

**Canadian Nuclear  
Safety Commission**

**Commission canadienne de  
sûreté nucléaire**

**Public meeting**

**Réunion publique**

**December 13<sup>th</sup>, 2018**

**Le 13 décembre 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**

**Ms Rumina Velshi  
Dr. Sandor Demeter  
Mr. Timothy Berube  
Ms Kathy Penney  
Dr. Marcel Lacroix**

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

**Secretary:**

**Secrétaire :**

**Mr. Marc Leblanc**

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

**Senior General Counsel:**

**Avocate-générale principale :**

**Ms. Lisa Thiele**

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Ottawa, Ontario / Ottawa (Ontario)

--- Upon resuming on Thursday, December 13, 2018  
at 9:00 a.m. / La réunion reprend le jeudi  
13 décembre 2018 à 9 h 00

### **Opening Remarks**

**THE PRESIDENT:** Good morning and welcome to the continuation of the meeting of the Canadian Nuclear Safety Commission.

Mon nom est Rumina Velshi. Je suis la présidente de la Commission canadienne de sûreté nucléaire.

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

Je vous souhaite la bienvenue and welcome to all those joining us via webcast.

I would like to introduce the Members of the Commission that are with us today.

On my right is Dr. Sandor Demeter; to my left are Dr. Marcel Lacroix, Ms Kathy Penney and Mr. Timothy Berube.

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

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

Marc.

**MR. LEBLANC:** Thank you.

Bonjour, Mesdames et Messieurs.

J'aimerais aborder certains aspects touchant le déroulement de la réunion aujourd'hui.

We have simultaneous interpretation.

Please keep the pace of your speech relatively slow so that the interpreters have a chance to keep up.

Des appareils pour l'interprétation sont disponibles à la réception. La version française est au poste 2, and the English version is on channel 1.

Please identify yourself before speaking so that the transcripts are as complete and clear as possible.

The transcripts should be available on our website by the close of next week.

I would also like to note that this proceeding is being video webcast live and that archives of these proceedings will be available on our website for a three-month period after the closure of the proceedings.

I would ask that you please silence your cell phones and other electronic devices.

I would also like to state that the

*Nuclear Safety and Control Act* authorizes the Commission to hold meetings for the conduct of its affairs.

The agenda was approved yesterday. Please refer to agenda CMD 18-M60.A for the complete list of items to be presented today.

For the record, I would also like to note the following.

As a follow-up to the November 8th meeting, Dr. Lacroix had sought clarification from Hydro-Québec and CNSC staff on residual heat of fuel bundles when transferred to the pool and this request has been satisfied.

President Velshi's follow-up question on the November 5th heavy water spill at the Point Lepreau facility has also been addressed satisfactorily.

Madame Velshi, présidente et première dirigeante de la CCSN, va présider la réunion publique d'aujourd'hui.

President Velshi.

**THE PRESIDENT:** The first item on the agenda is the Status Report on Power Reactors, which is under CMD 18-M63.

I note that we have representatives from the nuclear power plants available for questions, in attendance and also by teleconference. They can identify

themselves later when answering questions.

Mr. Jammal, I understand you wish to make an opening statement before we get to the status report.

**M. JAMMAL** : Bonjour, Madame la Présidente et Membres de la Commission.

Before we start with the status update for the nuclear power plants, I would like to provide you with an update to the commitment made by staff for the public hearing of June 25-29, 2018.

The CNSC Potassium Iodide Pill Working Group, which is also known as the KI Working Group has been struck and I am pleased to inform you that the Terms of Reference have been drafted by the Working Group. So we came to an agreement with respect to the members of the Working Group and as we speak the Terms of Reference are being translated for the purpose of being posted on the CNSC website for a 30-day comment period. This task will be completed before the end of December 2018.

In brief, CNSC staff coordinated input from the Working Group members, including the Office of the Fire Marshal and Emergency Management Ontario, Ministry of Health and Long-Term Care, and Ontario Power Generation. Following the public comment period, the comments received will be dispositioned and where appropriate the Terms of Reference will be revised and the final version of the ToR

will be posted.

CNSC staff are also drafting Operating Procedures for the CNSC Advisory Committee and we are in the process of confirming membership of this Committee. We will reach out to the prospective members of the Committee to verify their involvement and discuss any questions on the draft Terms of Reference during the 30-day comment period.

In addition, we commit to carry out a workshop with the stakeholders in order to ensure clarity and transparency.

This is the update, Madam President, with respect to the commitment we made on June 25-29.

**THE PRESIDENT:** Thank you, Mr. Jammal. I know the Terms of Reference will undergo a public review, but what is the kind of timeline you're looking at for coming back with recommendation based on the draft Terms of Reference?

**MR. JAMMAL:** It's Ramzi Jammal, for the record.

We are aiming for 30 days by the end of January with respect to the comments. We will commit to you that we will come to you before the end of the fiscal year with the revised Terms of Reference and the final version.

**THE PRESIDENT:** I'm sorry, I didn't mean the Terms of Reference. I actually meant the work that the Committee is going to be doing.

**MR. JAMMAL:** Ramzi Jammal, for the record. The Working Group will establish a workplan and that will be part of the Terms of Reference, with the dates of deliverables.

**THE PRESIDENT:** Thank you.

Okay, so Dr. Viktorov, the floor is yours for the status report. Thank you.

#### **CMD 18-M63**

#### **Oral presentation by CNSC staff**

**DR. VIKTOROV:** Thank you.

Good morning, President Velshi, Members of the Commission. My name is Alex Viktorov, I am the Director of the Pickering Regulatory Program Division, representing Mr. Gerry Frappier, the Director General of the Directorate of Power Reactor Regulation.

With me today are Power Reactor Regulatory Program Division Directors and CNSC staff who will be available to answer questions from the Commission.

The Status Report on Power Reactors presented in CMD 18-M63 was finalized on December the 5<sup>th</sup>,



2018, and I have the following verbal updates.

For Bruce:

Unit 3 started a two-month planned outage on December the 9<sup>th</sup>. This outage will include, among other work, implementation of the corrective actions concerning the primary heat transport pump seals. This is the final unit to have such corrective actions implemented. Return to service is currently scheduled for mid-February next year.

The comment regarding the Unit 4 governor valve should read in the second line that the valve closes "fully" as opposed to "slightly".

For Unit 8, an Event Initial Report with information on the transformer fire and mineral oil leak which occurred on December 6 will be presented as a separate item on the agenda.

For Darlington:

With regards to Personal Air Sampler results showing low level of radioactive particulates, including alpha emitters, CNSC staff are following up on OPG's investigation into the situation at Darlington Unit 2. We note that in response to the discovery OPG implemented immediate measures including: suspension of foreign material removal activities in the upper feeder/header cabinets; mandating that all work in the

feeder cabinets be conducted in plastic suits; accelerating analysis of Personal Air Samplers; and reinforcing expectation related to safe back-out and stop work in the face of uncertainty or changing conditions.

CNSC site inspectors have independently confirmed that work is conducted in plastic suits and are reviewing the workplace air monitoring and survey results.

Meetings with OPG staff were held on December 6<sup>th</sup> and 11<sup>th</sup> to discuss OPG's investigation and plans for detailed dose assessments.

Currently, CNSC staff are in the process of issuing a formal request pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations* for OPG to undertake in-vitro bioassay for ascertaining dose to workers potentially affected by this event.

For Pickering:

Unit 4 is derated currently to 92 percent of Full Power due to fuelling machine unavailability. We note that there is no impact on the safety of workers, the public or the environment as a result of this situation.

Units 6 and 7 are currently operating at Full Power.

We have no update for Point Lepreau.

This concludes the Status Report on Power Reactors. CNSC staff are available to answer any questions

the Commission may have.

**THE PRESIDENT:** Thank you.

Before I open the floor for questions from the Commission Members, maybe I'll start some questions to OPG on this incident, this particulate alpha incident at Darlington, and given what we discussed at the November meeting, there are a few areas I'd like to get some clarification on.

One is on anticipation of hazards and the confidence in being able to anticipate any alpha hazard. The second is around -- and I'll get to detailed questions on that.

The second is around conservative decision-making, particularly when it comes to protective equipment. And third is around reporting and timeliness of reporting, and fourth is around dosimetry.

So let me start off with anticipation of hazards.

Were you surprised that there was alpha contamination in the feeder cabinet?

**MR. MANLEY:** Robin Manley, for the record. I'm the Vice-President, Nuclear Regulatory Affairs and Stakeholder Relations.

President Velshi, thank you very much for the question and for the opportunity to provide some

clarifications around the situation.

I will note that I have colleagues on the phone at Refurbishment who I may call on to provide additional technical detail, but I'm going to attempt to give a high level answer, at least, to your questions and then I would like to sort of pause when I'm done in case they want to add some clarification because we have responsible health physicists and folks like that on the line.

So first off with respect to anticipation.

I'd like to, if you don't mind, spend a couple minutes providing some context around what anticipation means when we're talking about a very major project.

So the short answer is yes, we anticipated the presence of alpha as a potential hazard. We anticipate that because, first off, we know that we are in the feeder work that we're doing, the feeder install sequence that we're into, we are joining new metal to old metal.

The feeders are being welded to the large pipes called the headers which were not replaced as part of this project. They were not replaced because they remain fit for service and will be fit for service throughout the extended operation period.

Those headers are or were always connected

to the heat transport system, and thus radiological contamination that would be present in the heat transport system would be in the headers to some degree or other.

So you anticipate that because you know that you have gamma, beta, alpha hazard present within your heat transport system. That anticipation goes beyond just having an intellectual knowledge of it to what do you actually do in planning and preparing for this work.

So we -- and we spoke to this at our Darlington relicensing hearings in 2015 in which we spoke to the refurbishment project. We spoke to the fact that we anticipated the presence of alpha and that we were very well aware of the operating experience from other nuclear power plants in Canada, which they've gone through refurbishment work and encountered alpha hazards.

So we had implemented in the refurbishment project a wide range of alpha controls which were in place for this work, so that includes radiological exposure permits which speak to the hazards that can be present. It includes the training of the workers. It includes the dosimetry that we have in place. That includes the use of personal air samplers which are being worn by workers and which are detecting low levels, if there is any, in the air, in the surrounding environment around that individual worker.

It includes the use of alarming alpha contamination monitors in the workplace called Icams which would alarm if the -- if the area -- not just where the worker is, but if the area contamination airborne reached a level where you would actually be getting a noticeable dose rate. Those would alarm and that would cause a back-out condition.

It includes the use of alpha frisking of workers on their face and hands when they leave the radiological controlled -- like, the contamination area, to make sure that there wasn't contamination that was -- either got on them, but through contact, or sufficiently high airborne that would be settling on them.

It includes the use of alpha-detecting whole body monitors which, in addition, if nothing else detected it, that there's yet another barrier.

So there's these multiple barriers in place to detect the presence of alpha and, in addition to that, you've got the fact that the workers were wearing respirators which provide a very high protection factor.

Those respirators are fit tested for the workers so that we know that they are actually effective and they have high efficiency particulate filters on them which are intended to protect against dusts and aerosols such as alpha contaminants.

So you can see that by the presence of all of these many control measures and protective measures and detection measures we not just anticipate, but we have things in place to protect the workers.

So all that said, you know that there is always a potential for an alpha contamination event to occur or for an alpha uptake to occur. What you're trying to do is make sure that those would be a very low level.

They would be ALARA. They would be much less than any dose limits.

And that is, in fact, what we observed in these events. These six or so positive personal air sampler results are all at levels that are less than the dose recording level.

The dose recording level -- and I've got to make sure I've got my units right. The dose recording level is .1 millisieverts, and the maximum of any of these was 0.04 millisieverts, or less than four millirem in our units.

And you want to compare that to the total dose project to date. And I hope have my number right here, but the total whole body dose project to date is on the order of 15,000 person -- sorry, 1,500 person rem, 15,000 person millisieverts.

So if you compare what is primarily gamma

dose, we are trying to keep that gamma dose low. And so you can put all sorts of controls in place for all sorts of hazards. You cannot necessarily drive them to zero no matter what you do.

So what we've done is we've ensured -- and in this event, this is what happens. These doses are less than the dose recording level, which is less than our action level, which is less than our administrative level, which is less than the legal dose limit.

So you can see that the controls that we've put in place have been effective, in fact.

Thank you.

**THE PRESIDENT:** Thank you very much. That was very helpful.

So having explained how you've got all those controls and, yeah, this -- you weren't surprised that this happened because there was some likelihood of these personal air samplers showing contamination.

So why the switch to plastic suits now, then? Why is the particulate respirator not good enough?

**MR. MANLEY:** Robin Manley, for the record.

Again, thank you for the question.

So I would say that on the day when we got the personal air sampler result, okay, we have a positive



result. What does it mean? Do we fully understand it?

Do we know that the controls are adequate?  
Is there something that we're not aware of?

So I would say that in an abundance of caution, we said let's put, you know, the even more conservative measuring in place just in case.

When we do that, frankly, there's -- I don't want to overstate this, but there's a potential negative consequence to putting people in plastic suits when you've been telling people that respirators are protective.

The plastic suit is slower. It is more encumbering. There's a potential that, actually, it is non-ALARA, that you would actually end up with larger overall doses from doing this, which is why at various sequences during this job -- during the entire refurb job we have attempted to pick the right protective measure for the day, not the most conservative thing in every case.

So there are some parts of the work that goes on where people are not in respiratory protection because they're not in an area where there's an alpha hazard or they're not in an area where there's another airborne hazard.

There are some places where they're in a respirator. There are some places where they're in a

plastic suit.

It's not a one sizes fits all solution. But when we are faced with an uncertainty -- and hey, we got an alpha result. It was the first one that we had received in oh so many months, right.

We thought we better stop. Let's bundle up the protective equipment further, make sure we understand the circumstances, and then when we have assessed it adequately, then we would decide do we back that off a little bit back to respirators which we think is actually the right protective clothing for the job.

**THE PRESIDENT:** And then as far as dosimetry, how did you assess these doses for these six workers?

**MR. MANLEY:** Robin Manley, for the record.

And in this one, I think I may call on Ian Edwards on the phone to provide some additional assistance, but I'll start anyway.

So the dosimetry for an alpha uptake is not as straightforward as for tritium or whole body gamma dose. And apologies if I'm telling people things you already know.

But if it were a whole body gamma dose, we have two dosimeters on the worker at all times. We've got an electronic dosimeter which tells you your dose live

time, and we've got a thermal luminescent TOD badge which gets read out once a quarter and provides the official dose of record.

And it's very straightforward.

For tritium, we've got bio assay sample, urine bio assay samples that people put in, and you get a result back within a day or so and it's very straightforward.

Alpha is harder to detect. There's less of it present. And so the counting is a little bit more complicated.

You can't directly use a whole body counter, whereas you could for our gamma emitter use a whole body counter directly.

And so you rely on -- as a screening device, you rely on the personal air sampler which measures by a certain flow rate which you can compare to the worker's respiration rate.

It measures how much alpha airborne is picked up on a filter. The filter is counted and that gives you a number of Becquerels of alpha activity.

You assume a -- the most conservative alpha emitting radio nuclide.

You could do isotopic analysis if you wanted to refine that measurement, but we essentially

assume the most conservative.

We assume the most conservative in terms of most dose impactful particulate size. You assume the heavy breathing rate as opposed to light breathing rate. You do these calculations and you end up with a potential inhalation if unprotected.

Then you assume a protection factor for the respirator, again, which is conservative. We assume a protection factor of 10 in our procedures. In fact, when we do fit-testing of workers, we usually find a much higher protection factor for respirators than that. But you assume 10, and then you end up with a number, such as, as I was saying, about 0.04 millisieverts.

We have not done fecal analysis. Frankly, obtaining fecal samples from workers is unpleasant for the worker. It's -- nobody likes to do it. You have to transport these samples around. That's not very pleasant. You send them off to the lab; it takes something on the order of four weeks to get a result back. There is a cost to it. I'll be honest, you know, it's not a trivial amount of money.

And if you're trying to refine a dose estimate that is less than the dose recording level, why would you bother? If we were looking at a dose where potentially this worker was getting something at an

investigation level, an administrative limit, we'd absolutely be trying to refine that number and get the most accurate number possible. This is below the level when anyone would even record it. So why go to all that hassle to come back with a result that's frankly going to be more conservative than this? You know, like an even lower number than this.

So Ian, is there anything you'd like to add on the dosimetry perspective?

**MR. EDWARDS:** Ian Edwards, for the record.

No, Robin, you've actually covered it quite well. Thank you.

**THE PRESIDENT:** So what you have done is really not dosimetry; it's more an exposure modelling and have come up with what you think the uptake is.

And I guess I'll turn over to CNSC staff and ask -- because we just heard that you have issued or are going to be issuing a 12(2) requesting in vitro bioassay. Help us understand why you think that's necessary.

**MR. JAMMAL:** It's Ramzi Jammal, for the record.

I will start first, and I will pass it on to my colleagues, both Mme Riendeau and our inspectors on site.

I fully accept the fact there is science. I fully accept our exposure monitoring. To date, the performance of OPG has not been satisfactory from staff's perspective. And I'm not here to debate or go through what is satisfactory, what's not satisfactory. The event did occur. Multiple units are going to go under refurbishment, and it will be amiss for us not to really take in consideration the lessons learned from Bruce Power.

So I fully understand the sensitivity of every test. I fully understand the calculation rates that were calculated. However, we need to go to the bottom of the fact. Yes, the fecal sample is not something nice to do, but at minimum we should give the opportunity of the workers to determine if they want to go through the test or not. And this is not to discredit the science.

The transuranic elements and isotopic elements, each one has its own counting error, and every test has its own minimal detectability. We want to go right to the bottom of the fact to say for the next time when the personal air samplers is providing with such data, then we know for a fact there has been no biological intake for the workers.

I fully understand it takes four weeks. But let us make sure that what is being determined on the science and modelling will be proven via a dosimetry

bioassay.

And I will pass it on to Mme Riendeau or to Dean at Darlington.

**MS RIENDEAU:** Nathalie Riendeau, director of the Darlington Regulatory Program Division.

Just to add to Mr. Jammal's remark, also one aspect that factored in the decision of CNSC staff is the length of the event before it was detected by OPG. And also that their decision to use the P.A.S. sample to assess dose, although it's consistent with their procedure, they could also use additional information such as the contamination level of working surfaces or, like Mr. Jammal indicated, isotopic distribution.

So we believe, given our previous concern, the length of time that this situation essentially lasted and that not all available information was considered in making the decision for dosimetric analysis, that our position is that OPG should endeavour to have the best method, the best measurement to confirm whether there was an intake or not and to ascertain the magnitude of the dose for the workers.

With respect to our site staff, our site staff following up on this event and they're continuing with their oversight. And they have themselves independently confirmed that the work in the feeder cabinet

is taking place in plastic suit.

I would -- if site staff is online and would like to add to my remark ... are they online?

**MR. HIPSON:** Yes, Dean Hipson, for the record. I'm a senior site inspector at the Darlington site.

So as Nathalie has said, we independently verified that on Tuesday evening all the staff are in plastic suits. And we did that through the Teledose system. We also ensured that verifying through the VSIDS databases that surveys are continuing to being taken and are identifying any alpha contamination if present on the theatre cabinets or in the theatre cabinets.

**THE PRESIDENT:** Thank you. And is the in vitro dosimetry sensitive enough to pick up uptakes at what OPG has estimated these would be?

**MR. JAMMAL:** It's Ramzi Jammal, for the record --

**MR. HIPSON:** [indiscernible - multiple speakers] the RP Division perhaps respond to that question.

**MR. JAMMAL:** So my colleague's coming up.

**MR. THÉRIAULT:** Okay, this is Bertrand Thériault, for the record.

So we looked at the data from the personal air samplers, and the -- basically the activity on the



filters and modelled using the ICRP biokinetic models to predict how much alpha emitters would be excreted over time after the dates reported by OPG. So for instance, there's some workers reporting high P.A.S. results on November 25th, for instance. So the time after this.

For the worker with the lowest result, the 0.003 millisieverts, as indicated by the P.A.S., and comparing the bioassay predictions with the detection limits reported by Kinectrics for a fecal bioassay, at this point it's too low. It's below the detection.

However, the worker with the highest result, the 0.04 millisieverts, as indicated by the personal air sampler, it really depends on the isotope. Plutonium-239 would be above the detection limit as reported by Kinectrics for about 90 days after the intake, so there's still about a two months' window. But other isotopes, for instance americium, it would be little too late at this point. Curium, there would still be a few days to go.

So that's our answer. We need to know which isotope we're dealing with before going further.

**THE PRESIDENT:** Thank you. I mean this will, if nothing, confirm what OPG has estimated, give us reassurance. And maybe there's a need to revisit the dosimetry program after that. Thank you for that.

Is there any way -- has the header been decontaminated to reduce the source itself?

**MR. MANLEY:** Robin Manley, for the record.

I'm going to ask my colleagues to speak to that a little bit. Actually, why don't I just pass it back to Ian. Thank you.

**MR. EDWARDS:** Ian Edwards, for the record.

No, the headers have not been decontaminated. The amount of dose that would be expended for such an undertaking would be very significant. I can't give you a specific number. We can commit to checking with our ALARA folks if that's desired; however, based on our general understanding, I can't say with confidence that the amount of dose that would be expended and the risk of contamination exposure involved in attempting to remove all that contamination, which is in the form of magnetite, largely, inside that header, would outweigh any potential benefit from doing so.

**THE PRESIDENT:** Thank you.

**MR. MANLEY:** Robin Manley.

So if I can just, you know, jump on that for a second. So what Ian is saying is when you compare the dose consequence of events like this and the low level to the amount of dose that would be expended to prevent those by decontaminating the headers, we would spend a lot

more dose decontaminating it than we would prevent; that is not ALARA.

**THE PRESIDENT:** Yeah, no, I got that from what he said. Thank you.

And last question before I open it up to my colleagues. Are the workers concerned? Any issues there?

