion here, perhaps Mike Rinker can explain a little bit as to how the CMD got written up qualitatively instead of quantitatively, where in fact the quantitative data is somewhere.

**MR. RINKER:** Mike Rinker, for the record.

I think just a small point, because you have most of the answer. But much of the quantitative data that you see in the EA report is actual monitoring data that occurred over the previous monitoring period. So our compliance monitoring data that was submitted to us by Bruce Power that is reviewed quarterly and annually helped inform a large part of this EA under the NSCA. And the quantitative data that you're looking for, the predictive data, is on Bruce's website, which also informed the

narrative that's in this report.

**MR. SAUNDERS:** We can certainly make sure that you get a copy of that.

**MEMBER PENNEY:** If it's on your website. If it's on your website, I'll find it.

**THE PRESIDENT:** But I'm still missing something here. What is that we are measuring? When the thing is in operation, you're monitoring everything, emissions to water, to ground water, et cetera, et cetera. Then you take one unit off. So all the rest of the unit the same thing. So all of a sudden all -- so it's less emission than before. The only new stuff is if you grind something or do something. You may have some dust or thing which would be new. So what predictive data do you need?

**MR. SCONGACK:** Well, James Scongack, for the record.

I think that comment's spot on. So we are talking about very low-level items. So for example, people doing welding related to the major component replacement. Will there be an emission related to that welding activity? Right? And so we will take the actuals of what we saw in units 1 and 2, extrapolate those and project them forward.

I remember like it was yesterday sitting at the 1 and 2 hearing, and people were talking about how long is a forklift truck running for? You predicted was it



three hours? Is it doing to run two hours? So we are talking about very, very -- every environmental effect is important, but relatively low level.

**THE PRESIDENT:** As long as you don't predict alpha somewhere in there.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So just to come back to what you're saying, certainly as far as emissions from the station and all that goes, it's probably going to go down because you've taken a unit off. But the MCR is a huge construction project on its own right. And so this area was supposed to take a look at and to take a look at the effects of that MCR project. So you have a few extra thousand people on, they all have, you know, ATCO trailers everywhere, all that, all that kind of stuff, which I agree would probably be a lot smaller than the operation of the whole facility. But at the same time, that's something that has to be looked at. And it has been looked at, and this is the results. But I take the point that the quantitative data is not there.

**THE PRESIDENT:** Okay.

**MEMBER PENNEY:** And often when you -- if I may -- often when you take equipment down and then you bring it back up, you have upsets and you have an increase

in emissions. So.

**MR. RENCHECK:** Mike Rencheck, for the record.

The major component replacement on unit 6 is not the same scale of magnitude as what was experienced on unit 1 and 2. Unit 1 and 2 was -- coined the word "refurbishment," is much like what's happening at Darlington. They're actually doing the aggregate of our asset management program and the MCR program all at the same time.

We are not doing that. Those groups that work are separated so that huge construction project that was characterized really is much -- is much smaller in our space, and it's much more just dealing with the major component replacements.

Yes, we're doing some other project work around it, but it's not critical path. It won't get near critical path, unlike in previous refurbishments. So we would expect the level of activity to be much less than historically.

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

Mr. Berube.

**MEMBER BERUBE:** I just wanted to revisit the VSAT deal situation. We never had a chance to get around the table fully on that.

Looking specifically at the VSAT uplinks and the actual communication systems to the real world outside of the plant environment, which are critical for emergency management operations, and I'm curious to know what kind of redundancy is actually in that system and also whether or not the systems are actually hardened.

**MR. SAUNDERS:** Yes, so the first thing to point out is the VSAT is the sort of last row and defence. The normal transmission would be via the Web or whatever, you know, normal infrastructure exists. So the system has the capability to automatically switch from that kind of normal operation to a direct Internet over satellite operation. And so the data is stored at a data warehouse in Toronto and backed up at one in Montreal. So there's redundancy in the data.

The VSAT itself, we have several sets. So we establish it, set it up in the control room and -- or actually adjacent to the control room. So that system, fairly easy to work. We have one of each of A and B, which can be interchanged. We have a mobile command post, which is meant to replace the control room activity as well, and so that mobile command post is also so equipped, so you can use that. And we have it in our emergency mitigating centre -- or sorry, emergency management centre as well.

So we have several sets of the VSAT.