**MR. MANLEY:** Robin Manley, for the record.

And again, I'm going to get Ian to clarify my understanding, but from what I understand, we met with the workers; we had whole body counts with the workers; we offered them whether they would like a fecal sample. And my understanding is that they all declined the opportunity, which, if that is correct, may put us in a bit of a difficult situation if we are now directed to tell them to go and put them in. But I'm going to pass that back to Ian.

**MR. EDWARDS:** Ian Edwards, for the record.

That's correct. So I personally interviewed four of the workers. Two others were interviewed by my colleagues.

The general form of the interview was first to inform them of the positive P.A.S. result, of how the preliminary dose assessment was conducted and what the potential sort of bounding dose was, based on the

measurements that we had.

I also informed them that, you know, essentially we have a dose that is below our recording level; however, in light of the sensitivity around alpha and around, you know, internal uptakes, I did offer them the opportunity to have fecal sampling performed if they were looking for an added level of certainty in terms of whether or not there was actually an uptake.

In all of those cases the workers declined. I did let them know that, as has been mentioned by the CNSC Technical Staff, there is somewhat of a time limit.

However, if they changed their minds they were welcome to contact me. So far, no one has taken us up on that offer. As Robin alluded to earlier, the overall process is not generally appealing to people and these individuals, their level of comfort with the doses involved, have indicated that they would rather not go through that process.

Thank you.

**THE PRESIDENT:** Thank you. I guess you'll now have to make sure they understand why we're requesting that they submit these samples, it's to get reassurance and make sure that we actually understand what it is that we're dealing with.

Opening it up to my colleagues. Any questions on this before we go to the rest of the status report?

Dr. Lacroix?

**MEMBER LACROIX:** Yes, thank you. I want to understand. The purpose of the respirator apparatus is to prevent the inhalation of alpha particles, and the purpose of a plastic suit is to prevent the absorption of alpha particles through the skin. Am I right?

**MR. MANLEY:** Robin Manley, for the record. No, I would say not really. So we have a variety of different kinds of respiratory protection at Ontario Power Generation, and generally in the CANDU fleet.

The air-supplied plastic suit was primarily developed in order to protect workers from tritium oxide, which is both an airborne inhalation and skin absorption hazard.

It's not present during the refurbishment to any significant extent because of the fact that we have drained the heat transport and moderator system and dried them and the like. Which is not to say that we don't monitor workers for dosimetry for tritium, we do, but it's not really a hazard in this circumstance.

So the air-supplied plastic suit provides a very robust protection factor against tritium, both

airborne and -- sorry, airborne and from splashing actually, as well as skin absorption.

But it also provides by pumping clean air into the breathing zone, it provides a strong barrier against any airborne particulate, beta, gamma or alpha which could otherwise get into the breathing zone of the worker.

So it provides a higher protection factor than what we call a negative pressure respirator. A negative pressure respirator is a face mask with particulate cartridges on it which, because of the fact that you breathe, you're pulling air in from the outside environment through the respirator filter, it really does have a higher protection factor than 10, but that's conservatively what we assume.

Those negative pressure cartridges that I'm talking about right now are particulate and aerosol, they don't protect you against tritium oxide. We have a different cartridge which protects against tritium oxide which is not in use in this workplace.

So what we're essentially saying is that if the airborne particulate hazards are believed to be, based upon the controls in place, our assessment, and the monitoring we do, believed to be low-level, then the negative pressure particulate respirator is the ALARA

protective measure to use. If they're extremely low-level, then we would not wear a respirator. If they're higher than we would want with a respirator, when we would put the person in the air-supplied plastic suit.

**MEMBER LACROIX:** Maybe I misunderstood you, but you mentioned that there is a potential for a higher dose with a plastic suit. What do you mean by that?

**MR. MANLEY:** Robin Manley, for the record. So a worker who is unencumbered by too much gear of any kind is generally more efficient. A worker who has, you know, a fall arrest harnesses, is a little bit encumbered, but it's a safety measure you have to have in place. Gloves are a safety measure that you have to have in place.

A facemask respirator is not terribly encumbering. A big bulky air-supplied plastic suit slows you down, so you work more slowly and, therefore, you tend to absorb a higher gamma dose because of the fact that you are slowed down. There is, and I do not want to overstate this, but there is a slightly increased risk of tripping because you've got this air hose.

So you want to balance these various controls that you put in place, that you're not giving people substantially more dose from one source term just to protect them from a low dose from another source term.

**MEMBER LACROIX:** Thank you for this

explanation.

**THE PRESIDENT:** Mr. Berube.

**MEMBER BERUBE:** So, CNSC, I'm just trying to summarize this in my mind. The reason why we want to do a fecal sample here is to characterize the biological hazard in this particular unit, and this gives us an opportunity to do that, take a look at what's actually there, what we should be aware of for future purposes.

This incident being marginal at best, but in the event that something that comes along should be of a higher magnitude, is that correct, you just want to know what's there so that we have an idea of what we're up against? Because every one of these systems should be contaminated slightly differently, in my opinion anyhow, as we move through them.

**MR. JAMMAL:** Ramzi Jammal, for the record. At the high level the answer is yes. Definitely so for us to get confirmation.

The second point I would like to make is with respect to the safety culture. We trust that the licensee spoke to the employees. Even though we did not interview the employees, but at the same time we provide them with a safety net, another opportunity for them to decide.

So we're not going to force an employee to



take on fecal testing. But definitely, we would like to verify on the science basis for the future.

As I mentioned before, we had events at Bruce Power that were dealt with and, in my opinion as Chief Regulatory Officer and the information we're getting from our field inspectors, the performance of OPG has not been very stellar, and we want to make every effort to confirm what is on the P.A.S. has been no uptake to the worker.

**MEMBER BERUBE:** Correct me if I'm wrong, but did you just say that you can't interview the workers?

**MR. JAMMAL:** Ramzi Jammal, for the record. I said I don't have the information if our site inspector staff did interview the workers. So we trust the fact that OPG offered, through their radiation protection program, a fecal sampling for the worker. That's their statement.

I will call on our Inspector, Mr. Dean Hipson, if he wants to add. If our staff did interview the workers, I'm not aware of. But our role is to make sure that the culture for safety is being applied and independently the worker can, on their own, determine if they want to have the test done or not.

But the safety culture really pushes us to make sure that there is a safety net for the workers independent of the licensee. We trust, but we're going to

verify.

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

**MEMBER PENNEY:** Okay, thank you. It's a question about, again for OPG, Darlington, the November 20th -- it's not an incident, but a circumstance. It said, "Control maintenance staff were investigating a switch on an inverter found in an unexpected state." I would think that you wouldn't have people finding things in an unexpected state. So perhaps there's more information you can give us?

**MR. MANLEY:** Robin Manley, for the record. I'm going to pass this to my other colleagues on the phone who can indeed explain this somewhat interesting scenario. Thank you.

**MR. KHANSAHEB:** Yes. Thanks, Robin. It's Zar Khansaheb, Darlington Director of Ops and Maintenance, for the record.

Yes, this was discovered by operations walk-down of the equipment. Part of the issue with this was when a switch is found in this state we expect an alarm to be generated based on the function of this device.

At this point part of what we found with this inverter was that a circuit board had indeed failed, which ended up preventing that alarm from coming in. So it

was for this reason that it just happened by operator rounds. That's why we do these rounds, to make sure equipment is in its good functional state, and it was discovered that the switch was indeed open.

The purpose of that switch is to allow the automatic transfer of power to a backup supply and in the case of an electrical disturbance, that's the purpose of this switch. It was a good find by the operator to detect that.

**MEMBER PENNEY:** Thanks for that. So why wouldn't there have been an alarm when the board went out?

**MR. KHANSAHEB:** It is our attempt to have it -- again, for the record, there is actually a designed alarm within the function. The board itself was defective, which is what resulted in the fact the alarm did not come in.

**MEMBER PENNEY:** I'm assuming that you've fixed the situation, but what have you done to follow-up and make sure that other switches aren't in unexpected states and boards aren't out?

**MR. KHANSAHEB:** Zar Khansaheb, for the record again. Yes, we have fixed the erroneous board. It was tested and function tested successfully, which then allowed us to return the unit to power.

Part of what we have done, as extent of

condition in terms of the board aging management, we do have programs for this. In fact, we have projects to replace these inverter sets as they have aged.

We also, again as I said, rely on operator rounds and routines to pick-up on these kinds of things as a backup to ensure the design function is maintained.

**THE PRESIDENT:** Mr. Berube.

**MEMBER BERUBE:** So part of this incident, just to carry-on in that theme, is that you lost Class 2 power to the unit. Obviously you dump the unit in that process, is that correct?

**MR. KHANSAHEB:** We lost one electrical division. There are two divisions to this Class 2 power system. We lost the odd division and, as a result, the unit experienced a setback to approximately 94 per cent reactor power.

Part of our procedures based on some of these loads that are supplied by these buses indicates a reactor shutdown as warranted and that is what the team did, they placed the unit at low power hot conditions while the bus was being returned to service.

**MEMBER BERUBE:** And were there any other effects to any of the radiological systems Class 2s have some imperative to that, any transient issues or any other deleterious effects due to this kind of an

interruption?

MR. KHANSAHEB: Zar Khansaheb, for the record. Part of what we do when we experience any transient-type situation on a unit, we hold a post-transient review meeting which explores two things, one of which is, did the systems behave as per the design.

And, in this case, a thorough review is done by engineering and operations, we go through alarm summaries to make sure all of the systems operated and they did, they functioned as per the design.

The second part of the review is crew performance, how did the crew manage this particular event. And, again, we did the appropriate reviews by the crew, self-assessed with training in place and no specific outcomes from there.

There are minor enhancements in the procedure which we will manage.

**THE PRESIDENT:** Dr. Demeter?

**MEMBER DEMETER:** Thank you. I have to go back to the Alpha incident for a second.

We went through a similar discussion last time when there was some feeder tubes where there was a characterization of risk by one batch that was applied to another batch and the other batch created a contamination that wasn't there in the original batch.

And what I'm seeing here is, you want a system that anticipates the risk based on some analysis that drives the PPE that the people wear. And here it seems that despite these multiple barriers and the frisking and the environmental sampling, the canary in the cold cage here is -- coal mine is the personal air samplers.

So the system is such that you only detected it at that end and there didn't seem to be -- despite all these barriers and sampling, none of that picked it up until it came to the individual who was exposed.

There's got to be a better system to assess risk to drive whether they wear plastic suits from the get-go or whether you wait until there's a contamination then to say, they're going to have to wear plastic suits.

Just I'm trying -- I'm having real difficulty in this sort of after-the-fact exposure that wasn't detected by the systems.

**MR. MANLEY:** If I may attempt to answer that. It's Robin Manley, for the record.

So I don't see it that way and let me explain why. What we have identified is an extremely localized low-level release, if I may. We have a draft apparent cause evaluation which has been shared with CNSC

staff and we haven't finalized it, but our belief is that what occurred here is that the work -- and unfortunately, I don't have a diagram with me -- but the work on this header, this large pipe which has this internal contamination, we're fitting up new feeder metal pipes and we're performing welding -- and I'm not a welder so apologies for the poor description.

But in the process of doing this welding, you use an argon gas which you need to contain or isolate in some fashion with bungs that go into various parts of this overall metal pipework system and in the process of putting these bungs in and taking them out in various steps along the way, there is some pushing of components through the header which can sort of stir up this contamination which is localized up in that area, it isn't all over the place.

So any monitor that's going to pick that up is going to be very local. So if your worker is there working on that particular component and their personal air sampler is there, it's essentially the closest sampler that you can get to the local area.

You talked about, you know, the other things like the frisking and whole body monitors. Those are really downstream. This personal air sampler worn by the worker is actually right there at the source. So

you've actually got a pretty good detection at the source going on; whereas frisking the person on exit from the area, if we identified the person was contaminated, that would have actually been downstream. They weren't contaminated, the worker wasn't contaminated, right.

We're not saying, in fact, that the worker had an uptake, we're saying that we detected on the personal air sampler that there was localized Alpha contamination in the air at that location. So we're assessing that if that intake actually occurred, it would be a dose of this extremely low magnitude.

So I'm actually pretty happy with the fact that we're detecting such low levels that aren't even recordable, as opposed to, if I was coming to you and saying, yeah, we detected it and it was 1 mSv that would be, you know, a worse event for sure, right.

**MR. JAMMAL:** It's Ramzi Jammal, for the record. If you'll allow me, Madam President.

**THE PRESIDENT:** Sorry, Mr. Jammal, I just want -- let me just -- because you'll probably address my question too then.

From what you've told me it could just as easily have been 1 mSv because you don't know what the source is.

**MR. JAMMAL:** It's Ramzi Jammal, for the



record. I fully agree with you, Madam Velshi and Dr. Demeter's question is bang on.

The difficulty we're having is -- and I will have to rely on my colleague Dean to respond. The difficulty is the swipe test and the result of the determination prior to the entry, that's what -- the 12-2 were requesting that information from OPG, so we are able to determine on what basis OPG ascertained the dose to the workers before they entered the area. That's what the radiation protection program procedures require so that there be a determination via swipe test identification of the substance that they will have to remove.

So, in other words, they have to take swipe test, count them and determine the potential contamination prior to the worker's uptake.

I fully understand the complexity of the work, the cutting, the welding, the air disturbance and so on and so forth. In our 12-2, we're requesting for that information to be given to us.

I will ask Dean if he got the information or if we have the values. But we go back to the fundamental principle is, what is the source term, what is the determination of the hazard associated with the job before the job is carried out.

**MR. HIPSON:** Dean Hipson, for the record,

Senior Site Inspector at Darlington.

So as Ramzi had said, OPG is in the process of providing us that data. They have provided us smear results from Connectrix for the boiler manways as part of the boiler cleaning activities that they've completed, so that should be representative of the heat transport system, however, they're going to provide us detailed characterization data from smears that they took on the header.

We're also reviewing the VSDS entries for the smear data that they have collected over that time period.

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

**MEMBER LACROIX:** Maybe this is a silly question, but I was wondering, is the release of radionuclides that emit harmful particles a function or dependent on the welding process itself?

**MR. MANLEY:** Robin Manley, for the record. I may call upon my colleagues again for some assistance.

As a general rule, and this goes back, I'm going to say about nine years or so ago when we significantly increased the amount of, I guess I would say detailed rigor controls, et cetera, in our Alpha program as a result of a peer review that we had in 2009 at Pickering.

We benchmarked industry standards and, you know, enhanced expectations that improve over time and we learned that it is considered that grinding, abrasive activities, hot work, things that add energy to the system that has the contamination present are ways that an airborne hazard can be kicked up off the surface, can be heated off the surface or whatever mechanism.

So the controls that we established back then -- and again, I'm going to ask Ian to clarify in a moment -- but the controls that we established back then set stronger requirements for the protective measures to be put in place when we were doing hot work such as welding or grinding activities.

Ian, anything you'd like to expand on?

**MR. EDWARDS:** Ian Edwards, for the record. So Robin's correct, absent further information the requirement is to recognize the potential for welding activities to generate an airborne hazard. You know, we recognize that as part of our program.

However, if it can be established that the surfaces that are being welded are free of contamination, then obviously there isn't the concern for, you're not going to generate an airborne hazard.

And so, in the case of upper feeder welding you have the new feeder material and you have the

header nozzle which is old material, however, the nozzle has been prepped for the weld, and so the inner layer magnetite during a previous work evolution was removed, there was a weld build-up generated and so the surface itself that are actually contacted by the welding machine are essentially new metal.

And so, in looking at this work and determining what level of respiratory protection is required, we first did extensive sampling and surveys. And this work started back in the spring, we've actually been doing this for several months, and during that time it was done in plastic suits and we created a protocol by which we were going to perform surveys on the nozzle and on the feeder to look for loose contamination prior to fitting the feeder up for the weld.

We placed airborne samplers as close as we could physically get them to the nozzle when the welds were executed and this allowed us to create a body of work, a series of measurements. And the conclusion from those is that the surfaces were clean and they were not generating any airborne radiological contamination hazard, and that allowed us to have the confidence, coming in this fall, that the welding would not generate a hazard and therefore was safe to be performed in respirators. The activity associated with these positive past results was not a

welding activity itself. No one performing actual welds has had a positive P.A.S. result. So that activity, the assessment we did confirmed no airborne hazard and that has continued to be the case. It was activities related to removing things from the header that we believe contributed to the positive P.A.S. results in this case.

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

So, Mr. Jammal, at the next Commission meeting in February I think you're coming to give us an update on the other alpha incident at Darlington, the retube waste processing building follow-up, and we look forward to hearing any further updates on this particular incident too.

Okay, so moving on then, the next item is the Event Initial Report regarding a transformer fire and a leak of mineral oil at Unit 8 of Bruce B Nuclear Generating Station, as outlined in CMD 18-M62.

Mr. Maury Burton from Bruce Power is in attendance and available for questions.

Dr. Viktorov, do you wish to add anything before moving into the questions?

**DR. VIKTOROV:** Alex Viktorov, for the record.

The update on this event will be given by Luc Sigouin, Director of Bruce Regulatory Program Division.

**CMD 18-M62**

**Oral presentation by CNSC staff**

**MR. SIGOUIN:** Good morning, Madam President and Members of the Commission. Mon nom est Luc Sigouin. I am the Director of the Bruce Regulatory Program Division here at the CNSC.

I will provide you with information related to an event reported by Bruce Power on Thursday, December 6th, where a transformer fire and release of mineral oil occurred at the Bruce B station.

In the early evening of December 6th the CNSC duty officer was informed by Bruce Power of a fire at the Unit 8 station service transformer. Unit 8 had been shut down for a scheduled maintenance outage several weeks prior and was in Over Poison Guaranteed Shutdown State, OPGSS.

As you can see in the photos that we included in the Event Initial Report, this large transformer is located on the outside of the Bruce B Power House Building, on the opposite side of the reactor buildings.

A dedicated deluge fire suppression system activated per design and the Bruce Power onsite fire

brigade was deployed to the scene. Bruce Power also activated their Emergency Management Centre to provide additional support to the Bruce B response.

The transformer's metal casing cracked and mineral oil mixed with firefighting water and foam escaped from the retention basin around the transformer and onto the Bruce site. A containment boundary was set up by Bruce Power to mitigate the impact to the environment from possible runoff of mineral oil from the site. It should be noted that the mineral oil does not contain PCBs. The fire was brought under control and extinguished after several hours, but the transformer continued to smoulder and required ongoing water spray.

Bruce Power promptly began monitoring the lake for impact. They reported that there was no visible sheen on the water surface. Bruce Power notified the Ministry of Environment of the incident and the Ministry of Environment inspected the site on December 7th with CNSC inspectors and the Ministry of Environment reported that they were satisfied with Bruce Power's containment actions. The transformer continued to smoulder until fully extinguished on December 9th.

During the course of this event, CNSC staff were in regular contact with Bruce Power and we deployed a CNSC inspector to the Bruce Power Emergency

Management Centre from late in the evening December 6<sup>th</sup> into early in the night of December 7th.

There was no impact on nuclear systems, there were no radiological releases, and there was no impact on the public as a result of this event. Since the event, Bruce Power provided an event report as required by their licence. CNSC inspectors continue to monitor Bruce Power's actions at the site and we will determine what regulatory oversight activities need to be taken.

I understand that Mr. Burton from Bruce Power has a presentation for the Commission, after which CNSC staff will be happy to answer any questions the Commission may have.

**THE PRESIDENT:** Thank you.

Over to you, Mr. Burton.

**CMD 18-M62.1**

**Oral presentation by Bruce Power**

**MR. BURTON:** Good morning, President Velshi, Commissioners. My name is Maury Burton, I'm the Senior Director of Regulatory Affairs for Bruce Power.

We figured we would give a short presentation with some pictures because pictures always help out visualizing what's actually happening in the



field. So I'll quickly run through this. I'm not necessarily going to go through and repeat what Mr. Sigouin has already informed you.

This picture here is really to give a perspective of where the transformer sits on the site. As Mr. Sigouin said, it is on the outside of the building at the north end of the station, located in a containment area that is designed for containment of oil.

So during the initial response we do have some pictures here. There's one with the firefighters to kind of give you the scale or the size of this transformer. And you can see there they do have water. This is after the deluge had stopped. So there is water spraying there to contain the -- or cool the transformer.

And we do have some pictures here kind of showing the containment area that we set up, because with the water spray we did actually overflow the containment system. So we did put in measures to keep the oil in that area.

And the bottom picture kind of shows a general area of the transformer. I will note that in the bottom picture the transformer is the one in the middle that has the water spraying on it. The other transformers in the area are actually spare main output transformers that are stored in that area.

This next slide shows the containment system, what we actually use. It's a SorbWeb System which has various layers, the top layer being stone which is about 18 inches deep, and then a couple of porous plastic layers that are designed to spread the oil out so that it actually will spread out over a larger area of the containment system. In the bottom there is actually an oil mat, which is a polymer that will allow water to go through it, to permeate through it in normal circumstances but will congeal and solidify to prevent oil from getting further into the ground.

As for ongoing actions, this slide was really to demonstrate the areas that we're really concentrating work on. It's a little busy, but within the blue boxes are really the zones that we're monitoring and doing remediation areas.

So there is a Box 2 in the bottom where the TSS8 is located and that's the area that the main cleanup activities are taking -- we did get some oil and water mixture into the forebay, the intake channel. That has all been cleaned up.

We do have a boom deployed at the outfall, which is to the left here on the slide. We are monitoring that area. We have not seen any oil in that area, but we will continue to monitor just in case we have a large

precipitation event that could wash oil through the yard drainage system.

And the other area, which is kind of to the top right of the slide here, is where the yard drainage system drains to the lake on the north end of the station. So we have seen some oil in the manhole right before the lake and we do have remediation in place in that area.

In this next slide we show the picture again and we kind of give a general location of Manhole 8, where we do have a vacuum truck deployed to remove residual oil from that manhole. And at the actual outflow we can see in the middle picture we do have a weir dam set up to capture any oil sheen that is escaping from that manhole. The picture to the left there just shows the forebay cleaning. As I mentioned, that is now complete.

Moving on, this picture actually shows the containment area after the fire was out and we had stopped putting water to the transformer.

So the majority of the oil has been collected. We are still doing some cleanup activities, particularly on the roadway in the vicinity of TSS8, and we will be doing cleaning of the storm drainage system. That is ongoing today. We do expect these cleanup activities to be complete by end of day tomorrow.

There will be some more ongoing monitoring

and recovery efforts within the containment area itself, mainly because the SorbWeb has solidified. It won't let water through now. So we will be doing some ongoing pumping of that to ensure that we have full containment capacity just in case we do have another leak from one of the existing transformers in that area. And we will likely be fully replacing that system in the spring. The weather conditions aren't really suitable for replacing it in the winter months.

Beyond that, we have restored water treatment plants which were shut down during the event because of water in the forebay. So they have been returned to service. There is some additional remediation ongoing with our domestic water treatment plant that still will take a couple more days to finish, but it is in service and providing domestic water. We do have a stop consumption order, but it is available for wash or use in showers.

The last thing I just wanted to note is we do have a root cause investigation underway -- and I imagine we will be back to talk to the Commission about the results of that once that's done -- and an extent-of-condition review of all transformers onsite, all large transformers onsite. We do have 40 of them and we do want to make sure that they're all in good health, and in

cases where we do detect things we want to make sure that we're doing the right thing so we prevent another event like this.

I'm available for any questions that you have.

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

We'll start with you, Ms Penney.

**MEMBER PENNEY:** Thank you for this, and the pictures are quite helpful. So just looking at your slide there of your oil containment system, so that is basically the system that -- the containment area. So these are the layers that underlay the containment area as it exists?

**MR. BURTON:** Maury Burton, for the record. That is correct.

**MEMBER PENNEY:** Okay. And what I hear you saying is because it's absorbed, the oil from this incident and the water, it's actually not functioning like it should anymore.

**MR. BURTON:** As I did mention, it is designed to let water permeate in a normal circumstance. Because the oil has made contact with the polymer that's at the bottom, that will have congealed, so it will not allow water to permeate through. So we will have -- as an interim measure we've essentially dug a sump into this

containment and we'll be pumping that out at a regular interval to ensure that we still have capacity, because we do anticipate and are getting today precipitation that will affect the capacity. So it's going to be an ongoing monitoring until we can fully replace the SorbWeb System.

**MEMBER PENNEY:** So until the spring comes when you can replace this oil containment system, what I hear you saying is that you're digging a sump and you're going to be pumping, say, contaminated or otherwise water, runoff water from this area until that time. Where does it go?

**MR. BURTON:** Maury Burton, for the record.

It will be collected by one of our contractors and taken to an appropriate facility for treatment. Generally what they do is they put it through an oil-water separator and then dispose of the oil at an approved facility.

**MEMBER PENNEY:** Okay. And you've looked at the lake, done sampling, MOE has been out and they're satisfied that there's no contamination, no effect on the lake?

**MR. BURTON:** Maury Burton, for the record again.

Yes, that's correct. From last Friday until yesterday we did have boats out on the lake on a

daily basis. We did drone overflights and had shoreline sampling ongoing. We've stopped the drone and boat exercise because we're not seeing any oil in the lake at this time, but we are continuing to do the shoreline walkdowns and sampling, which is really just taking bottles and looking for any oil sheen in those. We really haven't seen any.

**MEMBER PENNEY:** So I'm assuming those samples, you will be submitting the results to CNSC. And CNSC, have we done any sampling?

**MR. SIGOUIN:** Luc Sigouin, for the record.

So at this point, Ms Penney, we haven't done independent sampling yet. Our focus at this point is on overseeing Bruce Power's activities, whose focus was on ensuring that they're putting containment systems in place. That will be part of the next steps now, is looking at what activities we're going to be taking in the transition, and I can assure you that we will be taking some activities to assess what was done and to do some verification of the findings that Bruce Power has reported.

**MEMBER PENNEY:** And are you satisfied that their containment system will be -- well, they'll have an interim measure in place for the next four-five months?

**MR. SIGOUIN:** Luc Sigouin, for the record.

So we're aware of the approach that Bruce

Power is proposing to take and, as described, it meets our regulatory expectations. We will continue to monitor it with onsite staff who will make this part of their regular walkdowns to verify that the system is being operated as it should be.

**THE PRESIDENT:** Mr. Berube.

**MEMBER BERUBE:** A difficult problem obviously, an expensive one I would think, but beyond that, let's look at exactly what these transformers do. I'm trying to understand the implications of the system now. Unit 8 was in a guaranteed safe shutdown state and this unit, this particular transformer is designed to step down the power from the grid to supply operations for the unit during shutdown; is that correct?

**MR. BURTON:** Maury Burton for the record.

That is correct. It is a step down transformer, it takes power from the grid at 500 KV and steps it down to 13.8 KV for system use inside the station.

**MEMBER BERUBE:** So at the time of the incident this transformer was underneath full load I would assume or close to full load. And what classes of power does it actually supply?

**MR. BURTON:** Maury Burton for the record.

This transformer supplies Class IV power and it actually would not have been fully loaded. With the



unit in a shutdown state, a number of the large pumps, such as the heat transport pumps and the boiler feed pumps, were not in service. So it was not at full load at the time, although it was supplying some Unit 0, which is a service building, loads, from what I understand. So as far as impact on the nuclear side, the heat sink was maintenance cooling at the time and it's supplied by Class III power, so it was unaffected by the loss of Class IV power that occurred when the transformer failed.

**MEMBER BERUBE:** Okay. And so I guess from the root cause analysis, just to get a ballpark on it, do you think this is mechanical failure, electrical failure?

**MR. BURTON:** Maury Burton, for the record. That's something that's being assessed.

**MEMBER BERUBE:** You don't know?

**MR. BURTON:** At this point in time the engineers have not completed that assessment and I know with past experiences with transformer fires that because of the fire itself, sometimes the evidence is destroyed as to the exact fault. So it's something that we will be definitely working to try to determine through our forensics that we'll be doing as part of the root cause, but I can't say for sure that we will be able to determine whether it was mechanical or electrical failure that triggered the event.

**MEMBER BERUBE:** Thank you.

**THE PRESIDENT:** Dr. Demeter.

**MEMBER DEMETER:** Thank you for the description and the pictures. These real-world events offer opportunities sometimes to reflect on response. From your Initial Event Response, were there any lessons learned that you can learn from and perhaps drive future responses?

**MR. BURTON:** Maury Burton for the record.

I was actually talking to our Fire Chief yesterday afternoon in preparation for this and that's one of the things that we did talk about. As Mr. Sigouin mentioned, the fire did smoulder for a few days and really that was because we were making sure that we had a safe plan of attack to get to the internals where the coils were actually what was still smouldering in there. And if you know transformer design at all, these things are basically wood. So wood that's been soaked in oil for 20 years tends to burn fairly well. So the real lesson learned there was to look at how we can establish that safe state on the transformer to allow the firefighters access to the internals to get that direct attack or water spray on the coils, because that's really the key to putting out the fire, and being able to add foam into there. We were very cautious here, understanding that during the initial event there could still be load going into there. Once we got

the transformer isolated and then some condition guarantees on that, then we could release it to the firefighters where they could actually open the manways and get in there. So we're going to look very hard at how we can do that quicker mainly because it allows us to get water off the transformer and then you don't have the issues of overflowing the containment area due to extra water. So we are going to look at other things as well that we can make sure that we contain everything where it's supposed to be so we don't have this massive cleanup that we're going through right now and looking at other transformers in the prevention side to see what we can do. Was there was something that we missed in our monitoring program that allowed this to happen, that would have told us that, hey, we've got a problem that's imminent?

**MEMBER DEMETER:** And have you had to manage a transformer fire like this before?

**MR. BURTON:** Maury Burton, for the record. We did have on Unit 6, back in 2004 I believe it was. A main output transformer failed and had a similar fire. In that case we actually did not have the SorbWeb containment system and we had a much larger impact on the environment because of that.

**MEMBER DEMETER:** Thank you.

**THE PRESIDENT:** Dr. Lacroix.

**MEMBER LACROIX:** Thank you for this presentation. I love the pictures. A picture is worth a thousand words.

You mentioned that you have -- well, there are 40 such transformers on Bruce sites?

**MR. BURTON:** Maury Burton, for the record.

Forty large transformers. Essentially each unit has five -- each operating unit has five large transformers:

- the system service transformer, which you see here, which is mainly used for shutdown;

- we also have what we call a unit service transformer which takes power directly from the turbine and supplies Class IV power back into the unit;

- and then the main output transformer we actually count as three transformers because it has one large transformer for each phase, being a three-phase supply.

So five per unit, eight units, so that comes out to 40.

**MEMBER LACROIX:** Do all these transformers come from the same manufacturer?

**MR. BURTON:** Maury Burton, for the record.

The answer to that is no. Most of the original transformers were Westinghouse but we do have a

program in place right now. These transformers are getting to end of life, so part of our asset management program is to replace these transformers. I know a number of them are now Siemens-built. So we've replaced the main output transformers on Units 3 and 4, and there is an ongoing program to replace all of these over the next 10 years.

**MEMBER LACROIX:** And is this transformer used when the Unit 8 is full power?

**MR. BURTON:** Maury Burton, for the record again.

It can be. Typically when we are operating though, the unit will run off the unit service transformer. For us it's a cheaper option because when we run from the service transformer we're actually buying power from the grid. So we much prefer to run off the unit service transformer, produce our own power and operate that way.

And given the way that the station -- the Class IV system is set up, we do have inter-connection between the units, so we can actually power this unit off one of the other system service transformers on one of the other units. And currently it's being fed from Units 5 and 6.

**MEMBER LACROIX:** Thank you.

**THE PRESIDENT:** Quick question. One of

the pictures seemed to show that the powerhouse wall was all blackened. Was it damaged at all?

**MR. BURTON:** Maury Burton, for the record.

There is an engineering assessment ongoing. There is some soot on the building. We are working to clean it.

The engineering assessment showed no structural damage there. They are looking at some of the clamps for the industrial siding to ensure that they're all intact and should any be discovered as damaged, they will be replaced. And that's part of our -- making sure that we don't have projectiles for high wind events of things like that, part of our PRA to ensure that those fasteners are in good shape.

**THE PRESIDENT:** Thank you.

And then from OpEx perspective, OPG, did you take any actions as a result of this incident?

**MR. MANLEY:** Robin Manley, for the record.

So we're aware of the event and we have our engineering folks obviously keenly aware of it. I'm not sure that I -- I want to put our engineering staff on the spot at the moment, but for sure we're always keenly interested in events that happen at our peer stations. And we'll be supporting Bruce Power in their investigation to

any extent necessary and obviously learning from the event.

**THE PRESIDENT:** Thank you. Thank you for the presentation.

The next item on the agenda is the mid-term report on the results of compliance activities and performance of OPG's Darlington new nuclear project.

I wish to note that representatives from the Department of Fisheries and Oceans, Environment and Climate Change Canada and the Municipality of Clarington will be available later on for questions.

Mark, are they available via teleconference?

**MR. LEBLANC:** I've not received confirmation with respect to DFO, but we have confirmation with respect to the others.

**THE PRESIDENT:** Thank you.

Okay. I'll turn the floor to OPG for their presentation.

Mr. Knutson, the floor is yours.

**CMD 18-M55.1/18-M55.1A**

**Oral presentation by Ontario Power Generation**

**MR. KNUTSON:** So for the record, my name is Mark Knutson. Good morning, President Velshi and

Members of the Commission.

I am the Senior Vice-President of Nuclear Engineering and the Chief Nuclear Engineer for Ontario Power Generation. Alongside me today is Jeff Lehman, the Vice-President of New Nuclear Development, and Robin Manley, the Vice-President of Nuclear Regulatory Affairs and Stakeholder Relations.

We are also pleased to be joined by other OPG members that are seated behind us.

It is our pleasure to be in attendance this morning representing the entire OPG team.

We are here today to deliver an update on the activities on the Darlington New Nuclear Project Site Preparation Licence. It is a 10-year licence which was granted by the CNSC in August of 2012 and expires on August 2022.

I'm not sure if you can see our presentation. The slide presently up there is the -- it's an aerial shot of the proposed Darlington New Nuclear Site looking westward with OPG's existing Darlington Nuclear Generating Station in the background.

Obviously the land there is where the site is proposed.

Just to clarify before I go further, OPG has not received any direction from our shareholder, the



Province of Ontario, to further advance this project in terms of project activities, including technology selection since the new nuclear project was deferred in 2013.

At that time, OPG was requested to maintain the site preparation licence for potential future nuclear capacity needs in Ontario, so to stay prepared.

Nuclear energy is the backbone of Ontario's energy clean mix, providing more than 50 percent of Ontario's energy needs. We remain ready should the province direct us to further advance the project.

In a moment I will ask Jeff Lehman to take the Commission through an overview of the Darlington New Nuclear Project, or DNNP as we will refer to it today, and a summary of our activities since the licence was granted in August 2012.

Jeff will then be more specific -- provide more specific details on how we are tracking the progress of the commitments made during the environmental assessment and licensing process and the work we've undertaken to advance and complete some of our commitments.

Following Jeff, Robin Manley will share a brief update on infrastructure improvements in and around Darlington site as well as the status of our ongoing engagement with indigenous and local communities.

And lastly, Robin will touch on OPG's

plans for the remainder of the licence period and term.

After Robin is finished, I will then conclude with some remarks and, following that, we will be pleased to answer any questions from the Commission Members at that time.

So I will now pass it over to Jeff Lehman.

**MR. LEHMAN:** For the record, my name is Jeff Lehman.

As Mark mentioned, I'm the Vice-President of New Nuclear Development at OPG. I'm responsible for leading OPG's business development efforts in the area of new nuclear generation.

In this role, I am responsible for the management of DNNP, including maintaining the site preparation licence. I will provide a brief outline of the project.

As you know, the DNNP site is in the Municipality of Clarington, Region of Durham, approximately 70 kilometres east of Toronto. OPG also recognizes the DNNP site is in the traditional and treaty territory of the Mississauga Anishinabek.

In August of 2012, the CNSC granted a 10-year power reactor site preparation licence that governed site preparation activities for up to four nuclear power reactors with a combined maximum electrical output of

4,800 megawatts.

OPG's application for a site preparation licence was based on a bounding, technology-neutral environmental assessment to allow flexibility in the technology selection process which was progressing in parallel at the time of the application.

The approach applied the parameters that would have the highest impact from each of the competing technologies at the time to develop the bounded impact for the project.

Following a 17-day public hearing process, a Joint Review Panel of the Canadian Environmental Assessment Agency and the Canadian Nuclear Safety Commission concluded the project would not result in adverse environmental impacts given the mitigations that were proposed by OPG.

In 2013, citing lower than expected projected energy demands, the Province of Ontario deferred the project and the parallel technology selection process and requested OPG to maintain the site preparation licence.

As you can see from this slide, this slide shows the project site in an aerial photograph of the entire Darlington site. The overall site boundaries delineated by the red line you see and the property is roughly -- the DNNP property itself is roughly the eastern

one-third of the site as shown by the green outline in the image.

It is bordered on the north by Highway 401, on the east by St. Mary's Cement property, on the south by Lake Ontario and on the west by the existing Darlington Nuclear Station.

The site is also bisected by the CN Rail line which passes through the middle of the property running east to west.

Since receipt of the licence in 2012, OPG has focused on the responsible control and maintenance of the DNNP site in accordance with our licence. Our intent has been to ensure the licence remains current and we are prepared for any decision by the province to further advance project activities.

During this time, OPG has completed a number of activities which include creating a DNNP commitments report which consolidates the commitments made by OPG and recommendations of the Joint Review Panel from the environmental assessment and licensing process.

We've completed and advanced a number of key long-lead commitments. We have submitted six annual progress reports to the CNSC. And we have monitored and provided input to CNSC-led activities on land use policies.

There's a lot of information on this

particular slide, and I don't intend to go through all of it. But it does highlight the considerable efforts we've made to date.

The timeline highlights the licensing milestones and various achievements since 2006 when the DNNP licensing process began. This timeline can also be found in our mid-term report which has been posted to OPG's public web site.

However, I do want to provide some additional detail over the next several slides on some key items we believe will be of interest to the Commission.

In terms of commitment tracking, I'll start with the DNNP commitments report. OPG remains committed to deliver the mitigation measures proposed and commitments made throughout the environmental assessment and licence application process as well as address the Joint Review Panel's recommendations as accepted by the Government of Ontario -- correction, Government of Canada.

To provide a comprehensive account of these items, OPG developed the DNNP commitments report to present them as clear and concise deliverables and provide a mechanism to efficiently track completion. The current version of the DNNP commitments report was accepted by CNSC Staff in June of this year.

OPG considers the commitments report to be

a living document which will be periodically updated to reflect completion and/or new commitments added throughout future licensing activities.

The current version of the commitments report is posted to OPG's public web site at OPG.com.

This next slide provides an update on the progress made with some of the commitments for the DNNP site.

The archaeological assessment of the site and excavation was undertaken over several years. In 2010, OPG hired a licensed archaeologist to survey the DNNP lands for archaeological heritage purposes.

The survey uncovered indigenous artefacts in one location and historic pioneer farmstead artefacts at two locations. Excavation at that time was halted until First Nations communities were notified and involved.

Representatives from the Alderville, Curve Lake and Mississaugas of New Credit First Nations communities participated in a site visit and review of the artefacts.

The archaeological investigation resumed and was completed in 2012. The photo on the upper right corner of this slide shows a salvage excavation site.

All artefacts excavated were cleaned, photographed, analyzed and catalogued. The total artefacts

recovered included 31 indigenous artefacts as well as many historic pioneer artefacts.

The Ontario Ministry of Tourism, Culture and Sport reviewed and accepted the final excavation reports and they were provided to the CNSC.

The entire artefact collection was subsequently transferred to the Ontario Sustainable Archaeological Repository for safe, long-term preservation and study.

Moving to the next commitment, the condensed cooling water option study was undertaken between 2012 and 2013 to thoroughly examine condenser cooling water technology options for DNNP. OPG prepared a BATEA, Best Available Technology Economically Achievable, assessment report which concluded that the preferred option is the once-through cooling water system.

CNSC Staff have accepted the report, concluding there are no fundamental barriers to licensing a once-through cooling water system and confirm that OPG had satisfied the Joint Review Panel's recommendation on this subject.

Next up I'll highlight some other commitments that have progressed but cannot be completed until a vendor or technology is ultimately selected.

OPG has managed a number of long-lead

commitments by conducting bank swallow and other terrestrial studies as well as surface water and aquatic studies. The environmental impact statement identified bank swallow habitat loss as a result of proposed DNNP activities.

OPG has continued to progress work towards a compensation strategy for this impact.

OPG has conducted annual burrow counts on and off site, funded bank swallow research to further knowledge on ecology and has tested artificial nesting structures.

To date, two structures have been built and tested, and currently a third type of habitat is being pursued based on a successful European design.

The Darlington site is well characterized through ongoing environmental monitoring, including annual field inventories for breeding birds, amphibians, reptiles, mammals and targeted survey for species at risk.

Surface water studies have included the collection of additional water and sediment data at near shore and offshore locations, while aquatic studies have included the completion of a more comprehensive entrainment study to improve estimates of entrainment and detection of low abundant species.

In consultation with Fisheries and Oceans



Canada, OPG has developed the Big Island Wetland Project for fisheries compensation of the impact of our current nuclear operations at Darlington and Pickering stations. OPG continues to monitor the performance of the project and has begun discussions with Fisheries and Oceans Canada to consider using the project as an offset measure for future authorizations related to DNNP.

The goal of the round whitefish action plan is to gain a better understanding of the round whitefish species and the effects contributing to its population decline in Lake Ontario.

Several studies have been completed, including thermal plume impacts, habitat characterization around the Darlington and Pickering stations, and genetic studies. These studies suggest that overall impact of DNNP on round whitefish will be less than predicted in the environmental impact statement.

OPG continues to monitor scientific advances in thermal impacts to round whitefish.

Since 2011, OPG has monitored the development applications that are filed within 10 kilometres of the current Darlington site within the Municipality of Clarington and the City of Oshawa. There have been no development applications proposing sensitive land use within three kilometres of the Darlington site,

for example, schools, long-term care facilities or daycare facilities.

In addition, since 2012 OPG has monitored municipal and regional land use policies within 10 kilometres of the Darlington site.

OPG staff continue to engage with provincial, regional and municipal representatives on matters pertaining to land use around the site. OPG's monitoring activities build upon the discussions that began in the CNSC-led workshop held in 2013.

And that concludes the update on the status of our commitments.

As the Commission knows, OPG has been internationally recognized as a leader in its response to the event that occurred at the Fukushima Daiichi plant. OPG's response to the Fukushima event has been focused on ensuring industry learnings have been incorporated into our operating plants.

The initial DNNP site evaluation was performed prior to the Fukushima event. However, OPG is confident the evaluation of the site was robust and conservative, and the DNNP site remains suitable for the construction and safe operation of the new reactors.

The CNSC updated its regulatory document applicable to site evaluation and site preparation, Reg Doc

1.1.1, which includes findings from the CNSC Fukushima Task Force.

OPG has indicated our intention to renew the site preparation licence when it expires and to identify any gaps between our current approach to the DNNP site and Reg Doc 1.1.1.

I will now ask Robin Manley to speak about the site infrastructure improvements, ongoing engagement with indigenous and local communities and our plans for the remainder of the licence term.

**MR. MANLEY:** For the record, my name is Robin Manley. I'm OPG's Vice-President of Nuclear Regulatory Affairs and Stakeholder Relations.

Jeff just mentioned the site infrastructure improvements. As the Commission is aware, OPG has a major refurbishment project ongoing right now, and partly in support of that and partly in preparation for new build, and for other reasons, substantial road improvements have been made around our Darlington site.