Everything from in the control room of the plant to out in the -- out behind the plant in an emergency control centre. And of course we have extra equipment that we could simply replace as well.

So it's designed to operate through the whole range of design basis and beyond design basis events. And in fact, you know, if you know this equipment, you can actually sit in the front of your truck and plug it into the dash on the battery and run it that way. So it is intended to be that kind of system where you will find a way of making it work if everything doesn't work.

So it does have to have both a manual and an automatic capability, because in some circumstances we know that the automatic capability either won't be reliable or may not work, and so therefore manual capability has to always be there as a backup.

**MEMBER BERUBE:** Thank you for that.

**THE PRESIDENT:** Thank you.

Ms Velshi.

**MEMBER VELSHI:** First my question is just a clarification. If the Commission were to accept staff's recommendation, would Bruce be the first unit -- first station to have a 10-year licence?

**MR. FRAPPIER:** Gerry Frappier.

No. There's a 10-year licence is at

Darlington as well.

**MEMBER VELSHI:** Right. So question for Bruce Power. Or even before I get to the question, is there MCR work deemed to be a construction project under the *Occupational Health and Safety Act*?

**MR. SAUNDERS:** Frank Saunders, for the record.

Certainly pieces of it will be for sure, right, and just depending on how you organize it whether it will or won't be. And we're not quite at that stage yet, but there are some aspects which will be under the construction regs versus the industrial regs, for sure.

**MEMBER VELSHI:** And Bruce Power may not necessarily be the constructor? It could be one of your contractors then? Or would you always maintain that responsibility?

**MR. SAUNDERS:** Again, we haven't specified, because that will depend on each contract. But we will retain the overall responsibility for sure. So we won't be -- you know, we won't be separate from the health and safety requirements in any way or shape.

**MEMBER VELSHI:** And if you were asked, so what do you see as the top three risks to you delivering your agreement with the IAEA, so what would those be, you know, from a safety and results perspective?

**MR. RENCHECK:** Yeah, when we look at the major component replacement project, when you -- when you look at risks, it's getting down to what prevents you from being on time and on budget. Right? So obviously --

**MEMBER VELSHI:** I'll put safety there before that, but --

**MR. RENCHECK:** Well, that's what I was going to say. From a risk perspective, we always worry about safety. A safety event at the facility is probably one of our top risks.

And the mitigation measures we put in place just for that fact, we -- to begin mitigating that, we created a whole separate division in the operations group called Life Extension. Their whole role in life is to make sure that they're managing the interface between the project and the operational units. They're there to ensure that we're able to both take the systems out of service, put them in lay-up while the major components are being replaced, manage the project work within that context, and the being able to return it to service.

They're also responsible for the aspects of our standards of human performance, how we're addressing industrial safety in the areas and those types of events, along with the project team. So this is probably the first risk we have in that space, and making sure we're managing

that as the people.

The second risk, whenever I start to look at the major component replacement is making sure that we can get all of our parts delivered before we start work. So from a supply chain perspective, we're in the process now of all of our final orders, so we'll be doing a lot of supplier engagements to make sure that the quality is where we want it to be and that the parts are in fact delivered before we take the unit offline and open the break.

The third key risk that I look at intently is making sure all of our design engineering work is done.

These three things on large projects around the world have caused issues. Right now we're scheduled to complete our design engineering by June, right, Gary?

**MR. NEWMAN:** For the record, Gary Newman. That is correct.

**MR. RENCHECK:** So we'll have the final designs then which will enable us to have full bill of materials and full ordering, and then really focus on transitioning away from a design project then a supply chain project into a construction project that will allow our life extension team to really focus then with the project team on execution.

But those three risks in order, starting

there, will lead us I think to a good spot.

**THE PRESIDENT:** Dr. Demeter? Ms Penney?

**MEMBER PENNEY:** Just a question about Bruce Power's Aboriginal or Indigenous contracting policy. I think I read somewhere that you encourage your contractors to have partnerships with and/or work with the Aboriginal communities.

I heard you quantify this morning the number of new employees of an Indigenous background that you have on staff. Do you have any numbers around the value that is flowing to Aboriginal contractors and/or contractors who have relationships with your Aboriginal communities?

**MR. SCONGACK:** Sure. James Scongack, for the record. I can follow-up with that number. It was a component that was characterized through our CCAB progressive Aboriginal relations audit. So I can certainly follow-up and get you the specific amount.