This slide shows an aerial view of the recent improvements to the Highway 401-Holt Road interchange, which is the main Darlington site access point. The improvements provide significantly better traffic flow and were part of the overall infrastructure improvement plans that were discussed during the Darlington

New Nuclear Project Joint Review Panel hearing.

OPG has also completed some additional infrastructure projects on the Darlington site, including some initial site turnover readiness projects. These include improved control of the access and use of the DNNP lands through upgraded fencing around the site. It includes clean-up of construction debris from the original Darlington station as well as the relocation of the 44 kilovolt transmission line.

In addition, completion and advancement of key supporting infrastructure projects led by other agencies has also progressed.

As previously mentioned, the Ministry of Transport's Holt Road-401 interchange upgrade is now complete and, as well, construction of the Highway 407 East extension has made significant progress.

Whenever we think about the potential for new nuclear development, we think about our social licence, our social licence to operate a facility. Social licence is identified as one of OPG's four strategic imperatives.

As such, we recognize that ongoing community support requires early and ongoing engagement and consultation.

OPG undertook an extensive public information campaign when DNNP was first announced in 2006,

which then continued throughout the environmental assessment and the licensing process through to when the project was deferred in 2013.

Since then, we have continued to share relevant project information with indigenous communities and with stakeholders through our ongoing robust communications program which supports our operating facilities.

As I mentioned, we've continued to engage with interested indigenous communities. OPG recognizes the DNNP site is within the traditional and treaty territory of the Mississauga Anishinabek, part of the Williams Treaties First Nations.

OPG is also aware that other indigenous entities such as the Métis Nation of Ontario, Region 8, and the Mohawks of the Bay of Quinte have an interest in activities at this site.

OPG continues to engage with interested communities as part of our ongoing communication and consultation program.

At our most recent meetings, we shared information about the DNNP mid-term report and ongoing activities with the Williams Treaty First Nations and the Mohawks of the Bay of Quinte. And for the Métis Nation of Ontario, Region 8, we have shared our mid-term report by

email and we will be personally meeting with them on January 13<sup>th</sup>, 2019.

To date, OPG has not received information that the DNNP would affect treaty or Aboriginal rights, lands or areas of interest.

As I mentioned earlier, OPG maintains a robust public information and communication program with stakeholders and the local community in support of our station operations. We share relevant DNNP project information as part of those communications.

For example, a project status update is included each time we make presentations to the Municipality of Clarington Council at their public meetings and, as well, the project status is included in our standard update to visitors to our Darlington station.

This includes the site bus tours each year we -- that we conduct, during the Darlington refurbishment open house, which draw approximately 2,500 attendees each year.

In terms of ongoing activities, OPG plans to continue to maintain the DNNP site preparation licence for the remainder of the current licence term until 2022 and to continue to maintain the DNNP site in accordance with the licence requirements.

We have begun the process to apply for a

renewal of the DNNP site preparation licence to ensure that we are ready should the Province of Ontario direct OPG to further advance project activities.

While we intend to continue to progress our commitments in support of the licence renewal application, there are currently no plans to perform any licensed activities at the DNNP site. OPG commits to continue keeping the CNSC informed of activities that occur or are planned for the DNNP site.

I will now hand the presentation back to Mr. Mark Knutson.

**MR. KNUTSON:** So Mark Knutson, for the record.

So in conclusion, we are proud of our long history of safe nuclear operation and the dedication and commitment of our team of highly skilled staff. We remain confident in the conclusions of the DNNP's environmental assessment and licensing process, and we remain committed to continue maintaining the site preparation licence by responsibly managing the DNNP site and also meeting the licence requirements and progressing the commitments we've made. We remain ready to further advance project activities should we receive direction from our shareholder, the Government of Ontario.

So thank you for the opportunity to share

this update with you, and we will be happy to answer any questions at the appropriate time.

**THE PRESIDENT:** Thank you very much for the update.

I'll turn the floor to Mr. Hugh Robertson for the presentation from CNSC staff as outlined in CMDs 18-M55 and 18-M55.A.

Mr. Robertson?

**CMD 18-M55/18-M55.A**

**Oral presentation by CNSC staff**

**MR. ROBERTSON:** Good morning, Madam President, Members of the Commission. My name is Hugh Robertson and I am the director general of the Regulatory Improvement and Major Projects Management Directorate.

With me today are Mr. Christian Carrier, director of the New Major Facilities Licensing Division, and Ms Chantal Morin, a senior project officer from the same division. We also have regulatory and technical staff from the CNSC present to answer any questions the Commission may have.

At the time of issuance of the licence to prepare site for the Darlington New Nuclear Project in 2012, the Commission requested that a mid-term progress



update be provided. Today's presentation will provide a background on the project and summarize the status of the commitments and activities carried out by both the CNSC and OPG at the midpoint of the licence.

The Commission directed that the mid-term update include the following:

- "- the results of compliance activities and licensee's performance
- information on control of land use around the site
- implications from the findings of the Fukushima Task Force, and
- information on the environmental monitoring and follow-up program."

It is the first time that CNSC staff have provided a mid-term report on this licence since licence issuance.

To help position the discussion, this slide provides the layout of both the existing Darlington site on the top right and of the proposed new build project on the bottom left.

In 2012, a specific reactor technology had not yet been identified for the project. The application sought permission to prepare the site for a maximum of four nuclear power plants with a combined capacity of up to

4,800 megawatts electric.

This slide provides the timeline of key activities from the initial application for a licence to prepare site through issuance of the licence in 2012.

Key milestones include the appointment of the joint review panel by the government to oversee the conduct of the EA in 2008; the resulting EA report to the Federal Minister of the Environment, which contained recommendations primarily aimed at the federal Government, but some of which were also addressed to provincial and municipal levels of government. In 2012, the Government of Canada accepted all of the recommendations or their intent. The licence was issued in August 2012 for a period of 10 years.

Please note that as a result of the Government of Ontario's decision to defer construction of new NPPs, very limited activities have been carried out in relation to this licence since it was issued.

OPG recently informed us of its intention to renew the licence in 2022.

After OPG submitted its licence application to prepare site, CNSC informed OPG that the project required an environmental assessment pursuant to the *Canadian Environmental Assessment Act*. Given that both the environmental assessment review panel and the licence

to prepare site process would involve the conduct of a public hearing, the Canadian Nuclear Safety Commission and the Canadian Environmental Assessment Agency established a joint environmental assessment and licence review process for the purposes of regulatory efficiency and effectiveness.

The three-member panel was established in 2009 and was comprised of Mr. Graham, Mr. Pereira, and Dr. Beaudet. In its report, the panel concluded that the Darlington New Nuclear Project is not likely to cause significant adverse environmental effects, provided mitigation measures are in place and OPG is qualified to carry out activities described in the application. The CNSC then issued the power reactor site preparation licence to OPG in 2012 with a term of 10 years.

I will now pass the presentation over to Mr. Christian Carrier, who will provide information on the structure of the current licence and on licence conditions relevant to the activities that have taken place during the review period.

**MR. CARRIER:** Good morning, Madam President. For the record, my name is Christian Carrier, and I am the director of the New Major Facilities Licensing Division.

The DNNP power reactor site preparation

licence is a standard licence with an associated *Licence Condition Handbook*. Section 4 of the licence authorizes activities during site preparation. These activities focus on establishment of infrastructure to facilitate eventual construction of the facilities. This includes clearing and grading of the site, building access roads, and installation of supporting infrastructure. They also include provisions to address environmental considerations such as construction of environmental monitoring and mitigation systems.

As a result of the Government of Ontario decision in 2013 to delay proceeding with a new build project, OPG has not commenced any of those activities.

Three licence conditions are key to this mid-term update. First, condition 1.1 sets the conditions to be satisfied before any site preparation activities authorized under the licence can be initiated. This effectively acts as a regulatory holdpoint before any licensed activities can commence.

This allows the CNSC staff the opportunity to review and independently verify that the implementing documents necessary for site preparation are in place before commencement of the licensed activities. This includes the establishment of management systems, including procedures and documentation, updated project execution

plans, environmental monitoring, and environmental assessment follow-up plans, training plans, and security plans.

Licence conditions 10.1 and 10.2 are not related to site preparation activities. They address licensing and environmental assessment commitments. This mid-term report provides an update on OPG's progress on those activities. The following slide will expand on those conditions.

The *Licence Condition Handbook* as in other CNSC licences, provides compliance verification criteria against which to judge the performance. Since the licence was issued, there has been no amendment to the licence or the *Licence Condition Handbook*.

To address conditions 10.1 and 10.2, OPG developed a report documenting a complete list of commitments that have been made to address the JRP recommendations, all commitments that were made during the conduct of the environmental impact assessment, and a licence to prepare site application reviews, and all commitments raised during the JRP public hearing process.

In this report, commitments are groups by licensing phases, namely the licence to prepare site, construction, and operation. CNSC staff have performed a thorough verification that this document is comprehensive

and consistent with the government's response to address the JRP recommendations.

The work undertaken to date consists of long-lead activities associated with licence conditions 10.1 and 10.2. They relate to the bank swallows mitigation measures, condenser cooling water assessment, fish habitat compensation plan, and round whitefish action plan. These activities will be discussed in the upcoming slides.

I will now pass the presentation to Ms. Chantal Morin, who will provide information on progress of activities during the reporting period.

**MS MORIN:** Good morning, Madam President. For the record, my name is Chantal Morin. I am a senior project officer in the New Major Facilities Licensing Division.

In the next few slides, I will describe activities undertaken to date by OPG and CNSC staff to address the JRP recommendations. Most of these activities are long-lead tasks for which advanced planning is necessary.

In the first few slides, I will discuss the OPG activities and associated compliance review done by CNSC. This section will cover activities related to the bank swallow habitat, condenser cooling option, and fish habitat.

With respect to the JRP recommendation on bank swallow habitat, it was recommended to implement mitigation measures prior to any destruction of the habitat. It is understood that the construction of the new NPP is expected to require removal of natural bluffs which provide a habitat for bank swallows. The extent of the natural bluffs' removal will be dependent on the technology chosen for condenser cooling water. In the worst case bounding scenario, most of the bluffs would be removed.

At this time, with no ongoing site preparation activities, there has been no impact to the bank swallows. Note that as of 2017, the bank swallow is now identified as a species at risk under the federal *Species at Risk Act*. During the JRP, they had a lower-level status.

OPG has provided annual reports on these studies, which were submitted to CNSC staff. The reports provided the results of census studies on bank swallows and described the progress on mitigation measures and plans, including the construction of an artificial bank swallow habitat and other potential compensation measures.

Over the years, OPG has tested two types of artificial nesting structures and informed the CNSC of the result of update of bank swallows in these structures. For various reasons, the bank swallows did not move into

these structures. This could be caused by the artificial habitat being too close to the natural habitat of the bank swallows.

OPG is now developing another artificial structure based on lessons learned and is in the process of finding another location to test it.

CNSC staff continue to monitor the development of mitigation measures and coordinate reviews with other departments.

For the recommendation on reactor cooling technology, the joint review panel recommended that OPG undertake a formal quantitative cost-benefit analysis for cooling tower versus once-through condenser cooling water, applying the principle of best available technology economically achievable, also called BATEA.

The BATEA assessment was submitted in August 2012. It was reviewed by CNSC staff, Department of Fisheries and Oceans, and Environment Canada and Climate Change. The assessment was based on a number of factors such as terrestrial and aquatic habitat loss, amount of excavation, water consumption, et cetera.

An independent third party with expertise in the design of these cooling technologies was also contracted to review the assessment. The conclusion of the review was that there are no fundamental barriers to



licensing a once-through cooling water system for the proposed Darlington New Nuclear Site, subject to several conditions. These conditions include an acceptable baseline study by which to measure impingement and entrainment reductions, design requirements around a live fish return system and approach velocities, and satisfactory completion of OPG commitments and JRP recommendations related to the selection of a once-through cooling system.

CNSC staff have posted their condenser cooling tower assessment on its website.

To support the once-through condenser cooling option, OPG will need to carefully select the location of the intake and diffuser structures to mitigate the risk of adverse effects from operation. These adverse effects could include impingement, entrainment, and thermal discharge.

To fulfill this condition, a preliminary step consists of carrying out baseline studies on the offshore aquatic community. OPG has begun to conduct these studies. More sampling is being done and the methodology for sampling has been reviewed by DFO, Environment Canada and Climate Change, and CNSC staff.

For fish habitat compensation measures, the JRP recommended that no lake infill is to be started

until a reactor technology is chosen and the project is certain to proceed. The lake infill shall be limited to a depth of two metres in Lake Ontario.

In its response to the recommendations, the Government of Canada committed to ensure that impacts to aquatic habitat are minimized and compensated.

Since site preparation activities have not commenced, there is no lake infill and no impact from the project on fish habitat to date.

It is expected that the construction of a nuclear power plant would result in some fish habitat destruction due to lake infilling and shoreline protection work. OPG has committed to offset the fish habitat loss. The Big Island Wetland project was successfully implemented as a habitat bank to offset the requirements of a future *Fisheries Act* authorization for the Darlington New Nuclear Site. CNSC staff and DFO reviewed and accepted the Big Island Wetland project, which was completed in 2014. CNSC staff and DFO continue to monitor the plan.

With respect to the JRP recommendation on the round whitefish action plan, the JRP recommended that OPG continue to conduct adult fish community surveys in the site study area and reference location on an ongoing basis.

The round whitefish action plan was developed as a means to manage a wide range of potential

issues affecting the aquatic environment from the DNNP. The issues include thermal discharge, impingement, and habitat alteration or loss.

CNSC staff and DFO have reviewed studies performed on genetics and temperature effects on eggs and spawning habitat. The results of these studies found that no discrete round whitefish genetic populations were identified along the north central shore of Lake Ontario. And although the round whitefish are a thermally sensitive species, the embryos appear to be able to withstand warmer temperatures than once thought.

The round whitefish action plan will need to be submitted to CNSC at least 60 days prior to commencement of lake infill. CNSC staff continue to monitor this activity and coordinate reviews with other departments.

In the next few slides, I will go through the activities that CNSC staff have undertaken on land use planning and Fukushima Task Force lessons learned to follow up on the JRP recommendations.

A few JRP recommendations address land use planning around the DNNP site. JRP recommendation 43 requested that CNSC engage stakeholders to develop a policy for land use around nuclear generating stations. As part of the environmental assessment for the DNNP, the JRP

considered land use and development matters near the proposed site. The JRP recommendation took into consideration lessons learned from the Fukushima Daiichi nuclear accident, stating that appropriate steps should be taken to evaluate and define buffer zones around NPP.

The JRP indicated that while there are appropriate measures in place to ensure that vulnerable populations, including hospitals, schools, retirement homes, and residential areas, can be safely evacuated in the event of an accident, it would be prudent to prevent locating sensitive land use within a three-kilometre zone around the DNNP site.

The JRP directed recommendation 43 to the CNSC and this recommendation was accepted by the Government of Canada.

CNSC staff have engaged provincial, regional, municipal stakeholders as well as OPG in developing this policy. In 2013, CNSC staff met individually with stakeholders and subsequently organized a land use planning workshop with provincial, regional, and municipal stakeholders and OPG. The objective of the workshop was to mutually address the JRP recommendations by identifying existing land use policies, any potential gaps in existing processes, and potential strategies for developing new policies for land use around nuclear

generating stations.

A key recommendation from the workshop was directed to the Government of Ontario to include energy-generating facilities in their definition of "major facilities" to strengthen the proposed land use policy. The Government of Ontario published its revised provincial planning statement in 2014, including these definitions. CNSC staff is satisfied that the Government of Ontario provincial planning statement addresses this JRP recommendation.

All municipalities in the province of Ontario need to demonstrate alignment to the 2014 PPS through their official plans, which are typically on a five-year cycle. The Municipality of Clarington is currently reviewing its official plan. CNSC staff and OPG continue to monitor Municipality of Clarington's development and implementation of their plan.

The JRP recommended that the Fukushima Task Force lessons learned be introduced into the DNNP project. The Fukushima Task Force resulted in a number of regulatory document improvements, such as documents on safety analysis and design requirements. When OPG proceeds with a project, CNSC staff will ensure that these new regulatory documents are taken into account. At the next licensing renewal, these updated regulatory documents will

be incorporated in the licence for the DNNP site.

Of particular interest to the licence to prepare site are REGDOC 1.1.1 on Site Evaluation and Site Preparation for New Reactor Facilities and REGDOC 2.10.1 on Nuclear Emergency Preparedness and Response. Key elements introduced by the Fukushima Task Force lessons learned are now discussed in these regulatory documents, and include consideration of events to include multiple and simultaneous severe internal and external events that could exceed the design basis. These REGDOCS highlight that planning and preparation for these scenarios should occur earlier in the project and that these accident scenarios should inform the emergency planning basis.

Again, CNSC staff will ensure that these requirements are met if the project proceeds.

Communication efforts is also another important ongoing activity for both CNSC staff and OPG. OPG is required to have a public information program. In accordance with this program, OPG has regularly informed key stakeholders on the status of the project by means of public newsletters and regional and municipal public meetings. CNSC staff, for its part, has provided an annual update on the DNNP project in the regulatory oversight report on nuclear power plants. CNSC staff will continue to ensure timely communication on this project.

CNSC staff have consulted with Indigenous communities with interests in DNNP as part of the initial environmental assessment and licensing process. Four Indigenous communities participated in the associated JRP hearings. All Indigenous communities with interest in the project were informed of this mid-term update to the Commission and of OPG's intent to renew their licence.

CNSC staff continue to engage with all interested Indigenous communities in order to share information and address any issues or concern.

I will now pass the presentation back to Mr. Robertson to summarize and conclude the presentation.

**MR. ROBERTSON:** Thank you, Chantal.

Hugh Robertson, for the record.

In summary, due to the Government of Ontario's decision to defer the construction of nuclear power plants, OPG has not commenced any site preparation activities, although limited activities have been undertaken by OPG on long-lead items needed to address the JRP recommendations and commitments.

During the first half of the licence term, CNSC staff have reviewed and monitored progress on activities under the licence associated with the DNNP commitment report, coordinated reviews of activities with other departments, updated the regulatory framework to

include lessons learned from the Fukushima Task Force, and actively engaged stakeholders in formulating a land use planning policy.

OPG has communicated to CNSC their intent to renew the licence when it expires in 2022.

In conclusion, at the midpoint of their 10-year licence, CNSC staff have found OPG to be compliant with the conditions of their licence. CNSC is satisfied with the work that OPG has undertaken to date and will continue to monitor OPG's progress on these commitments.

We are now available to answer any questions the Commission may have.

**THE PRESIDENT:** Thank you very much for the presentations.

We'll take a 10-minute break and then come back for the questions. So we'll resume at 11:20. Thank you.

--- Upon recessing at 11:12 a.m. /

Suspension à 11 h 12

--- Upon resuming at 11:21 a.m. /

Reprise à 11 h 21

**THE PRESIDENT:** Okay, we're ready to resume with our questions. We'll start with you, Dr.



Lacroix.

**MEMBER LACROIX:** When I was reading the report from CNSC and also the report from OPG I was a bit surprised to find out that the possibility of having cooling towers sitting on the Darlington site be installed, or at least the technology was contemplated.

So could OPG tell us in a nutshell why did you consider this technology as opposed to the once-through a condenser?

**MR. LEHMAN:** Jeff Lehman, for the record. So, first of all, I think it's important we state that of course we have no project presently planned for the DNNP lands. However, notwithstanding that, it's always prudent to look at all options. What I would tell you is that both the once-through cooling and the mechanical drive cooling towers both would be ultimately acceptable from an OPG perspective and from an EA perspective.

But then you start looking at sort of the sub-tier of indications and sub-tier of considerations. Ultimately, the review and the decision was that the once-through cooling made the most sense.

A large number of factors we considered, including visual effects, for example, but ultimately from an engineering perspective, from an efficiency perspective, the results, the analysis, and the decision was to go with

the once-through cooling.

**THE PRESIDENT:** Ms Penney.

**MEMBER PENNEY:** A quick question. I'm not allowed to ask about bank swallows, although they are really fascinating.

A quick question which is for the CNSC Staff. So OPG has indicated they want to renew the licence in five years' time. My question is to the CNSC Staff, what is the process and does the EA have to be revised?

**MR. ROBERTSON:** Hugh Robertson, for the record. I'll refer that directly to our EA folks, Mr. Andrew McAllister, to respond to that.

**MS CIANCI:** Candida Cianci, for the record. I'm the Director of the Environmental Assessment Division. So the EA decision has been taken and for all intents and purposes the EA is complete. There's no provision or mechanism for reopening an Environmental Assessment once it's completed. To answer your question with respect to that.

However, in terms of if there's new science or technology or information that comes to light, that's to be considered in subsequent licensing reviews.

In terms of the bank swallows and permitting process, I believe Environment and Climate Change Canada are on the line and could speak to, in

general terms, what the permitting process would be.

**THE PRESIDENT:** Ms Ali. Is Environment Canada and Climate Change on the line?

**MS ALI:** Yes, we are. Candida, like can you let me know what point you wanted us to address?

**MS CIANCI:** Absolutely. So just to provide clarity to the Commission in terms of once a species at risk is on the federal *Species at Risk Act*, what is the permitting process?

**MS ALI:** Okay. I will pass that question over to my colleague, Duck Kim, to answer.

**MR. KIM:** Duck Kim, for the record. So in a federal environmental assessment process Environment Canada and CWS, under the Memorandum of Understanding with the CNSC, we have a protocol for notification. Both the proponent of the project and the CNSC have a responsibility to notify CWS of the potential for a permit requirement.

A permit could be applied for under Section 73 of *SARA*, the *Species at Risk Act*, and the conditions under which a permit would be granted, the criteria, the key criteria are whether all reasonable alternatives that would reduce the impact on the listed species have been considered, and that the best solution has been adopted.

Number two, all feasible measures will be

taken to minimize the impact of the activity on the species or its critical habitat, or the residence of its individuals. Lastly, whether the activity will not jeopardize survival or recovery of a species.

Once the application provides that information to CWS, they will consider the application and the information provided and may issue a permit based on the information provided to grant the activity.

**THE PRESIDENT:** Thank you. So just a follow-up to Ms Penney's question. What would be entailed in renewing the site preparation licence? I'll ask CNSC Staff.

**MR. MILLER:** Doug Miller, for the record. So at the time of licence renewal OPG will be expected to: firstly, update their current documentation in view of any changes that they're aware of in terms of the bounding conditions and bounding information for the EIS and licence to prepare site; secondly, they would be expected to address against modern standards such as CSA N286-12 on management system as well as REGDOC-1.1.1 on site preparation and site evaluation, and then material that's listed in there. That's our standard practice.

Then they would look at the gaps and address what's necessary. So it's really an updating and refreshing of information over the last decade.

There are some things that they will have to revisit, such as the impact of climate change, in particular, and addressing the Fukushima actions as they pertain to the site preparation phase and looking forward in the project.

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

**MEMBER BERUBE:** A couple of questions. First of all, thank you for the presentation, very thorough. So a couple of issues here. First of all, technology has not been selected for this site, that's correct. In that case, has any initial design work been done at all other than selection of the condenser cooling water options at this point?

**MR. LEHMAN:** Jeff Lehman, for the record. As you correctly stated, we do not have a project plan for the DNNP sites right now.

I'll just perhaps refresh the Commission's knowledge. The initial EA, initial Environmental Assessment work did include for distinct designs. The result of the review of those four designs is a plant parameter envelope that was created that bounded future work within the EA. Certainly, it would be our intention that any future project would be bounded by that plant parameter envelope and, therefore, the current EA would of course still apply.

In terms of the type of cooling, we have not made a final selection. Of course, that would also be technology-dependant. So whether that was a cooling tower or once-through cooling, or perhaps even something else, that would depend on the technology selected.

You've already heard our intent, that a once-through cooling would be preferable for a number of reasons.

**THE PRESIDENT:** Dr. Demeter.

**MEMBER DEMETER:** Thank you. I know you don't have a crystal ball, but the project was deferred five years ago. Do you have a sense of any schedule for updates from the provincial government and what they intend to provide direction -- not necessarily their direction, but schedule of when you might next hear back from them on this issue? Is it on the slate?

**MR. LEHMAN:** Jeff Lehman, for the record. So, as part of ongoing discussions with our shareholder, we often bring up the DNNP lands and the opportunity there. As you know, that represents a very significant asset for both the OPG and the Province of Ontario. We remain very interested in developing that land. But in terms of a specific project or a specific technology, we haven't had discussions along those lines.

**THE PRESIDENT:** Thank you. We've got

someone from the Municipality of Clarington on the line. I have a question. We heard that you're currently reviewing your official plan to make sure it's aligned with the provincial plan.

So what's the status of the review and are you anticipating any issues with that?

**MS LANGMAID:** Actually, there is a bit of, I guess an update to that. Our official plan was reviewed and approved by our council in November 2016, and then approved by the Region of Durham in 2017. What is currently under review is Durham Region's official plan.

So our official plan is inline with the provincial policy statement from 2014. Durham is attempting to bring theirs into line.

**THE PRESIDENT:** Thank you. Thanks for that update.

Anyone with any other questions? Mr. Berube.

**MEMBER BERUBE:** Just out of curiosity, do you have any municipal by-laws in effect regarding zoning around the MPP?

**MS LANGMAID:** Absolutely. Sorry, Faye Langmaid, for the record. I'm the Manager of Special Project and currently the Acting Director of Planning.

We have a zoning by-law in place and,

because we have a new official plan in place, we have three years to bring that zoning by-law into compliance with the new official plan. So we are currently in the process of reviewing our zoning by-law and updating it completely.

We just released the rural portion of it and now we're working on the urban portion. So we have until June 2020 to complete that zoning review.

**THE PRESIDENT:** Okay, thank you very much. Thank you for the presentation and the update.

--- Pause

**THE PRESIDENT:** Thank you. Before we move to the next item listed on the agenda, I understand that Ms Penney, and maybe other Members, have questions regarding the portion of the wall that collapsed at the Port Hope Harbour in early October, and at the November 8th Commission meeting we ran out of time to cover any questions around that.

So I understand we've got CNSC Staff and a lot of other representatives, either here or by phone, to give us a quick update and answer any questions that we may have.

So let me just see who we have here. We have the Municipality of Port Hope, Cameco Corporation, the Canadian Nuclear Laboratories, the Ontario Ministry of Environment, Conservation and Parks, and Environment and



Climate Change Canada.

We have also been given CMD 18-M66, which I guess is on the record now on this subject.

So let me turn the floor to you, Ms Tadros, and see if you have an opening statement to make first.

**CMD 18-M66**

**Oral presentation by CNSC staff**

**MS TADROS:** Thank you very much, and good morning. For the record, I am Haidy Tadros, the Director General of the Directorate of Nuclear Cycle and Facilities Regulation. So, for the record, I'd like to read in a short statement and update to the event that happened at Port Hope.

So on October 9th, 2018 Cameco Corporation and Canadian Nuclear Laboratories notified the CNSC Staff that a large concrete section of the west wall of the Port Hope Harbour collapsed and fell into the harbour. The collapsed section of the harbour wall is outside of and immediately adjacent to the Port Hope Conversion Facility.

The harbour wall is the property of the Municipality of Port Hope and is under the jurisdiction of the Municipality. In terms of oversight, Environment and

Climate Change Canada administers section 36 of the *Fisheries Act*, which pertains to regulating deleterious substances and the Ontario Ministry of the Environment, Conservation and Parks have regulatory authority over the water quality in the harbour.

At the time of the collapse a silt curtain, which functioned as expected, was already in place around the affected area, and the Municipality installed a second silt curtain following the collapse.

As a precaution, Cameco has installed an inner security fence in that area in case further erosion causes the perimeter security fence to be compromised.

The Municipality, Cameco, and Canadian Nuclear Laboratories have developed a plan to replace the harbour wall, and as of December 11th, 2018 work has begun.

CNSC staff have visited the site, taken samples, and are being kept informed of the harbour wall repair progress.

Representatives from various jurisdictions and CNSC staff are available to answer any questions the Commission may have on this matter.

**THE PRESIDENT:** Thank you. We'll start with you, Ms Penney.

**MEMBER PENNEY:** Thanks. Thanks very much for this. It's a two-part question. The first part is,

are the licensed facilities at risk? When will the wall be put back in place? So I don't know if the question is for you or for Cameco.

The second part I think is for Environment and Climate Change Canada with respect to the contamination of water, and if they're satisfied with the clean-up?

**DR. DUCROS:** Dr. Caroline Ducros, I'm the Director of the Nuclear Processing Facilities Division. The first part of your question in terms of whether any of the licence holders are at risk, some of the update spoke a little bit to that, and Cameco's here to talk about it.

But for the Port Hope Conversion Facility, they did take some added precautions in terms of the fence line in case there's additional erosion. But since the work has already begun and things are stabilized, that should not be an issue. They can add to that.

In terms of the work being completed, I think there's some hope. Again, the Municipality may want to respond to this, that the work will be completed by the end of this week or early next week, weather dependant.

**THE PRESIDENT:** So why don't we ask Cameco go to first?

**MR. MOONEY:** Sure. Liam Mooney, for the record. In relation to this event there was no impact to our operation. With the work on the repair proceeding, we

don't anticipate any impact to our operation.

As indicated, we constructed a secondary line of fencing. The first line was taken down to allow the work to proceed, and so the security of the facility is maintained.

**THE PRESIDENT:** Anyone from the Municipality want to add anything to what's been stated?

**MS BERNARDI:** Good morning. It's Sue Bernardi, for the record, for the Municipality of Port Hope. I concur, that everything that has been represented in terms of progress on the west wall stabilization is accurate, and we do continue the work as we speak now. We do anticipate it will be done and is on target for the end of the week. Again, as was represented, it is weather dependant. Thank you.

**MEMBER PENNEY:** The second part of the question was for Environment and Climate Change Canada.

**MR. KIM:** Thank you. Duck Kim, for the record, Environment and Climate Change Canada. Environment Canada and Climate Change Canada, sorry, does have the mandate for regulating section 36(3) of the *Fisheries Act*. We have been following closely what's happened with the wall collapse. We reviewed the sampling results that CNSC conducted and both our group and our enforcement officers have been engaged.

We have concluded that, as a result of the performance of the silt curtain that was in place, our main concern was sedimentation, total suspended sediments in the harbour, and it was clear that the silt curtains have been able to protect the harbour itself. So, at this point, we are satisfied that there is no deleterious effect as a result of the wall collapse.

**THE PRESIDENT:** Anyone from the Ontario Ministry of Environment, Conservation and Parks? If you have anything to add please?

**MR. BRADLEY:** Yes. David Bradley, for the record. We had a staff environment officer attend the location on October 10th, and during that time we confirmed there was adequate containment measures in place from the collapse.

We've also had our technical support section take a look at the water quality data and Victor Castro, our surface water group leader is on the line, and I'll ask him to speak to that.

**MR. CASTRO:** Yes. Victor Castro, for the record. I agree with the statement made by Duck Kim. We also looked at the analytical results of the samples that were collected by the CNSC following the breach of the wall, and those samples showed that, for the most part, all the provincial water quality objectives were met in the

inner harbour with a slight exceedance of uranium.

But outside of the harbour, outside of where the silt curtain was installed, all the PWQOs were met and it didn't appear that there was silt that had crossed that barrier. So the containment seemed to be effective.

**THE PRESIDENT:** Good, thank you. Thank you very much, all of you, for being here to answer our questions. That's much appreciated.

We'll move onto the next agenda item.

The next item is the Regulatory Oversight Report on Uranium and Nuclear Substance Processing Facilities in Canada: 2017, as outlined in CMD 18-M47 and 18-M47.A. I understand that the representatives from Environment and Climate Change Canada are still with us, available for questions after the presentations.

I'll turn it over to you, Ms Tadros.

**CMD 18-M47/18-M47.A**

**Oral presentation by CNSC staff**

**MS TADROS:** Thank you, president Velshi, and good morning Members of the Commission. For the record, I am Haidy Tadros. Colleagues with me today presenting are: Dr. Caroline Ducros, Director of the

Nuclear Processing Facilities Division; Rinat Rashapov; Mike Jones; and, Michael Young, who are Project Officers and Inspectors working in the same division.

We also have colleague licensing compliance as well as subject matter experts with us here today to help support and answer any questions the Commission may have.

We are here to present Commission Member Document CMD 18-M47 titled Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2017

CNSC Staff found three errata identified on this slide in our CMD 18-M47: the first on page 27, there were seven inspection action items at Blind River Refinery; on page 117 there were 12 inspection action items at Best Theratronics; and, on page 158 the title for the Table F-15 should have residential locations identified.

CNSC Staff will correct this for the publication of the ROR and apologize for any inconvenience this may have caused.

The outline of our presentation today is provided on this slide. Following an overview of CNSC's risk-informed regulatory oversight activities of the facilities, the safety performance of specific uranium processing facilities and nuclear substance processing

facilities will be covered.

In the end, we will cover some of the major themes identified in the interventions, which CNSC staff have received.

The CNSC currently produces a number of Regulatory Oversight Reports. As shown on this slide, this is the last Regulatory Oversight Report produced this year.

The sixth Annual Report on Uranium and Nuclear Substance Processing Facilities is presented today. The public has been invited to intervene on each of these annual reports.

The 2017 report includes a summary of CNSC's regulatory efforts, overviews comparing performance across similar facilities, and site-specific sections outlining licensee information on operations and major developments, CNSC Staff's safety and control area performance ratings, as well as detailed performance reporting on three safety and control areas of radiation protection, environmental protection, and conventional health and safety.

I will now turn the presentation over to Dr. Caroline Ducros, who will present an overview of CNSC's regulatory oversight.

**DR. DUCROS:** Good morning, President Velshi and Members of the Commission. For the record, my



name is Dr. Caroline Ducros and I'm the Director of the Nuclear Processing Facilities Division.

As this section on CNSC's regulatory oversight was presented at yesterday's Commission meeting, we'll keep it brief. The Canadian Nuclear Safety Commission regulates Canada's uranium and nuclear processing facilities to protect the health, safety, and security of Canadians and the environment. The nature of this regulatory oversight is commensurate with the risk associated with each licensed activity.

The CNSC measures a licensee's performance by its ability to mitigate risks posed by the licensed activity and to comply with regulatory requirements. CNSC staff use 14 safety and control areas to evaluate each licensee's performance which are shown on this slide.

CNSC staff continually access the licensee's performance based on results of regulatory oversight activities. CNSC staff assign performance ratings based on the results of oversight activities for a given SCA and consider set criteria such as key performance indicators, compliance with licence conditions, event reviews and follow-up activities.

Each SCA consists of several specific areas. An example for the environmental protection SCA is shown on the right side of this slide.

A key performance indicator for the radiation protection and environmental protection SCA is licensee adherence to regulatory limits and action levels. Regulatory dose limits are set out in regulations under the *Nuclear Safety and Control Act* to limit doses to workers and members of the public. Environmental licence limits are established to limit the quantity of nuclear and hazardous substances released to the environment.

Action levels are defined as an indicator that, if reached, may indicate a loss of control of part of a licensee's radiation protection program or environmental protection program and showed as a requirement for specific action to be taken. Action levels are designed to alert licensees before regulatory limits are reached.

The CNSC requires that licensees set action levels based on operational experience and using national and international guidance. These levels are part of approved radiation and environmental protection programs.

The next slide provides a graphic representation of regulatory limits and action levels. As discussed in yesterday's presentation of the regulatory oversight report for uranium mines and mills and historic and decommissioned sites in Canada, this diagram

illustrates the relationships between a regulatory limit, an action level and a monitored parameter using normal operation. The regulatory limit is shown as the red line on the graph, an action level is shown as the blue line. The region with the green dots represents the range of normal operation for the parameter.

This slide lists the locations where the CNSC conducted its independent environmental monitoring program, or IEMP, around uranium processing facilities in 2017. Sampling was completed for Cameco Blind River Refinery, Port Hope Conversion Facility and Cameco Fuel Manufacturing. CNSC staff posted the results on the CNSC IEMP website.

IEMP sampling at other sites continues to be conducted in accordance with CNSC staff's IEMP sampling plan.

The results from the IEMP demonstrate that the licensee's environmental protection programs are effective and that the people and the surrounding environment are protected.

As presented in yesterday's Commission meeting, following a review of a request from the public to include radionuclides to the National Pollutant Release Inventory, or NPRI substance list, Environment and Climate Change Canada determined that nuclear facilities in Canada

already monitor and report this information to the CNSC. The CNSC is working with Environment and Climate Change Canada to establish links between the NPRI and CNSC websites to provide accessible databases for radionuclides.

This slide summarizes Indigenous engagement and outreach activities conducted by CNSC staff. Since 2014 CNSC staff and the Mississauga First Nation have had regular meetings to discuss activities at Cameco's Blind River Refinery. In July, 2016 both parties met and developed an IEMP sampling plan. Since 2017 CNSC staff have incorporated IEMP sample locations proposed by the Mississauga First Nation.

In addition, CNSC staff participated in community liaison committee meetings in Toronto and Peterborough, open houses and a meeting between an Indigenous group and Cameco staff in Blind River.

CNSC staff also provide information through the CNSC website and social media.

Staff are in the process of establishing a long-term Indigenous engagement strategy that aims to establish regular formalized engagement with interested Indigenous communities with a direct interest in CNSC regulated facilities including the Blind River Refinery and other facilities featured in this report.

I will now pass the presentation to Mr.

Rinat Rashapov.

**MR. RASHAPOV:** Good morning, President Velshi and Members of the Commission.

My name is Rinat Rashapov and I'm the Project Officer in the Nuclear Processing Facilities Division.

The following slides provide an overview of the regulatory oversight activities, performance ratings and safety performance matrix of uranium processing facilities in Canada in the 2017 calendar year.

The nuclear fuel cycle begins with uranium being extracted from the ground and ends with its disposal following its use in its generation of energy. Uranium processing facilities are part of the nuclear fuel cycle including refining, conversion and fuel manufacturing.

This slide shows the location of the uranium processing facilities in Canada. Cameco's Blind River Refinery, Cameco's Port Hope Conversion Facility and Cameco Fuel Manufacturing facility in addition to BWXT Nuclear Energy Canada in Toronto and Peterborough. All facilities are located in the Province of Ontario.

The licence expiry dates and financial guarantees values for these facilities are shown in the table. All uranium processing facilities have valid financial guarantees in place for future decommissioning.

In 2017 CNSC staff spent 128 person days on licensing activities for the uranium processing facilities, while 1,033 person days were dedicated to compliance activities. This was accomplished through inspections and desktop reviews which can be either scheduled or unscheduled.

CNSC staff performed 18 inspections at these facilities in 2017. All enforcement actions arising from the findings were recorded and tracked to completion using the CNSC regulatory information bank.

In 2017 two enforcement actions were issued. The first one was a formal request under subsection 12.2 of the *General Nuclear Safety and Control Regulations* issued to BWXT. The other enforcement action involved a CNSC designated officer who issued an administrative monetary penalty to Cameco. Both enforcement actions are discussed in more detail in the upcoming facility-specific sections.

This slide shows the 2017 performance ratings for each of the 14 safety and control areas. The Blind River Refinery received a rating of fully satisfactory for the conventional health and safety SCA in recognition of 11 continuous years without a worker lost time injury.

The Port Hope Conversion Facility received

a rating of below expectations for the management system SCA due to deficiencies identified in Cameco's management system following a release event in 2017. Further details on this are provided in the section discussing the Port Hope Conversion Facility.

Cameco Fuel Manufacturing and BWXT for both its sites in Toronto and Peterborough received a rating of satisfactory for all safety and control areas.

Over the next slides I will present the performance and trends for radiation protection, environmental protection and conventional health and safety SCAs.

The graph on this slide shows the average and maximum individual effective dose to nuclear energy workers in 2017 for all uranium processing facilities.

The red line on this chart represents the 50 mSv regulatory effective dose limit for nuclear energy workers. As illustrated, doses to workers at all uranium processing facilities were well below the 50 mSv regulatory dose limit in any one year and below 100 mSv within a five-year dosimetry period.

This slide provides a five-year trend of doses to the public from each uranium processing facility from 2013 to 2017.

In summary, doses to the public from all

uranium processing facilities continue to be well below the regulatory limit of 1 mSv per year. Note that in 2016 Cameco updated its public dose calculations to change the gamma monitoring location to the fence line, which is closer to the operating facility than the previous location, resulting in the increase as shown in the table. This change provides a more conservative dose estimate compared to previous years. However, this increase in public dose is due to updating the public dose calculations and is not the result of an increase in actual environmental releases or gamma dose from the Port Hope Conversion Facility.

This diagram shows the five-year trend for monitoring uranium in ambient air around uranium processing facilities from 2013 to 2017. The Ontario Ministry of the Environment Conservation and Parks, MECP, quality standard for uranium in ambient air, shown as the green line on the slide, represents a concentration that is protective against adverse effects on health or the environment.

The monitoring results, which include the highest annual average from each facility's air monitoring stations, indicate that concentrations of uranium in ambient air around these facilities were well below the ambient air quality standard for uranium.

This slide shows a five-year trend for



annual average uranium concentrations in soil around uranium processing facilities from 2013 to 2017.

Licensee's soil monitoring programs monitor the long-term environmental effects of air emissions and show whether there is an accumulation of uranium in the soil surrounding a facility.

The Canadian Council of Ministers of the Environment, CCME, guideline for residential and parkland land use is the most conservative soil quality benchmark type of land use and is, therefore, shown on this slide as the green line at 23 microgram of uranium per 1 gram of soil.

Soil sampling results in 2017 continue to indicate that the current uranium in soil concentrations are well below the guideline and do not pose a risk to people or the environment.

The number of lost time injuries and corrective actions taken in response is the key performance indicator for the conventional health and safety SCA. As shown on this slide, in 2017 there was one lost time injury at a uranium processing facility. This is further described in the section of the presentation pertaining to the Port Hope Conversion Facility. CNSC staff reviewed and were satisfied with Cameco's corrective actions.

This completes the overview on the uranium

processing facilities. I will now pass the presentation to Mr. Mike Jones who will discuss each of the uranium processing facilities in more detail.

**MR. JONES:** Good morning, President Velshi and Members of the Commission.

My name is Mike Jones. I am a Senior Project Officer and Inspector in the Nuclear Processing Facilities Division.

In the following slides I'll provide some specific highlights for each uranium processing facility for 2017, beginning with the Blind River Refinery.

Cameco's Blind River Refinery is a Class 1B nuclear facility and is located in Blind River, Ontario. Its operating licence is valid from March 1st, 2012 to February 28th, 2022.

Cameco receives uranium concentrates from uranium mines around the world. These concentrates are digested with nitric acid, purified, heated, concentrated and, finally, thoroughly decomposed to produce a final product called uranium trioxide. This product is then transported to Cameco's Port Hope Conversion Facility for further processing.

In 2017, there were no changes to the facility or its Licence Conditions Handbook. During the summer the plant was shut down to conduct regularly planned

maintenance activities. The facility was maintained according to its licensing basis.

In 2017, there were no regulatory limits exceeded, there were no environmental action levels exceeded and one radiation protection action level exceeded which will be discussed in the next slide.

In 2017, there were no lost time injuries. Cameco was rated fully satisfactory in the conventional health and safety SCA.

In 2017, there was one exceedence of the refinery's action level for whole body dose of 2 mSv per month to the CNSC. Cameco's investigation revealed that the reported exposure of 4.6 mSv was mostly non-personal in nature based on a review of affected employees' work practices. In addition, an analysis of the dosimeter by the dosimetry service provider confirmed that this was an irregular exposure recorded on the dosimeter and not indicative of the normal whole body exposure.