It's a material amount in the several hundreds of millions of dollars, in particular because one of our largest procurements we have as an organization is the procurement of fuel. So when we purchase fuel from Cameco and we look at the fact that 60 to 70 per cent of Cameco's employee base in Northern Saskatchewan is Indigenous, that certainly I think puts the top level



numbers really high.

But I think it would also be safe to say that beyond that the reason why we created the Indigenous Relations Suppliers Network was because, you know, beyond that there's still a tremendous amount of opportunity. We're launching that office, it's officially opening on March 21st.

We can certainly follow-up with some particulars, but I can tell you with the numbers that we've been alluding to throughout the day in terms of investment there's a lot of opportunity in that, because all of this is either spending on equipment or it's spending on people.

**MEMBER PENNEY:** Indigenous communities in Northern Saskatchewan, they're not really in your backyard. So I'm interested in how the ramp-up of activity for the MCR, how you're going to implement to actually benefitting the communities in your backyard?

**MR. SCONGACK:** James Scongack, for the record. Absolutely, and that's really the purpose of the protocol agreements, because the protocol agreements we have in place with each community is about, you know, how do we enable that?

I would also imagine that by Part 2 you'll also see some very exciting ventures that we're working on right now. I mean, for example, just one case in point,

and maybe we can provide a bit more colour in this in the submissions prior to Part 2. You know, we have a new company that we've located to Paisley, Ontario, it's about 20 minutes from our site, and they're actually making suits for our operational facility and it's an Indigenous-owned business.

One of the things we've also required is all of our major suppliers to become registered through PAR, because there's a tremendous amount of activity that they're doing we want to capture.

But I think more importantly, locally, the real localization strategy that Mr. Soini talked about earlier, that's really the next frontier for us. We recognize there can be Indigenous content for people that we contract with throughout Ontario or across Canada, but our goal is to localize as much of it as possible.

Since we have, you know, a long runway as a company, there's a really strong business case for these companies to set-up locally and for them to sell their services to the nuclear industry outside of Bruce, Grey and Huron Counties.

**MR. RENCHECK:** Mike Rencheck, for the record. We started our economic development outreach in September 2016, and we invited all participants from the community to participate in that. We actually have a lot

of the groups working together on this, wanting to create an environment that would welcome suppliers into the area.

When we first started, I would tell you the folks didn't think this was going to happen from an aspect of getting the suppliers to move into the area and actually begin economic development and growth. But I think there's some believers now. We have now about 21 companies or so that have not only established offices in the area, but are expanding, some have begun to set-up manufacturing facilities, light manufacturing.

So it won't all be done there, but if we can keep a percentage of the work in the communities. In particular, it's also not all associated around the major component replacement. When the entities get there we don't look at what type of work we're giving them per se, we have a company there.

So like Abraflex, they took over an abandoned burned out meat packing house in Paisley and they've been able to completely revitalize that, and now they're hiring 20 or so people, we're shifting more of our work there. In fact, OPG just shifted some of their suits there to try them out. If that goes, it'll grow and create a nice sized business in the area.

We're very passionate about rebuilding the communities around Bruce Power. They were quite taken back

by 2008. To that point, the suppliers' networks and the employment networks, we're running more job fairs now with the manufacturing coming in. Kinectrics ran a job fair, they're hiring 25 to 30 people, they're part of the Indigenous Suppliers Network. They're looking to hire Indigenous peoples from the area.

We're also looking to create business opportunities where if a light manufacturing facility could be created, they may be able to buy into the creation of that facility with one of the suppliers, and then Bruce Power would supply a contract like a PPA, like a Power Purchase Agreement, but we would purchase things over a long enough period of time where the investment would start to provide income and other types of benefits to the community at large.

There are also opportunities for standalone businesses, and we've provided some ideas on those items and we see some groups starting to take more and more action to build them, but then there's also lot of spin-off businesses happening. There's hotels starting to be built in the area where we had none, there's housing permits. I read the local newspaper, there's 2,000 housing permits. It's suddenly started, it's a record we haven't seen in the area since the 1970s, right?

So it's having a profound effect and it's

been probably the last year and a half. I can tell you the first meeting we had there was a lot of doubting Thomases, but slowly but surely it's coming together.

We're looking next at a broader piece that would bring higher technology into the area and attach to the schools, and we'll hopefully have an announcement here in the coming weeks on how we get that set-up, and it would offer it to the students of the local high schools and their ability to start to see technologies that they would not have the opportunity to see at rural Ontario.