Cameco pursued a change to the official dose records in the National Dose Registry for the employee as per the CNSC established process. The dose change request was reviewed by CNSC staff and approved in December, 2017. As stated in the regulatory oversight report, CNSC staff are satisfied that in 2017 Cameco implemented an effective radiation protection program at

the Blind River Refinery to protect the health and safety of its workers and the public.

This concludes the section on the Blind River Refinery.

I will now discuss Cameco's Port Hope Conversion Facility or PHCF. Cameco's PHCF is a Class 1B nuclear facility located in Port Hope, Ontario. PHCF's licence is valid from March 1st, 2017 to February 28th, 2027.

Cameco receives uranium trioxide from the Blind River Refinery and converts it to uranium dioxide, or UO<sub>2</sub>, and uranium hexafluoride, UF<sub>6</sub>. UO<sub>2</sub> is used in the fabrication of fuel pellets for CANDU reactors, while UF<sub>6</sub> is shipped to countries around the world for further processing.

Vision in Motion, or VIM, is Cameco's project to clean up and renew the PHCF. The project is being carried out safely according to Cameco's licence limits. In 2017, Cameco carried out waste repackaging and building demolition preparation work to further progress VIM activities. It is anticipated that most aspects of VIM, particularly building demolition, environmental remediation and transfer of waste to the Port Hope area long-term waste management facility will occur over a five-year period. The waste transfer is being conducted as

part of the Port Hope Area Initiative Project led by Canadian Nuclear Laboratories.

In 2017, there were no regulatory limit exceedences and 19 instances of one environmental action level exceeded. These are discussed further on the next slide.

There was one lost to time injury where an employee injured their arm muscle when attempting to lift a drum from a conveyor in the UO2 plant. CNSC staff reviewed and accepted Cameco's corrective actions in response to the injury.

In May, June, July and October, 2017 there were 19 action level exceedences for uranium discharges to the sanitary sewer at PHCF. Cameco's investigation determined that this was due to heavy rainfall in those months which led to groundwater infiltration. Cameco committed to corrective actions such as investigation work, sealing identified infiltration sources and upgrading the sanitary sewer system as part of the Vision in Motion project.

CNSC staff reviewed Cameco's investigation and ongoing implementation of corrective actions and found them to be acceptable.

In 2017, there were no changes to the facility operation or Licence Conditions Handbook. The UO2

and UF6 plants had planned summer shutdowns during which Cameco performed maintenance activities. The facility was maintained according to the licensing basis.

In May, 2017 Cameco reported a release of hydrogen fluoride gas which occurred during maintenance work at PHCF. The next two slides focus on the event and subsequent administrative monetary penalty issued to Cameco. The junior technician involved was not injured and there were no environmental impacts as a result of the event.

Based on Cameco's investigation into the event it was determined that the required work clearance and permits were not obtained by a junior technician prior to beginning the maintenance work. Furthermore, the junior and senior technicians were performing this maintenance activity without the necessary work clearances and permits for an unspecified period of time. This practice was known by the UF6 production supervisor.

CNSC staff assessed the release event and conducted a reactive inspection at PHCF. From the inspection findings and reviewing Cameco's past compliance history with regards to procedural adherence, CNSC staff determined that Cameco failed to verify that work was being performed correctly in accordance with approved procedures. This activity was required by Cameco's management system

and is outlined in PHCF's Licence Conditions Handbook.

As a result of the inspection findings, and based on the evidence provided, a CNSC designated officer issued an administrative monetary penalty, or AMP, to Cameco in September, 2017. The purpose of the AMP was to promote Cameco's compliance with its management system and to deter future violations.

Cameco requested a review of the AMP by the Commission and sought a determination that Cameco did not commit a violation and, subsequently, requested to have the AMP withdrawn. The Commission review of the AMP was held in March, 2018. The Commission rendered its decision on the review and determined that Cameco committed the violation. In June, 2018 Cameco paid the full amount of the AMP.

Additional details on the AMP are provided on the CNSC website and in CMD 18-H100.

As a result of this event, CNSC staff increased its regulatory oversight activities with regards to the management system SCA.

In November 2018 CNSC conducted a focused inspection on the corrective actions from the release event. CNSC staff confirm that the three corrective actions have been implemented to address the two root causes identified. CNSC staff will continue to monitor

oversight practices during future inspections.

As presented in the Regulatory Oversight Report, CNSC staff are satisfied that Cameco continues to protect the health and safety of workers, the public and the environment.

This concludes the section on Port Hope Conversion Facility.

I will now discuss Cameco Fuel Manufacturing facility.

Cameco Fuel Manufacturing is a Class IB nuclear facility located in Port Hope, Ontario. Cameco's licence is valid from March 1st, 2012 to February 28th, 2022. Cameco Fuel Manufacturing receives UO<sub>2</sub> powder from the Port Hope Conversion Facility and manufactures fuel bundles used in CANDU reactors.

In 2017 there were no changes to facility operations or its Licence Conditions Handbook. The licensing basis of the facility was maintained throughout 2017.

In 2017 there were no regulatory limit exceedances and no lost-time injuries.

One radiation protection action level and one environmental action level were exceeded, which are described on the next slide.

In the second quarter of 2017 CFM reported



and exceedance of the facility's action level for whole-body dose to the CNSC. Cameco's investigation identified that the worker had undergone medical radiation treatment which was the primary contributor of the dose recorded on the dosimeter.

The second action level exceedance was measured for fenceline gamma dose in the third quarters of 2017. Cameco conducted an investigation and determined that the elevated measurement was due to increased radioactive material being stored at the nearby fuel storage building. To reduce the gamma dose rate at this location, a soil berm was installed in December 2017. This resulted in a decreased gamma level measurement at the same fenceline location, indicating that the soil berm has been effective. Fenceline gamma levels remained below regulatory limits throughout 2017 and no impacts to the public were expected as a result of this action level exceedance.

For both action level exceedances, CNSC staff reviewed Cameco's investigation and corrective actions and were satisfied with Cameco's response.

As presented in the Regulatory Oversight Report, CNSC staff are satisfied that Cameco implemented effective radiation protection and environmental protection programs at CFM to protect the health and safety of

workers, the public and the environment.

This concludes the section on Cameco Fuel Manufacturing.

The next slides will discuss BWXT Nuclear Energy Canada.

BWXT Nuclear Energy Canada, or BWXT, operates two facilities, one in Toronto and one in Peterborough, under a single Class IB nuclear facility licence. BWXT's licence is valid from January 1st, 2011 to December 31st, 2020. BWXT's licence authorizes it to produce uranium dioxide pellets in Toronto and produce and test fuel bundles in Peterborough. The Peterborough facility is also authorized to receive, repair, modify and return contaminated equipment from offsite nuclear facilities.

In 2016 the Commission approved the transfer of the operating licence from GE-Hitachi Nuclear Energy Canada to BWXT.

In 2017 there have been no changes to the operations at BWXT Toronto and Peterborough.

In 2017 there was one regulatory limit exceedance and no action levels exceedances or lost-time injuries at BWXT.

In August 2017 BWXT reported one occupational exposure event to the CNSC in which the

occupational exposure limit for beryllium was exceeded. This event was the subject of an Event Initial Report presented to the Commission in October 2017. More details on the event are presented in the following slide.

The event occurred at BWXT's facility in Peterborough and affected two workers. BWXT's investigation determined that the workers were wearing incorrect respirator filters during maintenance activities.

Occupational health and safety of Class IB nuclear facilities like BWXT are governed by the *Canada Labour Code*, which deals with handling of hazardous substances in workplaces. The *Canada Occupational Health and Safety Regulations* specify limits to which workers may be exposed to hazardous substances like beryllium in workplaces.

BWXT's current operating licence stipulates a value of 0.05 micrograms per cubic metre as the occupational exposure limit for workers to control hazards associated with beryllium particulates in the air. For this event BWXT determined that the air concentration of beryllium in the room where the task was being performed was at 0.26 micrograms per cubic metre, exceeding the occupational exposure limit for beryllium.

In response, BWXT has implemented several corrective actions related to procurement of filters

subsequent to this event and has proposed several improvements to its management system to prevent reoccurrence.

CNSC staff reviewed BWXT's investigation and were satisfied with the corrective actions. Additional details of this event, corrective actions and subsequent CNSC actions are detailed in CMD 17-M53.

This concludes the section on BWXT.

To summarize and as presented in the Regulatory Oversight Report, CNSC staff are satisfied that in 2017 licensees operating uranium processing facilities implemented effective programs to protect the health and safety of workers, the public and the environment. In addition, CNSC staff are satisfied that Cameco has made improvements to its management system at PHCF and continues to ensure the protection of workers and the environment.

I will now turn the presentation to Michael Young, who will discuss the performance of nuclear substance processing facilities.

**MR. YOUNG:** Thank you.

Good afternoon, President Velshi and Commission Members. My name is Michael Young and I am a Project Officer and Inspector in the Nuclear Processing Facilities Division.

Nuclear substance processing facilities

are different from the uranium processing facilities as their end products are not related to the nuclear fuel cycle for power reactors.

The products created by nuclear substance processing facilities have a variety of end uses such as:

- diagnosing and treating cancer;
- sterilizing items for sanitary reasons such as surgical gloves; and
- creating self-luminous emergency and exit signs for buildings and airplanes.

There are three Class IB nuclear substance processing facilities in Canada, all of which are located in the Province of Ontario. SRB Technologies is a gaseous tritium light source manufacturing facility located in Pembroke. Nordion is a health sciences organization that provides products used in the prevention, diagnosis and treatment of disease. Best Theratronics manufactures teletherapy machines, self-shielded irradiators and small cyclotrons. Both Nordion and Best Theratronics are located in Ottawa.

The licence expiry dates and financial guarantee amounts for these facilities are shown on the table on the slide.

CNSC staff spent a total of 23 person days on licensing activities for the nuclear substance

processing facilities in 2017. A total of 409 person days were dedicated to compliance activities, including inspections and desktop reviews. CNSC staff performed a total of 11 compliance inspections at these facilities. All enforcement actions were recorded and are tracked in the CNSC Regulatory Information Bank.

For 2017 all of the nuclear substance processing facilities met CNSC requirements and received a satisfactory rating, with the exception of three SCAs that were rated as fully satisfactory for exceeding CNSC expectations.

In 2017 CNSC staff rated SRBT's fitness for service program as fully satisfactory as a result of SRBT's continuous improvements to its manufacturing processes equipment and revision of its maintenance program. SRBT proactively incorporated best industry practice.

Nordion received a rating of fully satisfactory for environmental protection due to its continual low environmental releases and the licensee's commitment to the ALARA principle. Nordion's security protection was also rated fully satisfactory due to its continual improvements and ability to effectively maintain the program.

Overall, these ratings indicate adequate

management of safety and control measures at all facilities.

The graph on this slide shows the 2017 average and maximum effective radiation doses to nuclear energy workers for the three facilities. The red line represents the regulatory annual effective dose limit of 50 mSv for a nuclear energy worker.

As illustrated, the average and maximum effective dose received by workers at each of the facilities was well below the regulatory limit. This data demonstrates that doses to workers at nuclear substance processing facilities are safe and that the licensees' radiation protection programs remain effective.

This slide provides the dose to the public from each nuclear substance processing facility from 2013 to 2017. Doses to the public from all nuclear substance processing facilities continued to be well below the regulatory limit of 1 mSv per year. Note that public dose estimates are not provided for Best Theratronics because its licensed activities involved sealed sources and there are no discharges to the environment.

This slide outlines the trend of lost-time injuries within the past five years. As shown in the table, the number of lost-time injuries at the nuclear substance processing facilities in 2017 was low and

decreased compared to 2016. CNSC staff continue to review corrective actions taken by licensees to ensure that injuries are prevented.

Now, we will look at the three nuclear substance processing facilities in more detail, starting with SRB Technologies, or SRBT.

SRBT is a Class IB nuclear facility located in Pembroke, Ontario. Its licence is valid from July 1st, 2015 to June 20th, 2022.

This slide illustrates some of the items that are manufactured at SRBT, including exit signs, aircraft signs, safety markers and raw light sources.

In 2017 there were no significant process modifications to SRBT's facility. There were no changes to the Licence Conditions Handbook and the facility was maintained according to the licensing basis.

This figure provides the 2017 average groundwater monitoring data near the SRBT facility. The tritium concentration pattern observed in this slide is reflective of aerial deposition rather than groundwater migration. During rainfall, tritium in the air is transferred to the groundwater and decays before it is able to travel very far. This means that tritium concentrations are expected to decrease from what is observed today.

As indicated by the yellow boxes, the



highest tritium levels in groundwater occur adjacent to the facility. CNSC staff note that these wells are sealed monitoring wells and are not used for drinking water.

Tritium concentrations near residential areas and the Muskrat River are very low, as shown by the green boxes.

Tritium values in wells located in the residential area have reduced below 200 Bq/L, which is well below the provincial drinking water standard of 7000 Bq/L. These residences in this figure are connected to the municipal water supply, which is fed from the Ottawa River, where tritium is near the detectible limit of 5 Bq/L.

CNSC staff conclude that residents in the area and the Muskrat River remain protected.

In 2017 SRBT had no regulatory limit or action level exceedances with regards to radiation protection and environmental protection.

SRBT experienced three lost-time injuries. As a result of the increase in 2017, CNSC staff rated the conventional health and safety SCA as satisfactory compared to fully satisfactory in previous years. CNSC staff were satisfied with SRBT's corrective actions and determined that despite the increase in lost-time injuries, SRBT continues to implement an effective conventional health and safety program.

CNSC staff are satisfied that SRBT has adequately controlled radiation exposures and environmental releases and continues to implement an effective maintenance program. SRBT continues to protect the health and safety of workers and the environment.

This concludes the section on SRBT.

I will now discuss Nordion (Canada) Inc., or Nordion.

Nordion is a nuclear substance processing facility located in Ottawa, Ontario. Nordion manufactures sealed radiation sources used in cancer therapy and irradiation technologies, and a variety of medical isotopes used in nuclear medicine. The satellite photo on the right-hand side of this slide shows both the Nordion and Best Theratronics facilities as they are directly adjacent to one another. Nordion's facility is highlighted with the red box. Nordion's licence is valid from November 1st, 2015 to October 31st, 2025.

As shown on the slide, Nordion manufactures sealed radiation sources for medical and industrial applications, and processes unsealed radioisotopes for health and life sciences applications.

In 2016 Nordion made the business decision to cease production and sale of iodine-125, iodine-131 and xenon-133. There was no impact to Nordion's environment or

health and safety programs as a result of this change.

There were no changes to the Licence Conditions Handbook in 2017 and CNSC staff determined that Nordion maintained the facility according to the licensing basis.

CNSC staff note that in 2018 BWXT announced the commercial acquisition of Nordion's medical isotopes business. From a regulatory perspective, Nordion remains responsible and accountable for the entire Nordion facility and its workers.

In 2017 Nordion had no regulatory limit or action level exceedances and there were no lost-time injuries. CNSC staff are satisfied that Nordion has adequately controlled radiation exposures and protects its workers.

Nordion has implemented an environmental protection program and a security program that exceed requirements.

This concludes the section on Nordion.

I will now discuss Best Theratronics Ltd., or Best Theratronics.

Best Theratronics is a nuclear substance processing facility that is also located in Ottawa, Ontario, directly adjacent to the Nordion facility. The photo on this slide now shows the Best Theratronics

facility highlighted in the red box. Best Theratronics' licence is valid from July 1st, 2014 to June 30th, 2019. This slide shows an image of a cyclotron manufactured by Best Theratronics.

In 2017 there was a change to the *Licence Conditions Handbook* to reflect a change to the financial guarantee. Otherwise, CNSC staff determined that Best Theratronics maintained the facility according to the licensing basis.

This slide summarizes the closure of an enforcement action and an associated licence amendment in 2017.

Best Theratronics revised its preliminary decommissioning plan, which included a revised decommissioning cost estimate of \$1.8 million. The Commission accepted the financial guarantee, amended Best Theratronics' licence and closed the order that had been issued in July 2017. For more information, refer to Commission Member Document 17-H103.A.

Best Theratronics is now in compliance with its financial guarantee licence condition.

In 2017 Best Theratronics experienced no regulatory limit or action level exceedances. Due to the nature of its activities, there are no environmental action levels for Best Theratronics' facility.

There was one lost-time injury in 2017 where an employee cut their thumb on a sawmill. CNSC staff reviewed and confirmed Best Theratronics' corrective actions in response to the incident.

This concludes the section on Best Theratronics.

In summary, CNSC staff conclude that licensees operating nuclear substance processing facilities have adequate measures to protect the health and safety of workers, the public and the environment.

I will now turn the presentation back to Dr. Caroline Ducros.

**DR. DUCROS:** Thank you.

Caroline Ducros, for the record.

The following slides present an overview of the CNSC's Participant Funding Program and of the interventions received regarding the Regulatory Oversight Report.

The CNSC offered a total of up to \$25,000 of participant funding, or PFP, to assist members of the public, indigenous groups and other stakeholders in reviewing this Regulatory Oversight Report. Participant funding is intended to enable recipients to provide new, distinctive and valuable information through informed and topic-specific written or oral submissions to the

Commission.

The CNSC received four written interventions for the Regulatory Oversight Report. The two PFP recipients were Canadian Environmental Law Association, CELA, and Sagamok Anishinabek First Nation.

Interventions were also received from the Canadian Nuclear Workers Council and Northwatch.

The key themes identified in the interventions are listed on this slide, and we will address each of these themes in the following slides.

CNSC Staff's more detailed disposition of the comments received is provided in Annex 2 of this presentation.

CELA expressed concerns regarding the availability of licensee documents such as their environmental protection programs, waste management programs and preliminary decommissioning plans. In response to a request by CELA during their review, CNSC staff provided the licences, Licence Condition Handbooks and redacted environmental risk assessments for all of the applicable facilities.

CELA also requested program documents directly from the licensees.

CNSC staff note that all the licensees discussed in this ROR post their annual compliance reports

on their public web sites. These reports include information on environmental monitoring and waste management activities.

Since waste management programs and preliminary decommissioning plans may contain proprietary information, these are not always shared publicly. However, some licensees chose to provide these documents to the public.

CNSC staff recommend that interested parties contact licensees directly to obtain these documents.

A principal recommendation from CELA is that future regulatory oversight reports report on waste management safety and control area. The Regulatory Oversight Reports include the ratings for all 14 safety control areas as CNSC Staff annually assess the performance ratings for all SCAs for each facility.

The Commission accepted the approach to focus on the following three SCAs: radiation protection, environmental protection and conventional health and safety since these provide a good overview of licensee performance across all SCAs.

It should also be noted that any changes such as improvements or deteriorations of licensee performance in any other SCA would be reported in the

Regulatory Oversight Report.

The licensees report annually on the status of waste management at their facilities through submission of their annual compliance reports, which are posted on the licensee's web sites. CNSC staff also conduct inspections with focus on the waste management SCA to verify the implementation of the licensees' waste management programs and the information provided in the annual compliance reports.

In addition, Canada is a contracting party of the IAEA's Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. As such, every three years the CNSC on behalf of Canada tables a national report on waste management practices and activities in Canada. This comprehensive report is peer reviewed by international counterparts.

Canada's national report, the accompanying presentation and responses to questions raised by the peer review are available on CNSC's public web site.

In response to CELA's comment regarding inspections, CNSC has adopted a risk-informed approach to compliance. Compliance plans have been developed for each facility that cover all 14 SCAs.

While different SCAs are inspected in a given year, additional inspections can be conducted if



warranted by licensee performance. Compliance verification involves more than just inspections.

In addition to performing environmental protection inspections, the CNSC ensures compliance with licensees' programs by performing desktop reviews.

CNSC staff review licensees' annual and quarterly compliance reports to ensure no licence limits are exceeded and that licensees are in compliance with the requirements established in licence and Licence Condition Handbooks.

CELA noted that for all of the facilities included in this ROR, environmental releases are very low and recommend that lower licence limits should be established to ensure that variations in emission releases are detected.

CNSC staff note that release limits are set at levels that are protective of the public and the environment. Variations in emissions are detected through monitoring and reporting.

As part of annual reporting, licensees are required to monitor and report their trend analyses. Exceedances of action levels would be reported to the CNSC.

CNSC acknowledged that the licence limits can be much higher than the releases at certain facilities. The upcoming REGDOC 2.9.2 on environmental protection will

address licence limits and action levels.

The Sagamok First Nation have recommended improvements to CNSC and licensee engagement and outreach activities. The CNSC recognize the value of community knowledge and Indigenous traditional knowledge and understands the importance of consulting and building relationships with Canada's indigenous peoples.

Sagamok First Nation recommended that Indigenous representation be directly involved in CNSC inspections and participate in compliance verification activities. While the CNSC does not conduct inspections with members of the public or Indigenous groups, the CNSC continues to encourage licensees to provide facility tours to interested Indigenous groups.

CNSC staff will make inspection reports available upon request.

CNSC staff will continue to explore opportunities to provide objective scientific information in a user friendly manner on the activities that it regulates and continue to meet with Sagamok First Nation to discuss any issues and concerns.

I will now pass the presentation back to Ms Haidy Tadros, who will present the conclusions on the regulatory performance of the uranium and nuclear substance processing facilities in Canada.

**MS TADROS:** Thank you. For the record, my name is Haidy Tadros.

So in conclusion, CNSC staff compliance activities during the 2017 calendar year have confirmed that with the exception of the management system safety and control area at the Port Hope Conversion facility, all 14 safety control areas were rated as satisfactory or fully satisfactory for uranium and nuclear substance processing facilities.

CNSC staff also confirmed that licensees' programs are implemented effectively to protect workers, the environment and the public, and that priority areas using risk-informed approach and verification activities have been maintained safely and securely.

CNSC staff have also confirmed that performance trends across the uranium and nuclear substance processing facilities are in the safe direction.

This concludes CNSC staff's presentation of the Regulatory Oversight Report. We thank you for your attention.

**THE PRESIDENT:** Thank you for the presentation.

We'll now take time off for lunch and we'll reconvene at 1:45 p.m. Thank you.