**THE PRESIDENT:** So, you know, we as a Commission, we don't have an economic mandate, if you like. But we hear all those anecdotal stories, we don't hear a bottom line, you know, impact, numerical impact. What's the business value that, you know, the facility brings to the community? You can do economic modelling and actually come up with a number.

What we are interested in though, is in the impact on the Indigenous communities. You mentioned that you created 66 additional jobs, but what is the total number of employees in Bruce that come from the Indigenous communities around?

I never see those kind of numbers written or explained or grossed or a trend. I think it would be useful to demonstrate this quantitatively somewhere for

Part 2.

Some of the studies that were sponsored by OPG and Bruce about the environmental impact on fish, the vectors, they are of concern. Again, I hope it's going to be in the public domain so people can see that.

**MR. SCONGACK:** James Scongack, for the record. We can certainly ensure further amplification of those in Part 2. I can tell you a couple of points. So, you know, overall employment numbers we can certainly share, we shared it in 2015. As I mentioned, we're up to -- we've increased 66. Previously we've given certainly a full employment breakdown. I know we'll be sharing that with CNSC Staff. You know, as much quantification, Mr. President, that you want on this, we're happy to provide that.

I can tell you from a technical perspective, you know, you alluded to a lot of the work with Valued Ecosystem Components, that is all in the public domain. So when we talk about engagement we've had with the community, whether it's an Indigenous or a non-Indigenous community, those are all items that are on the public record actively discussed and actively important.

You know, when you look at what are the top issues that people raise in Grey, Bruce and Huron

Counties, it's economic issues they're interested in. What's the jobs? What's the local investment? I know in our presentation we provided some, but I would be very surprised if you come to the Part 2 hearing and the community members that choose to intervene before the Commission if those issues are not going to be front and centre.

**THE PRESIDENT:** Thank you.

Ms Velshi.

**MEMBER VELSHI:** Thank you. I was very heartened to hear about how extensive the industry collaboration is, but certainly in Bruce Power and OPG it's not something that I have seen to this extent, we see it on the technical research side.

So what's been the driver for that and is there -- I think somewhere I read in there that -- I don't know if it's a goal or whether the IESO requires that both of these refurbishments, MCRs, have to be successful or, you know, there's a joint responsibility for doing so, or is it led by the leadership of the two organizations?

I'd like to hear what's making this happen now.

**MR. RENCHECK:** Mike Rencheck, for the record. I think it started with IESO having requirements in contractual terms with Bruce Power and I think as part

of the provincial move forward with the long-term energy plan recommended collaboration.

That started in 2015, and then in 2016 a memorandum of understanding was signed. But I think it's also the leadership. You know, I think Jeff Lyash and myself, we've known each other for a long time and we see the benefits of collaboration. We're both trying to accomplish something that's very promising for Ontario and providing clean, reliable, affordable energy. You know, when you look at nuclear in Ontario, combined we're generating about 60 per cent of the electricity for all of Ontario.

When you look at the way it breaks down, solar is 48 cents a kilowatt hour, gas is running around 14 cents to 17 cents, wind's about 11 cents, and nuclear we're at 6.6 cents, with hydro at 5.8. We want to be able to keep our rates low. I think that serves the province well.

If we can do that by sharing ideas and cooperating, I think it makes both organizations stronger, but then it also makes our supply chain stronger because now we're able to look at the total scopes and scale of the work we're having, we're able to sit down with the suppliers and start to paint a picture with them about employment, why they should build, why they should invest, why they should staff-up here in Ontario.



We've actually had few suppliers move into Ontario and set-up shop here because of the scale. So we're in the process of rebuilding that supply chain and making it stronger and developing it.

Then when you look at jobs, particularly we have a great influence on jobs. Whether you're in a building trades union, a power workers union, or the Society of United Professionals, they just changed their name, it creates a very good I'll say middleclass job. You can have a career, you can raise a family on that type of work that we have. It won't be outsourced, right, it's going to be done here in Ontario. We're creating a manufacturing base here, the people live here.

So when we look at all of that, we create about 22,000 jobs just Bruce Power alone, direct and indirect, throughout the province, and I think OPGs numbers are very close to that.

Jeff and I look at that and we talk about the role and the social responsibility that we have as the leaders of the two organizations in bringing that together and making that happen for Ontario. It's something that we both aspire to do.

Like I said, we have a staff meeting every two weeks with all of our direct reports and we go through a list of about 30 items, many of the things we talked

about today we're collaborating on, and we have work groups, and that breaks down into teams.

We're sharing our resources back and forth and information so that we're successful on achieving, not just continue generation and safe generation, but also the economic aspects and the opportunities, especially for a lot of the young folks that are coming into the industry now.

**THE PRESIDENT:** Ms Penney.

**MEMBER PENNEY:** One small question.

**THE PRESIDENT:** Go ahead, ask as many as you want.

**MEMBER PENNEY:** One small question. I'm very cognizant that we're keeping you here.

So this is about REGDOC 2.2.4 for the CNSC, drug and alcohol testing, it goes to fitness for work. A two-part question, very short. Are you requiring random testing or is it for cause? The second part is, have you anticipating cannabis being legalized?

**MR. FRAPPIER:** Gerry Frappier, for the record. There's been lots of discussion around this REGDOC and this REGDOC is in the process of being implemented, so it's not in force right now. So the industry is in the process of providing us with an implementation plan for putting that REGDOC in. It does anticipate marijuana and

other drugs, not just alcohol. Also it does look at random-type testing as well as for cause and for pre-placement.

The actual plan to put it in place, as I said, we're waiting for industry. But I think the intent of industry is to look at doing everything except the random testing first, and then they'll bring that in over the course. But that will be implemented over the course of this licensing period.

If you want more details, I think André Bouchard can certainly provide some.

**MEMBER PENNEY:** Thank you.

**THE PRESIDENT:** Go ahead.

**MEMBER DEMETER:** Just on that point, I noticed in the documents that the proposal from industry to CNSC is expected by the end of March. So you can anticipate questions on CNSC's response to industry's proposal at Part 2.

**THE PRESIDENT:** Any reaction to that?

**MR. FRAPPIER:** Gerry Frappier, for the record. As you said, we're expecting a plan to be formally submitted by the end of March. I think we have a pretty good sense of what it's going to say. We'll certainly be able to comment on that at Part 2. Probably of great interest to the Commission will be the schedule for

implementation, I'm sure.

**THE PRESIDENT:** Okay. Questions?

**MEMBER VELSHI:** I have a few short ones.

**THE PRESIDENT:** Go ahead.

**MEMBER VELSHI:** So it's for Staff. On Bruce Power's rating on conventional health and safety where it went from fully satisfactory to satisfactory in 2016, the primary reason given was the two lost-time injuries. Now, one of them happened in 2017. I just wondered, how did that impact the 2016 rating?

**MR. SIGOUIN:** Luc Sigouin, for the record. The incident that occurred in 2017 did not impact the 2016 rating. We expect that it will impact the rating that is coming later this year for 2017.

**MEMBER VELSHI:** Okay. So it was the one lost-time injury in 2016 that brought them from fully satisfactory -- well, it was a contributor to bringing them to satisfactory?

**MR. SIGOUIN:** That is correct.

**MEMBER VELSHI:** On the security one, there wasn't much detail provided in the CMD. It said something about challenges with security practices and drill and exercise. But no further detail or what's been done to address that. Can you shed some more light on that?

**MR. FRAPPIER:** Gerry Frappier, for the

record. I'll get Mr. Mike Beaudette to come up. But I would also advise, as usual with security, there's certain things that can be said and certain things that cannot, and so if we need to get more detail we can make arrangements for that.

But, Mr. Beaudette, if you could provide a publicly acceptable answer or a publicly available answer?

--- Laughter / Rires

**MR. BEAUDETTE:** Michael Beaudette, for the record, Director, Nuclear Security Division. I'll just start by saying that Bruce Power continues to have a robust security plan. The areas of drills and exercises and security practices, there was some assessments done during the reporting period and there were some deficiencies that were noted, they were not significant safety issues, but they were noted and they've since been addressed. But because they were noted and they took place during that reporting period, it caused the rating to go from a fully satisfactory down to a satisfactory.

In the SCA there's four criteria areas of assessment: you need two in fully satisfactory to be rated at fully satisfactory, they fell below that so consequently they went from a fully satisfactory to satisfactory.

As Mr. Frappier says, the details of that are sensitive, but if there is a requirement for an in

camera, we can certainly address those issues.