--- Upon recessing at 12:45 p.m. /

Suspension à 12 h 45

--- Upon resuming at 1:46 p.m. /

Reprise à 13 h 46

**THE PRESIDENT:** So we'll now give the licensees an opportunity to make an opening comments that they may have. And we'll start with Cameco Corporation.

So Mr. Mooney, any comments?

**MR. MOONEY:** Good afternoon, President Velshi and Members of the Commission. My name is Liam Mooney. I am Cameco's Vice-President of Safety, Health, Environment Quality and Regulatory Relations.

Joining me today is Tom Smith, our Director of Compliance and Licensing for our Fuel Services Division in Ontario.

We are joining you as part of your review of CNSC staff's 2017 Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities. We wanted to take the opportunity to emphasize that Cameco's highest priorities are the health and safety of our workers and the public along with the protection of the environment.

We also take pride in the quality of our processes that support these priorities.

Some of the Commission Members were able to experience this firsthand when you toured our Port Hope Conversion Facility earlier this year.

Cameco's strong performance in these key areas is demonstrated in the 2017 Regulatory Oversight Report. As one example, the Blind River refinery received a fully satisfactory rating in conventional health and safety for the fifth year. This is well deserved considering it has been more than 11 years since the facility had a lost time incident.

Our environmental performance continues to be strong, with extensive pollution control and emission prevention systems in place. Our facilities strive to improve environmental performance through setting annual environmental objectives and through the implementation of our programs.

For many years, Cameco has been dealing with challenging market conditions for refining and conversion services. Despite this, Cameco remains committed to the safe operation of our facilities and environmental protection during these significant economic pressures.

As such, while responding to increasing regulatory demands, we must focus on core activities that relate to worker and public safety and environmental

protection.

In 2017, we continued to engage with our key stakeholders near our operations through newsletters, community forums, our web site and attending community events. At our Blind River facility, this includes our near neighbour, the Mississauga First Nation.

We also respond to specific requests such as the request for facility tour made by the representatives of the Sagamok Anishinabek. We are proud of the high levels of public support and trust that we see in the communities where we operate.

We know that support is a product of both our strong operational performance and mature management systems that are assessed and verified by independent regulators with their subject matter expertise.

Thank you for the opportunity to speak today in relation to staff's report. We'll be available for any questions that you may have for us.

**THE PRESIDENT:** Thank you.

I'll next turn to BWXT Nuclear Energy Canada Inc. to see if they have any comments on the staff's report.

**MR. MacQUARRIE:** Good afternoon, President Velshi and Members of the Commission. My name is John MacQuarrie, and I'm President of BWXT Nuclear Energy

Canada.

With me today are Ted Richardson, Director of Fuel Operations, David Snopek, Director of Environmental Health and Safety and Regulatory, and Sara Forsey, Manager of Community Relations and Communications.

Twenty seventeen (2017) was the first full year of operation for BWXT in our fuel business, and we're very pleased with how the business operated under after the transition of ownership from General Electric Hitachi. Safety quality and production have all met or exceeded our expectations for the year.

For example, during the year there were no lost time injuries and no radiation or environmental action levels were exceeded.

In 2017 we maintained our safety ratings across all 14 safety and control areas, as was mentioned earlier this morning. Our Toronto site did not have any recordable injuries and received a BWXT internal safety award for best safety record -- one of the best safety records in the BWXT corporation when compared to our 11 manufacturing locations in North America.

We continue to engage actively with our communities and expand our public outreach program, and we're committed to operating transparently in our communities. And we appreciate the opportunity to make

these brief comments, and we look forward to answering any questions you may have.

**THE PRESIDENT:** Thank you.

I'll now turn the floor to SRBT Technologies Canada Inc.

Mr. Levesque, do you wish to make any comments at this point?

**MR. LEVESQUE:** Thank you very much, Madam President, and Members of the Commission. My name is Stephane Levesque. I'm President of SRB Technologies.

And to my immediate right I'm joined by Vice-President of SRB, Ross Fitzpatrick, and to my left, Jamie MacDonald, Manager of Health Physics and Regulatory Affairs.

And we're just ready to answer any of your questions you may have on the report. Thank you.

**THE PRESIDENT:** Thank you.

Next, the floor to Nordion (Canada) Inc. Mr. Brooks, do you wish to make any comments?

**MR. BROOKS:** Yes, thank you, President Velshi and Members of the Commission.

I'm Kevin Brooks. I'm the President of Nordion. And I'm joined here today with Richard Waasenaar, who is our Director of Regulatory and Environmental Health



and Safety.

Also Mr. Ron McGregor, who is our Vice-President and responsible for our contractor relationship.

We have Jennifer Mahoney, who is our Manager of Health Safety, and we have Shannon Lacasse, who is responsible -- who is our licensing specialist.

At this point in time, we have -- we are thrilled to be here and have an opportunity to participate in the hearing -- or the meeting, and we have no further comments at this time.

**THE PRESIDENT:** Thank you.

And I'll next turn the floor to Best Theratronics.

Ms Soleimani, do you wish to make any comments at this point?

**MS SOLEIMANI:** Good afternoon, Ms Velshi and Members of the Commission.

As mentioned in the CNSC Staff presentation, there has been no changes to the licensed activities and operations at Best Theratronics.

Best Theratronics continues to maintain its radiation protection, health and safety and environmental protection program in compliance with approved procedures and regulatory guidelines and licensing

conditions.

I'm glad to be here, and I'm available to answer any questions that the Members of the Commission may have.

**THE PRESIDENT:** Thank you.

We will now move to the written submissions filed by the intervenors.

And before we do that, I do want to make a comment on CELA's intervention.

In its intervention, CELA is, once again, raising the issue of procedural rights regarding it not being permitted to present orally and respond to questions while licensees have such an opportunity.

As I had stated at the Commission meeting on November the 8<sup>th</sup> in the context of CELA's intervention regarding the nuclear power plant regulatory oversight report, I do not wish for this public proceeding, which is to consider the 2017 ROR for uranium processing facilities, to become the place for discussion of systemic process issues.

The CNSC is currently looking into its processes and procedures, and CELA's concerns are being considered in this review.

I will note, as I did in November, that I do not have any concern that the Commission's treatment of

its intervenors gives rise to a reasonable apprehension of bias, perceived or real, on the Commission's part, nor do I have any concern that a duty of fairness has been breached as a result of the structure of today's process.

**CMD 18-M47.1**

**Written submission from the  
Canadian Nuclear Workers' Council**

**THE PRESIDENT:** So the first submission that we will address is from the Canadian Nuclear Workers' Council as outlined in CMD 18-M47.1.

Are there any questions regarding this submission?

**CMD 18-M47.2**

**Written submission from Northwatch**

**THE PRESIDENT:** Not having any questions on that one, we'll turn to the next one, which is from Northwatch as outlined in CMD 18-M47.1.

Any questions?

Ms Penney.

**MEMBER PENNEY:** It's a general question that they raise and also I was going to ask about it. I

think it's on page 29 and page 30.

It's about the tritium contamination. I think it's SRB.

Two wells in the ground water, highly elevated. And their question has to do with, is it transitioning off site, contaminating outside of the fence line, and is it getting in the municipal water system.

Are the pathways -- are the wells themselves a pathway for contamination?

I think it's on page 29 or 30.

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

So perhaps SRBT can take the first part of the answer and CNSC staff can confirm and provide any further details on that.

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

The tritium contamination result from historical emissions that have happened a number of years ago, and they -- there's an underground water flow, but it takes several years before it reaches the fence line of SRB Technologies, and by the time it reaches it, it's well below the drinking water limit.

We have a network of wells -- I'll get someone to second my question -- that monitors to make sure that there's no increase and the concentration in all the

wells have been decreasing steadily in the last number of years.

I'll pass it on to Jamie MacDonald.

**MEMBER PENNEY:** Can I ask the historic contamination, was it five years ago, 10 years ago? Was it contaminated tritium, contaminated water that was released to ground? Is that what's --

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

It resulted mainly from historical air emission that deposited themselves onto the ground from the inception of our facility in 1990 to approximately early 2000s where, since then, their emissions have reduced to less than 97 percent of the emissions that we had then, so any other fraction of the emissions that we had at that time.

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

Perhaps I'll ask Mr. Andrew McAllister to provide CNSC staff's perspective of the tritium values there.

**MR. McALLISTER:** Andrew McAllister, Director of the Environmental Risk Assessment Division.

It would -- if we can get the figure up, I think that might help everyone with respect to walking us through these different wells and different types of wells

and what we're seeing up there, perhaps paint the whole picture.

So as we look at this picture, I just want to point out a couple of important things. And I believe Dr. Ducros and her team sort of highlighted some of these.

But the two wells highlighted in yellow are monitoring wells. They're capped. They're not used for drinking water; strictly monitoring, right below the facility.

As we move in this picture roughly to -- from left to right, we venture towards the Muskrat River. That's the flow of ground water in this area.

And as we see, the values quickly drop off as we move towards the Muskrat River.

With the Muskrat River, that value there is just above the detection limit, so we're confident in that the Muskrat River is protected, as is the Ottawa River.

When we look at some of the other wells highlighted in green, we go a bit further down in that picture, one of them that was highlighted by one of the intervenors of the 113 Becquerels per litre, again as Mr. Levesque has indicated and as what we have verified is the values that we're seeing in these ground water wells are attributed to airborne deposition. It's not a case of this

historical legacy moving through the ground water and contaminating drinking water. That's far from the truth.

And we had done -- when -- around the time when these concerns were raised, this would really help launch the tritium studies that were done.

We were in front of you last year in November to update you on the results of that where this was an area that was extensively looked at from a human health perspective looking at produce and other aspects to verify that though the releases were high historically, they weren't posing a risk to the environment.

And with the improved controls on releases, the very robust groundwater monitoring program in place, as we said, things are trending and stable and we continue to have that oversight moving forward.

**MEMBER PENNEY:** Mr. McAllister, I wasn't here last November, so perhaps you can give me like the Coles Notes version of the tritium studies. That'd be really helpful.

**MR. McALLISTER:** Okay. The tritium studies was sort of launched around that time at the direction of the Commission, and ended up looking at sort of a lot of different facets around tritium science in general. So I made reference to a couple of aspects. One was we ended up -- a total of seven reports were developed

out of that along with a synthesis report with some recommendations for further work.

So that original body of work -- and I might be missing a few of these -- include looking at what are the existing standards and guidelines out there around tritium, an examination of -- in the Pembroke area around produce and dose to public, looking at the atmospheric pathway for tritium, the environmental fate of tritium, and there might be a few others that admittedly I'm missing right now.

There is then subsequent follow-up work that had been done looking to try to better understand how organically bound tritium was moving through different environmental components, looking at aspects such as the types of samplers that were being used to sample tritium, passive versus active. And again, we had updated the Commission at different points on that and really wrapped it up last November sort of again to update them on what the other advances we had done around tritium science and where we saw things going.

So all to say is that given the facilities that we regulate, tritium will always remain an area of regulatory interest for us, and we'll continue to remain abreast of the latest developments and we anticipate being back in front of you to give you updates on those matters.



**MEMBER PENNEY:** Thanks. And you're comfortable that the contamination is stopped and that the monitoring is tracking where it is?

**MR. McALLISTER:** That's correct. We're comfortable with the -- both the groundwater monitoring that they have in place, there's the annual dose to public that's showing no risk to humans, and certainly our licensing staff can comment on whatever inspections or compliance that they're doing around the actual controls that are in place. But overall, from -- at least from a risk assessment perspective, which is what my division's mandate is, we're satisfied.

**MEMBER BERUBE:** I'm looking at page 4 of the report here, and they state --

**THE PRESIDENT:** Oh, sorry, I think Mr. Levesque wanted to add something to it.

**MR. LEVESQUE:** I'm sorry to interrupt. Stephane Levesque for the record.

Just to give you a bit more of a historical snapshot, when we first did the groundwater study and we had all the wells that we have now in 2007, at that time we had -- of all these wells that we had, and we had about 50 of them, there's 10 of them on site that were over the drinking water level. And since then, find yourself in 2018, there's two that are over the drinking

water limit and one that is just slightly over, and once the 2018 average will be done, will be just under. So you look at starting 2019, where only one of these 10 wells that were above drinking water limit. So it's flushing its way out slowly but surely. Thank you.

**THE PRESIDENT:** Thank you.

Mr. Berube.

**MEMBER BERUBE:** Yeah, I'm looking at the report, page 4, from Northwatch here. A question for Cameco. One of the things they point out is that of five environmental objectives, four were accomplished, one was cancelled. That particular item was an incinerator sampling point that was looking at the location of the sampling was to be changed. And the question is, you know, why did you decide to cancel that? Could you please elaborate?

**MR. MOONEY:** Sure. It's Liam Mooney, for the record.

In relation to that particular piece, we did successfully make modifications to improve the analyzer performance. And after we did that, moving the sampling location was no longer required and we cancelled the objective.

**THE PRESIDENT:** Anyone else? Dr. Demeter.

**MEMBER DEMETER:** Thank you. I'm looking

at Northwatch's intervention on page 6. And this is for CNSC staff to help better frame a risk message.

So in one of their bullets, which is the third bullet of the page, they're talking about the statement such as -- and this isn't for any particular site, just a generic, I guess --

"the IEMP results indicate that the public and the environment in the vicinity surrounding [in this case] the BRR site are protected and safe."

And Northwatch are saying that that maybe too definitive a statement.

I think context is important, that the IEMP is one factor of a larger program. And I think it's important perhaps for staff to respond to the intervenor's concern that the environment and individuals are protected and safe, what that's based on beyond the IEMP, so that people have some assurance that it's not a very limited sampling that drives that relative safety statement.

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

Yes, that is correct. The independent environmental monitoring program is CNSC's own program that's taking samples outside the licensed area. In addition to that, the CNSC reviews samples that are taken

by the licensees themselves, and we have inspections on the sites. We review the compliance reports and any other technical documents that the licensee may have committed to. So it is -- the compliance aspect is not the IEMP, it's the inspections and desktop reviews.

**THE PRESIDENT:** Dr. Lacroix.

**MEMBER LACROIX:** In the Northwatch submission, on page 14, according to Northwatch, the waste minimization should not be discretionary, but it should be a requirement of the licensing process. Staff, is it a good suggestion? Is it feasible? Is it reasonable?

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

So I'll ask my colleague Karine Glenn to provide further details.

One thing of note, though, is within the waste management area, safety and control area, we have specific areas that we look at, and waste minimization is one of those specific areas that are maintained within an effective waste management program.

And perhaps Karine can elaborate on the expertise and the assessments that staff use when they look at waste minimization.

**MS GLENN:** Good afternoon. My name is Karine Glenn, and I'm the director of the Wastes and Decommissioning Division of the CNSC.

So the CSA standards which are used and referenced in many of the licensees' Licence Conditions Handbook, and which we use as a criteria, if you'd like, for verification of the licensees' waste management programs, does have waste minimization as a requirement.

What we don't -- we don't impose a level to which they must minimize the waste, because that will vary greatly from licensee to licensee also based on what is economically feasible as well, and nor do we dictate how they do the waste minimization. However, every time we review a waste management program, that is one of the basic principles that we will always look at.

We are in the process of drafting a new regulatory document for the CNSC which is waste management programs and which will enshrine within the CNSC framework itself the principles that are to go behind a waste management program. And that definitely includes waste minimization.

**MEMBER LACROIX:** Thank you.

**THE PRESIDENT:** I wanted to once again compliment staff for the way you have dispositioned comments from the intervenors. It's extremely helpful to make sure that all their concerns have been addressed and that we have a more complete record.

There are a couple of suggestions which --

actually it was Mr. Berube who made them -- was for instance where in Northwatch they ask for more information around waste or some other areas. You have in your disposition said, Well, this information is available on the licensee's website, for instance, or in our report -- the convention report. Why not just provide a hyperlink and make it easier for doing so? So I think that's a great suggestion.

I have a question for Cameco. For the Blind River refinery, where Northwatch asked for the production levels, and the staff's disposition is that that's proprietary information. And I guess what the intervenor was getting at, is there a correlation between the production level and the emission levels? Is there a direct correlation?

**MR. MOONEY:** It's Liam Mooney, for the record.

And there is a relationship between production and those levels. It's not a direct relationship. We would expect to see some variability in that regard as well. And things change over time in relation to the pollution control mechanisms that are in place with respect to the facility. So that's also impacting it.

But to answer your question, yes, there is

a relationship.

**THE PRESIDENT:** Thank you.

Anyone with any other questions around Northwatch? No? Okay.

**CMD 18-M47.3**

**Written submission from the  
Canadian Environmental Law Association**

**THE PRESIDENT:** Then the next submission is from the Canadian Environmental Law Association, as outlined in CMD 18-M47.3.

Questions? Dr. Demeter.

**MEMBER DEMETER:** Dr. Demeter. So I just wanted to probe a bit, and I saw the disposition from the staff on this issue about CELA's request for the environmental protection plan, and they listed what the responses were per licensee.

And I wanted to get a sense, is this a standard document that is released to CNSC as a request? Is this an in-house document that is not necessarily part of a standard document that's sent to CNSC as part of the licence application or renewal? And I'm trying to get my head around what would be proprietary over an environmental protection plan that could not be redacted to allow some

transparency.

So perhaps I'll pick on Cameco, because they're on top of the list here. Give me a sense of what this document is and what may be proprietary about it that it couldn't be released or it couldn't be released in a redacted format. And then I'll get staff to comment on how this document fits into the licence application process or renewal.

**MR. MOONEY:** It's Liam Mooney, for the record.

We had a chance to discuss this sort of peripherally yesterday, but on those program-level documents, we invest a good deal of time and energy developing them. We have seen an increased level of interest from competitors, not necessarily in this space, but in the uranium mining space asking for our documents using the ATIP process. So in that context, we are able to respond and redact documents, having regard for the balancing of interests that inherent to the access to information process.

So the other piece I would offer there is in relation to the consideration of what the rules are in relation to the documents that we've submitted. And I touched on REGDOC 3.2.1, and that talks about the public information program and what the expectations are for



licensees. That was just recently published in that regard. And in that conversation, did not talk about pushing your programs out further than that.

So we feel that between the ATIP process provides a rigorous means of testing the process. We recognize that might not be ideal for the intervenors, but we also feel that given the proprietary information that is included in many of those program-level documents that that's the right course for us.

**MEMBER DEMETER:** So maybe from staff, is there a way that an intervenor could understand the environmental protection approach of the licensee without getting hold of this document, perhaps? I'm just trying to understand where this document fits into the documents you receive.

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

So for a licence to be issued, there's certain documents that we require, and one of those is the environmental protection program. We have the waste management programs and the preliminary decommissioning plans. And the reason why I mention all three is because the intervenor asked about all three programs.

We need to receive those and review them and accept them before a licence will be issued. And so

during the licensing hearings, those are the documents that we'll be referring to and those are documents that we'll give more detail on in the Commission Member Document.

Some of the information that supports those documents -- well, in this case it's the environmental protection program that you asked about -- would be elements like the environmental risk assessment. And in that case, some licensees post those on their websites, and others don't.

But this intervenor asked during their review to have copies of the environmental risk assessments for six out of the seven facilities that require them. And in some form or other, those were all supplied. Some of it was redacted for proprietary reasons.

And in the future, that will be a requirement under the information and disclosure REGDOC 3.2.1, that the ERAs are readily available.

So I sort of mixed sort of the underlying information that supports the environmental protection programs with the programs themselves, which are not necessarily always readily available.

**MR. MOONEY:** It's Liam Mooney, for the record.

And we have -- when you talk about coming halfway, we have developed summaries of some of the key

documents. And when they are prepared, we post them. So for example, on the preliminary decommissioning plans, we've developed summaries for our facilities and we post those, given some of the concerns around the confidential information that is the full PDPs.

**DR. DUCROS:** And if you don't mind, I would like to clarify in terms of the Commission Member Document that I referenced earlier for the licensing hearing, we do synthesize all that information in an environmental assessment report, whether that be a *Canadian Environmental Assessment Act* EA or an environmental assessment under the *Nuclear Safety Control Act*. So that information is synthesized and presented in that format at the licensing time or renewals.

**MEMBER DEMETER:** So I think I get an understanding that the time and energy you spent on developing the document is like a company producing policies and procedures. They don't want them just to be copied and used somewhere else, because of your investments into them.

Is there a comment from any of the other licensees on this issue that -- you know, perhaps BWXT, because they're second on the list.

**MR. MacQUARRIE:** John MacQuarrie, for the record.

So our response to this intervenor was that although we don't release those documents, we would be willing to answer specific questions. And so we invited those, but we did not receive any. And so you know we are trying to address specific concerns, but much like Cameco's view, we view some of the information in those documents as proprietary and we don't view that -- and they're targeted more for our internal use and for the Commission and not meant as a public document. And so we don't see that there'd be a great deal of value in providing those. But we are willing to answer specific questions and meet with concerned parties if that's necessary.

**MEMBER DEMETER:** Okay. And Nordion?

**MR. BROOKS:** Kevin Brooks, for the record. I'd like to invite Richard Wassenaar to comment.

**MR. WASSENAAR:** Richard Wassenaar, for the record.

Similar to Cameco and BWXT, we've taken a similar stance. Again, some of those program documents do contain some proprietary information. But like with BWXT, when we spoke with Northwatch -- with CELA, we also sought to seek what specific information they were looking for and would be more willing to share something more specific than the general documents that we had. Again, we would

continue to be open to sharing specific information that they would seek as oppose to the general documents. Thank you.

**MEMBER DEMETER:** And Best Theratronics is listed as not responding to the request.

**MS SOLEIMANI:** Mojgan Soleimani, for the record.

Unfortunately, I did not receive the request. I understand that it might have been sent to our general mailbox. When I received the intervenor's document, I started an investigation to find out which email they have used and where the request went.

However, we provided the environmental risk assessment to the CNSC staff as per request. We redacted some information, but we provided the environmental risk assessment to the CNSC.