**MEMBER VELSHI:** That's good. That's good for now, thank you.

Another quick one on Staff presentation, slide 59. This is the CSA standards in the compliance verification criteria. You say there are 10 new ones, but only six new ones are listed. You just may want to update that slide.

**MR. SIGOUIN:** Luc Sigouin, for the record. We apologize for the confusion. The N289 series includes multiple standards within that series, which accounts for the total of 10.

**MEMBER VELSHI:** You may want to put a footnote or something there.

**MR. SIGOUIN:** Yeah, thank you.

**MEMBER VELSHI:** Staff, in just about everything that I read in the CMD it said very much we did our assessments, we did our desktop reviews, there were minor findings of low safety significance. Is that correct? Was there anything of significant concern? I mean, we heard something on the security front, perhaps that resulted in a lower rating.

Was there anything that, as you sit here, you go I wish Bruce Power would do a better job at this?

**MR. FRAPPIER:** Gerry Frappier, for the

record. So you're talking about with in the program areas?  
Because we certainly --

**MEMBER VELSHI:** Yes, just the program areas, yes.

**MR. FRAPPIER:** -- because, clearly, we're all interested in pressure tubes and things of that nature. But, no, I think that as far as the CMD goes, it is a complete CMD. We did talk about every one of the SCAs. We didn't do that in the presentation. If there was anything that was of a particular note from a licensing perspective, it would be in there.

**MEMBER VELSHI:** Okay. Because this is your opportunity to actually get a bit oomph in getting things moving.

**MR. FRAPPIER:** Yes. But, having said that, at the same time we are looking at meeting requirements that are necessary to recommend issuing a licence.

**MEMBER VELSHI:** My last one is -- I know you said there would be a separate report for Bruce A and Bruce B even though there's one licence, mostly because of the different age of the plants, I think is what I heard. But given the common programs, given the common organization, is there merit in having just one report for the site? You know, the annual performance report?

**MR. FRAPPIER:** Gerry Frappier, for the record.

So we do just have the one report. However, we do rate the safety and control areas separately in Bruce A and Bruce B. I agree that there is many of them that could be a single rating because it's the same program, but there is lots of them that are quite different, or they're not quite different, but they could be different because it's a separate staff at Bruce A and Bruce B for a lot of the safety and control areas that we're looking into and a lot of, in particular, the inspections that we do.

**MEMBER VELSHI:** Bruce Power, do you have a comment on that?

**MR. SAUNDERS:** Yeah, Frank Saunders, for the record.

Yeah, there are many of the SCAs, which could be combined, for sure. But where the SCA actually touches on the physical plant and the plant is different then you could end up potentially with different ratings. Now, you could still rate them in the one report, in my view, if you wanted to do it that way. I don't know if it adds a lot of significant advantage to do that.

But most of our programs, as you point out, are common, but the plants themselves are just



different enough that they are not the same. They are not hugely different, but they have -- slightly different.

**MEMBER VELSHI:** Yeah, we could make that argument for the units too, that they are not the same and they are different from each other.

**MR. FRAPPIER:** I guess my argument would be I'd be open to it if staff wanted to do it that way. I think it's pretty --

**MR. FRAPPIER:** Gerry Frappier --

**MEMBER VELSHI:** Neither of you seem terribly keen on that.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So as I had mentioned, it is going to be in one report. We certainly have looked at, are there some that could be combined? But to be honest, once you start doing that, it gets even more confusing because you'd have sort of some for A, some for B, some for corporate.

There is always room to improve the report, for sure, but right now as we are preparing for the 2017 report that will be Bruce A and Bruce B.

**THE PRESIDENT:** You're leaving it up to me. Okay, I have got a couple of them.

So well, I saw those big steam generators getting up. So what is their end destination?

You know where I am going with this?  
Right. Is Sweden off the plan?

**MR. SCONGACK:** James Scongack, for the record.

As per our agreements we have with OPG, OPG will take care and custody of those steam generators. Upon the removal of those steam generators from Unit 6, they will be transferred from Bruce B to the western waste management facility directly.

**THE PRESIDENT:** You're passing the buck? Is that what he is doing?

**MR. SCONGACK:** No.

**THE PRESIDENT:** No?

**MR. SCONGACK:** We're letting the folks, who carry out waste management, carry it out. I know OPG has a plan in place that they have plans to store them on a temporary basis. They have long term storage options. Those steam generators will be cut, disassembled as part of that.

But I think the genesis of your question, to answer it directly because I'm not one for skirting around questions, is will we be transporting them to another jurisdiction for processing, and the answer is "no".

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

You know, there is a couple of -- in your submission there is a couple of indices and graphs. I'm a fan of graphs, but I have to understand what we are measuring. So for example, on B-36 of 192, "human performance station level clock reset", what is this?

And while you are looking into this, the next one is 66, human performance event, the target is .04. It seems to me like you are never ever going to meet those targets.

And the other index that I am really curious about, and maybe staff can also help me on this one, was the environmental index. This is on B-123 of 192.

**MR. CLEWETT:** Len Clewett, for the record.

I'll take those first two and turn it over to Mr. Scongack for the environmental index.

But the human clock, station clock reset, and human error rate are industry standard metrics that we utilize. A quick description of human performance: We trend what we call clock reset. We track how many days without a reset. Station level is the highest. We mentioned the lost-time accident back in 2016. That triggers a station level reset. You can have an error where you have loss of generation or some significant event. That would be a station clock reset.

We also track those resets at a department

level and a crew level. So we resolve issues at a low level.

The human error rate is -- and I can't recall exactly how many hours. I think it's ever 2,000 hours that we track and error had a section or department level or above.

And we trend that for not only ourselves, but all our major suppliers to do work on the site. We trend that error rate to make sure we understand any adverse trends in performance and take proactive actions.

**MR. SAUNDERS:** I should point out that being below the target is what you want here, so we are actually already meeting it.

**THE PRESIDENT:** Well, you are setting a target. It's a moving target that you are setting up, right? So it was bizarre. It was -- from 2007 it was flat and then an increase, and then it goes down. So I didn't really understand what we are measuring in. Yeah, I'm talking about the clock reset.

**MR. SAUNDERS:** It's essentially us implementing a new and more sophisticated program, so essentially you set your targets a little higher, as you say, so you can get going, and then as you understand it better you can challenge yourself to lower targets. That's what that's about.

So we're setting the targets lower on purpose to improve performance.

**THE PRESIDENT:** M'hmm.

**MR. SCONGACK:** James Scongack, for the record.

I think you're referring to the environmental performance index on page 123. So essentially, we look at the Bruce site as from an EPI point of view, as Bruce A, Bruce B and Centre site, so each one of those divisions starts the year at 100 percent. If they have any compliance issues, whether it's a provincial Ministry of Environment and Climate Change permit, whether it's any compliance items, or if there is items internally that we set lower administrative targets, we have a process where we are working with our chief nuclear officer. On a monthly basis, we deduct points from your environmental performance index.

What I should say is that what the organization came to realize at the end of 2017 was we've had record environmental performance index onsite. And so from a staff engagement point of view, we looked at is the environmental performance index the best metric for us to use in terms of driving that level of excellent performance.

So starting January 1st of this year, we

actually piloted, and we think it's going to be an industry-leading new indicator, called an environmental health index, where what we're starting to do is look at elements in our program that are more forward-looking and saying, how can we have an indicia that actually helps us take the performance to the next level, whereas EPI tends to look a little bit backward, in the sense of what was the actual performance.

So I'm very happy with the EPI. That's how it works, but we are trying to transition the organization to the environmental health index.

**MEMBER PENNEY:** I had a quick question. Where would I find that information about your environmental health index and your environment health -- is that on your website?

**MR. SCONGACK:** Yeah, James Scongack, for the record.

So this is very new, so all of the information that was provided to the Commission would have been as the end of 2016 or some of -- end of 2017. So this is something -- we are still running the EPI this year and piloting EHI this year, tweaking it, so I would imagine in future licence renewal hearings, the EHI will likely be a new additional indicia for all intents and purposes.

**MEMBER PENNEY:** Would I find it in a

sustainability report or an annual report that you produce?

**MR. SCONGACK:** Yes, you would. Yes.

James Scongack, for the record.

So given the fact that we just started it in January of this year, when you saw things like our annual review, or when we go and update the community on various items we'll be talking about EHI.

**THE PRESIDENT:** So staff, is that one of our safety performance indicators, or what do you think about this? It sounded like a good indicator.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So there's several of them there, but the environmental one Mr. Rinker will comment on.

**MR. RINKER:** Mike Rinker, for the record.

So in general, the performance metrics that feed into Bruce Power's metric here are the same ones that we would look at when we assess our safety and control areas. When we do inspections we view these records. We see if there is -- and there is some terminology here where we talk about -- you know, there is licence limits to meet our regulatory limit. There is action levels which they must report to us. Then they have their own internal limit that they must act and make corrections.

So under an environmental management

system and the need for corrective actions to be put in place -- this is the information that Bruce Power is collecting themselves for their own self-improvement.

And so we look at this through inspections, so our site inspector would be going through this information. This information is also reported to us separately so that we can review it in annual quarterly compliance reports.

**THE PRESIDENT:** So I still didn't get it. So are you using the same index or you have your own?

**MR. RINKER:** Mike Rinker, for the record. No, it is not our index, no.

**THE PRESIDENT:** So is that an industry-acceptable environmental performance? It sounds -- the title of this index sounds something that I thought every industry would like to have, an environmental index.

What are we -- what is CNSC using as a kind of an equivalent?

**MR. RINKER:** Mike Rinker, for the record. I'm still speaking in terms of the environment but, in general, ours are provided in regulatory document 3.1.1. And I guess you could say that other CANDU operators and other industries do have an internal program much like Bruce Power does, but our



requirements are in REGDOC 3.1.1.

**THE PRESIDENT:** Okay. I have a last one. I promise, the last one. There is one on steam generators, still on the number of plugged tubes, so on page B-103.

My question is very simple. When is the number is too much? So on Unit 8, according to this table, there is 80. When -- what's the magic number where you say that's it, that's all? Is there a magic number?

**MR. NEWMAN:** Gary Newman, for the record.

Yeah, each different type of heat exchanger we have will have a plug -- a maximum number of plugs that you can put in there. Otherwise, the heat exchanger will not be able to achieve its design requirement. Plus, there is also some thermal hydraulic stresses that can be created in the vessel itself.

So yeah, each and every one of them had that. I don't have the information right in front of me, but typically we would have a maximum limit for each of ours. Those are calculated and we work to those numbers, but we're nowhere close to that for any of our vessels currently.

**MR. FRAPPIER:** Gerry Frappier, for the record.

So certainly something we're very interested in as well, certainly for the steam generators,

to ensure there is an appropriate heat sink. I will ask Dr. John Jin to provide some details.

**DR. JIN:** For the record, my name is John Jin. I am the Director of the Operational Engineering Assessment Division.

We are looking after the structural integrity of the steam generator. So we are monitoring the number of plugged tubes in the Bruce Power unit, and currently at the Bruce B it is less than 1 percent of the whole tubes except Unit 8, which is around 3.7 percent. So the limit of number of plugged tubes, there are two factors. One is the fuel performance from the economic region and the other one is the heat sink during emergency situation.

I don't have the limit neither, but to my knowledge it is current percentage of plugged tubes is far less than the limit from the safety and economic perspective.

**THE PRESIDENT:** So is there a regulatory limit somewhere, from a regulatory perspective that you'll say thou shall not operate it beyond?

**MR. NEWMAN:** Dave Newman, for the record. There is probably a limit based on the safety analysis that could be as high as 10 percent. So there is a limit and it's based on the safety analysis and

the safety report.

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

Anybody, a last...?

So thank you very much. Thank you for your patience and we'll see you sometime in May, I think.

**THE SECRETARY:** That is correct, Mr. President.

Just a few last words. So this hearing will be continued with Part 2 on May 30 and 31, 2018, at the TownePlace Suites Marriott, in Kincardine.

The public is invited to participate either by oral presentation or written submission on Hearing Part 2. Persons who wish to intervene in Part 2 of the hearing must file their written submissions and their request to intervene by April 16, 2018.

Rule 19(1) of the Canadian Nuclear Safety Commission Rules of Procedure provides that the Commission may permit interventions "in the manner and to the extent that the Commission considers will enable it to determine the matter before it in a fair, informal and expeditious manner".

It is for the Commission to determine, if the request to intervene has been permitted, the format of interventions, either in writing only, or in writing and orally, that will best assist it in the consideration of

the matter, and in ensuring an efficient, expeditious and fair process.

If you borrowed interpretation devices, remember to return them at the reception and claim your identification card.

The Commission meeting will begin at 9:00 a.m. tomorrow.

Thank you. Bonne fin de journée. Safe travels.

--- Whereupon the hearing adjourned at 7:03 p.m. /

L'audience est ajournée à 19 h 03