**MEMBER DEMETER:** Okay, thank you. And I noted that SRBT released the information, so. Thank you.

**THE PRESIDENT:** Anyone else with any ...? Go ahead.

**MEMBER PENNEY:** Question for staff. CELA takes issue with the IEMP, the independent environmental monitoring program, the frequency and the detail. So my question really is, is -- I'm assuming it's a risk-based frequency -- but do you publish in advance what facilities

you're going to do the independent environmental monitoring at in the upcoming year? And the data that they're seeking, is that available on the CNSC website?

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

To give my colleague Kiza Sauvé some time to get positioned, she will be answering that question.

**MS SAUVÉ:** Kiza Sauvé, for the record.

I'm the director of the Health Science and Environmental Compliance Division.

That is a question we haven't gotten on the IEMP, and no, we have not at this time posted those on our website.

Once the decision is made as to which facilities we do go to -- and you're right, it is on a risk base. We look at what licensing hearings are coming up; we look at creating a baseline for all the facilities; we look at Indigenous engagement requests. So usually the decision for the next year's sampling happens in around December or January.

And once that decision is made, we do inform the licensees; we inform Indigenous communities; and then when we get closer to the sampling time, we inform municipalities and surrounding areas so that they know we'll be in the community. But at this point, we don't post on our website as to where we're going that year.

**MEMBER PENNEY:** And the data that they're looking for, the details, are they on the website?

**MS SAUVÉ:** Kiza Sauvé, for the record.

All of the details are on the website, and there's also a link where you can request a technical report as well.

**THE PRESIDENT:** Anyone else? Okay, Dr. Lacroix.

**MEMBER LACROIX:** According to CELA, action levels are licensee-specific, and they may -- well, they depend on the operational and radiological conditions. CNSC, could you comment on this?

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

That is correct. Action levels are set by the licensees, and as was noted yesterday, CNSC staff do review action levels and provide questions or offer comments in terms of why action levels are placed the way they are. But ultimately, action levels are based on operational considerations that each licensee has, and that is why each action level per licensee is set at different places.

**MEMBER LACROIX:** Thank you. Thank you for your answer.

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

**CMD 18-M47.4**

**Written submission from the Sagamok Anishnawbek**

**THE PRESIDENT:** And the last submission we have is from the Sagamok Anishnawbek, as outlined in CMD 18-M47.4.

We did review this yesterday, but see if there are any additional questions for the facilities we're reviewing today. Any questions?

Ms Penney.

**MEMBER PENNEY:** So for staff, as we discussed yesterday, one of the points that they made was that in the communities people aren't aware of the CNSC or the role of the CNSC. And we had some conversation yesterday about our participation in the communities, but I think it's worth repeating here what you plan to do going forward to strengthen the relationship.

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

Our plan right now is to go back to Sagamok First Nation in the coming months when they're available, and start talking about a specific work plan with them based on their intervention that you have before you, and talk about what their priorities are.

And obviously, we have a lot of work to do based on their survey results indicating that there isn't a



lot of awareness of CNSC and nuclear activities in their territory. So I think starting to build some general awareness of the CNSC and the work that we do is a great starting point, and then going from there to see how we can better integrate them into some of the regulatory work we're doing in their area.

**THE PRESIDENT:** I think the survey instrument they used was also a good one, that maybe we, you know, CNSC staff should consider or something of that form, kind of a before and then down the road to see how much better people are aware of the CNSC and what it does.

Okay. Thank you. So that takes care of all the interventions. Open round of questions. Any other issues that have not been addressed, anyone?

Mr. Berube.

**MEMBER BERUBE:** So this is for Cameco Blind River, actually. I was surprised to hear during the Staff presentation that the Cameco refinery is actually processing uranium from other countries. Is that true?

**MR. MOONEY:** Liam Mooney, for the record. Yes. Blind River Refinery processes uranium ore concentrates from around the world. The bulk of them do come from Northern Saskatchewan when we are producing, but it does do that service for customers from Kazakhstan, Australia, et cetera.

**MEMBER BERUBE:** Just out of curiosity, because it gives me an idea how much flow that we're talking about. What's the annual volume of international processing? Do you know off the top of your head?

**MR. MOONEY:** Liam Mooney, for the record. Thirty to 40 per cent of the Blind River throughput is from outside Canada.

**THE PRESIDENT:** Dr. Lacroix.

**MEMBER LACROIX:** Thank you. That concerns the ROR. The strong point is the reply to the intervenors at the end of the report. I think it's very informative and it answers many of my own questions, so I really appreciate. Also, the format, questions and answers, that's a very good idea, so I would like you to keep it for future RORs.

The weak points, if you could put slide 22 please -- slide 20, I'm sorry. Is it slide 20? No. Oh there, right.

The dose to the public. Again, I'm repeating what I said yesterday. When I look at these numbers these are measurements or calculations, but in both cases these numbers are not absolute. So what I would like to see is the uncertainties on these numbers, I would gain confidence in these numbers. For instance, .005 mSv per year. What is the error on this number, plus or minus .005

or plus or minus .00000-something? This is what I would like to see.

Also on slide 63, you show the activity around Pembroke. Now, when I look at these numbers, once again if I look at the activity in the Muskrat River the activity is 6 becquerels per litre, and the detection limit is 5 becquerels per litre. What does it mean in the sense that -- well, it means that it's a low count, but on the other hand I do not have confidence in these numbers. So I'd like to see the uncertainty.

**MS TADROS:** Haidy Tadros, for the record. Noted. I believe we had taken that comment yesterday as well, and where there are estimates we will ensure that there are the uncertainty bars that are included, and where there are averages we'll include the uncertainty bars as well.

Perhaps I'll ask Ms Christina Dodkin from Radiation Protection to provide a little bit further clarity on doses to the public.

Kiza Sauvé.

**MS SAUVÉ:** Kiza Sauvé, I'm the Director of the Health Science and Environmental Compliance. It's actually a common confusion that dose to the public fits in the environment division, and that's because it's the environmental releases that contribute to the dose to the

public.

In terms of further clarity, I'm not sure -- I mean, the numbers are -- what we're looking at are extremely low, right, compared to the 1 mSv. So that's kind of the main message that we're trying to show on here.

If we want to get into further -- you know, showing the air, showing the range, it will make the slides quite busy and we're trying to balance that, you know, public-friendly slides. So maybe it's something we -- I would suggest we look at in the CMD. But it would add a lot of numbers onto the slide if we start showing those.

**THE PRESIDENT:** Ms Penney.

**MEMBER PENNEY:** Page 63 of CMD 18-M47 with respect to the Port Hope Facility, Cameco. It's a gamma dose exceedance at the fence line. So I was just curious. So are these air emission samplers at the fence line, and it only exceeded -- it exceeded the action level, and you took action, I just want you to run me through what you did and why it would have solved it?

**MR. SMITH:** For the record, Tom Smith. That event occurred at our Cameco fuel manufacturing facility. We had seen increasing trends in gamma at that particular receptor, which is a dosimeter mounted on the fence line, and we had already started and commenced

engineering necessary to put up a shield berm to be able to attenuate that reading at that.

Unfortunately, we didn't get the engineering and the construction done until we exceeded the action level. But since that time the levels have dropped significantly, indicating the remedial action we took during that was successful.

**MEMBER PENNEY:** So the berm is a shield?

**MR. SMITH:** Yes, it is.

**MEMBER PENNEY:** What's it shielding?

**MR. SMITH:** There's finished fuel bundles in a bundle storage facility that's in fairly close proximity to that area.

**MEMBER PENNEY:** Okay. Thank you.

**THE PRESIDENT:** Mr. Berube.

**MEMBER BERUBE:** So this question is for Cameco on the Port Hope Facility. Actually, I think it's more appropriately addressed to the CNSC staff. The management system violation. You mentioned that there was two root causes that needed to be corrected.

Would you mind elaborating on what those root causes are and what the resolution was please?

**MR. JONES:** Mike Jones, Senior Project Officer, for the record. After the event happened in May 2017 Cameco hired a consultant to identify what the root

causes were the event were.

The root causes were the maintenance work and management process allows identification of permits to be left to the execution step immediately prior to the tradesperson performing the task and inadequate management direction, reinforcement, monitoring, and feedback of employees, expectations in regard to the task analysis and safety card task and safety clearance process. So those were the root causes.

Cameco has set-up or identified three corrective actions to correct those problems. So the first corrective action was to develop an improved maintenance practice for assigning work to shift maintenance employees. Because the event that happened was on the night shift and there was an issue with transferring maintenance workers to the night shift.

The second corrective action was related to the cards I mentioned, the task cards, and related to looking at the way the system was set up, separating out the timesheet aspect of it, adding more to the task cards, and improving the way that the hazards were identified.

The third item was related to the assessment of the site's audit program. So they assessed the site's audit program and essentially set-up a new program to do assessments of tasks both during the day

shift and the night shift. So that's what Cameco did.

What CNSC staff did was in addition to reviewing the submissions from Cameco we went on site in 2018 and we verified implementation of all these corrective actions and saw that improvements had been made. So thank you.

**THE PRESIDENT:** A question for SRBT on your safety performance last year with your three lost time injuries. Do you want to comment on those? Are there any common causes there? How are you changing awareness and any changes to your safety program itself as a result?

**MR. LEVESQUE:** Stephane Levesque, for the record. Thank you for the question. I'll answer the first part and then I'll Jamie MacDonald answer the second part.

First, we took those increases very seriously because we hadn't had a lost time injury at our facility in a number of years. We've instituted some controls in place and to make sure that this wouldn't reoccur again.

Jamie will discuss the details, as he's a member of the Occupational Health and Safety. But I'm happy to say that in 2018, so far, that we've had no lost time injuries, and our minor incidents went down by 30 per cent, and those requiring any hospital visits or WSIB claims went down by 64 per cent. So we're back on the

right track.

I'll let Jamie tell you what we did to get back on track.

**MR. MacDONALD:** Jamie MacDonald, for the record. So the first lost time injury occurred relatively early in the year, in January, and it was a lacerated hand from an individual who was changing a blade on a knife.

When that occurred, our committee took the opportunity to do a safety stand down with the employees and to make sure that it was fully understood what the requirements were in handling sharps, making sure that blades were guarded when they're not being used for production purposes. That was well-received and it proved to be effective over time. We haven't had any major lacerations since, as I've said.

The second injury, we didn't feel that it was related so much to any of our processes. An employee was lifting a box of something and lifted it, ended up wrenching their back slightly and missed one day of work. So when that employee returned we made sure that they had proper coaching on the proper lifting techniques when they're doing this kind of activity.

Finally, we had an individual report some shoulder strain we felt could be related to some repetitive tasks. So that individual had some time off in order to



recuperate. As a committee, we made sure to reinforce with all of our supervisors and our staff the importance of making sure that for jobs, where there are repetitive motions, that we have a lot of job rotation and that we make sure that if there are tasks being done for long periods of time that frequent breaks are taken, proper stretching is done. That proved to be quite effective as well.

So, you know, we don't want to see any injuries at all, whether they're lost time or not, and we feel that the actions that we took in these cases were appropriate and we're pleased with the results.

**THE PRESIDENT:** Thank you. Dr. Demeter.

**MEMBER DEMETER:** Thank you. I'm looking at staff's CMD 18-M47, page 41 and 42. I just want to see if, the way I read this, maybe when I'm thinking of it, to make sure I'm not taking it out context. So at the end of page 41 it talks about -- this is regarding the AMP, and that determined that the junior and senior technician were performing maintenance activities, all the necessary work clearance and permits. Then it goes on to say that the practice was known to the UFC production supervisor.

CNSC staff had previously identified non-adherence procedure in a 2014 inspection and noted non-compliances to Cameco management system since 2014, and

Staff assessed the release event -- this is the 2017 release event when they got the AMP.

So this makes it look like you knew about it since 2014, and there have been multiple non-compliances with the management system, and it took a release to -- it looks like this was puttering and smouldering for three years, and then there was a release that resulted in an AMP, the way I read it.

So help me understand what this three-year gap and these multiple non-compliances were over this three-year period and why it didn't result in a quicker action earlier than 2017.

**MS TADROS:** Haidy Tadros, for the record. So with every non-compliance there is always an action. I take your point, Commissioner Demeter. I believe we haven't really provided enough context to those three years in that one small paragraph. So when the lack of adherence to procedures occurred and CNSC staff noted it in 2014, as with all non-compliances, we issued a non-compliance to Cameco indicating that they needed to correct it.

It was not with the same procedures that caused the 2017 exposure of the worker. So there has been different non-adherence practices since 2014, and with every found practice of non-compliance CNSC staff issued a non-compliance, tracked the corrective actions that Cameco

indicated that they would be putting in place to correct the non-compliance, and have gone back and followed up to ensure that that improvement or corrective action has been put into place in Cameco's management system.

So this occurred, it was fixed, CNSC staff reviewed the fix, the corrective action.

Then another inspection note in another non-adherence practice of Cameco, issued another action notice for them to provide corrective actions. Cameco did their results.

So we don't want you to see in this that there has been systematic issues, but there has been enough non-adherence practices that using our graduated enforcement at one point we needed to look at the event in 2017 and the severity and significance of what could have happened and determine what action to take from our enforcement tools. That's why the AMP was issued in 2017.

**MEMBER DEMETER:** Thank you, that context is very helpful, because it's not a single problem that's reoccurring and reoccurring and reoccurring.

Now, is this licensee's practice with regards to management systems an outlier compared to other licensees? I mean, I haven't seen this kind of language used for other licensees with this CSA, and is it continuing? This is 2017, now we've got sort of another

year. Although you say it's not systematic, it seems to be multiple non-compliances with this CSA. How does it fit with the industry standard?

**MS TADROS:** Haidy Tadros, for the record. So across various industries CNSC staff do note that there are non-compliance with adherence to procedures. They are found and they are corrected when CNSC staff notice them.

Perhaps Mr. Pierre Lahaie can speak to the CSA Standard and speak to the prevalence of non-adherence procedures in different industry practices?

**MR. LAHAIE:** Pierre Lahaie, for the record. I'd be lying if I said it was surprised that any licensee would have a finding for procedural non-adherence. It's something that we see across industry sectors from nuclear power plants to, you know, Class 1B facilities. Most of the time these things are fairly benign, just needs an update to the procedure or to modify the procedure.

When it relates to things like work control, work verification, management oversight, then it's a little more important. So when we cite not only procedural adherence, but lack of certain steps and processes are not being followed, that becomes more important.

In the case with Cameco, a lot of the procedural non-adherences had to do with work verification,

work control, and management oversight. So those are the things that actually corrected after the AMP was issued in the course of the following events.

**MEMBER DEMETER:** Thank you for the context.

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

**MR. MOONEY:** Sorry, I was just going to jump in there for a second, again at my own peril.

But on the AMP, I did want to emphasize that we had an independent, a former employee, do the investigation and we had the corrective actions identified. They were being implemented before the AMP was issued, some of them were closed after the AMP was issued. But we had self-identified a number of changes to be made that were outlined earlier by Staff.

**THE PRESIDENT:** Thank you.

**MEMBER LACROIX:** Concerning the document of the ROR, M47.A, slide 32. It's a question of understanding for Cameco. The process on the top converts U03 into U02, and eventually to UF6. The process at the bottom converts U03 into U02. What is the difference? The top process you convert in one step -- well, it's a schematic, I understand. In one step you convert U03 into U02, and in the bottom process you convert it through U02, but in many -- well, three processes.

Is there a reason?

**MR. SMITH:** Tom Smith, for the record.

Yes, there is. The UO<sub>2</sub> that's produced in the bottom line is ceramic grade UO<sub>2</sub>, it's suitable for reactor fuel. The UO<sub>2</sub> that's produced in the production of UF<sub>6</sub> is a process intermediate and it doesn't have the same qualities as ceramic grade UO<sub>2</sub>.

**MEMBER LACROIX:** That's what I suspected.

Thank you very much.

Then if we move on to slide 44. That concerns the BRR Facility. I see that at the fence the gamma measurement is 1.1 microsievert per hour. So if you stand beside the fence for an entire year, you end up with something like 10 millisieverts per year. Am I correct?

**MR. MOONEY:** Liam Mooney, for the record.

There was gamma measurement at one point at 1.1. Earlier one of the questions was in relation to this about the work that was done. We had identified an increasing trend because we were storing more fuel on site. So while we were doing the engineering design we had that uptick there. Since that time, the berm that was discussed earlier was put in place and we've seen those fence line numbers come down.

I'm not sure if Mr. Smith has more recent monitoring data, but that was outside the bounds of what we

were expecting, although we were trending that way and that's why we were going to put the berm in place.

**MEMBER LACROIX:** So this is not an average value, it's an punctual value?

**MR. SMITH:** Tom Smith, for the record. It's a value for a quarter only.

**THE PRESIDENT:** Ms Penney.

**MEMBER PENNEY:** I'm just going to bring our attention to -- and this is with respect to conventional health and safety, page 78, it's BWXT and it's something, Staff, that I talked about yesterday in terms of can we start having, in the ROR -- we had yesterday, we actually had severity and frequencies and well as lost time incidents, and we had a conversation about whether everybody can consistently produce the similar data. I'm looking for a recordable incident rate or recordable injury rate similar to OSHA, we talked about it yesterday.

I just wanted to -- on this BWXT, they actually have provided more information than some of the other proponents, or at least in this part of the report there's more information. There's information about near misses, which is really good. There's information about which part of the body was harmed in a first-aid.

I'll leave it to Staff to decide what data you put in a ROR, but I would prefer to have something

along the line of an incident rate or frequency, and more than just a lost time incident. Because if you've lost time, you know, that's a less conservative data point than if you were to look at all injuries that are medical or above. So I'll just leave that with you. I liked this data in here.

**THE PRESIDENT:** Okay. Last round of questions. Dr. Lacroix.

**MEMBER LACROIX:** Once again, this is a question for my own understanding. I've noticed in the ROR that the guideline for uranium and ambient air is .03 micrograms per cubic metre, and that for groundwater is .2 micrograms per cubic metre.

I was surprised to find out that they're almost the same, but for two completely different media. Is there a reason for that?

**MS TADROS:** Haidy Tadros for the record. So I believe our colleagues from the environmental compliance group are coming to provide an explanation of the different concentrations.

There's also the provincial and Ministry of the Environment sets limits as well, so maybe Kiza can provide some detail on that.

**MS SAUVÉ:** Kiza Sauvé, for the record. I'm not sure I can provide great details. The .03 for air



is the point of impingement, it's an MOE guideline that the CNSC has adopted. The groundwater, we're going to have to get back to you.

**THE PRESIDENT:** Thank you. I have one last question, it's for BWXT and for your Peterborough facility where there was the occupational exposure of the two workers to beryllium, and it was I think like five times the limit.

So are there any health implications of that? Maybe Staff first and then maybe Peterborough, BWXT, can answer. I mean were there worker concerns associated with this exposure?

**MS TADROS:** Haidy Tadros, for the record. So I'll ask our Project Officer who's been monitoring and involved in this event, Mr. Julian Amalraj, to take that question.

**MR. AMALRAJ:** Julian Amalraj, for the record. The limit for the occupational exposure of beryllium is actually from the Occupational Health and Safety Regulations under the Canada Labour Code.

In terms of the value itself, Staff did issue 12-2 for a BWXT to investigate that particular filter or the use of incorrect filter, and the protection that those filters offer, and what the actual exposure level could be.

The study showed that because of the way the air intakes were positioned, the actual risk for the worker was much much lower, in fact almost similar to having used the real accurate filter.

Having said that, we did identify several deficiencies, mostly systematic, associated with the use of filters, and BWXT has implemented several corrective actions associated with that in terms of preventative measures to ensure that this does not happen again.

**THE PRESIDENT:** Thank you. BWXT, anything you want to add?

**MR. SNOPEK:** David Snopek, for the record. Yes. In regards to health effects, we've not seen any health effects. We, of course, immediately notified the two affected employees and we put them into our investigation process, which involved consultation with our occupational health nursing as well as our physician.

In this case, what we were looking at is is there potential that they develop a sensitivity because of the exposure to beryllium? In this case, the filters that were used and the respirators that were used, they were used very infrequently over the course of about a year and a half. So the amount of time of exposure was quite low.

But what we've done with these folks is

we've put them into an increased monitoring program over the course of two years, which we are halfway through now. So we have a routine sampling program where we look at beryllium sensitivity, it's a blood test. We do that for this class of worker on an annual basis routinely.

We're monitoring these two folks every six months, and we're going to continue to do that for at least another year. There's been no indication that there's been any sensitization as a result of this or any other activity for these two folks.

**THE PRESIDENT:** Thank you very much. That brings conclusion to this agenda item. So thank you to Staff, the licensees, and to the intervenors, thank you very much.

**MR. LEBLANC:** If you allow me, Mme President, I'd like to know if Monsieur André Gagnon and Madame Annette Proulx are in the room for the next item? If you are, can you identify yourself? Yes, you are, okay.

So you're just arriving, so why don't we take a few minutes, 10 minutes?

**THE PRESIDENT:** Yes, 10 minutes and resume at 3:00. Thank you.

--- Upon recessing at 2:53 p.m. /

Suspension à 14 h 53

--- Upon resuming at 3:01 p.m. /

Reprise à 15 h 01

**THE PRESIDENT:** Okay. The next item is the event initial report regarding an exceedence of a regulatory dose limit for a nuclear energy worker at Isologic Innovative Radiopharmaceuticals as outlined in CMD 18-M65.

Representatives from Isologic Innovative Radiopharmaceuticals are available in attendance. And anyone available by videoconference --

**MR. LEBLANC:** Yes.

**THE PRESIDENT:** Yes.

**MR. LEBLANC:** We have Valerie Phelan.

**THE PRESIDENT:** Okay. -- to answer questions from the Commission.

So, Mr. Moses, over to you first.  
Anything you wish to add?

**MR. LEBLANC:** Before we start, j'aimerais vérifier avec nos participants s'ils voulaient que ça se déroule en français ou en anglais. Avez-vous une préférence?

**MR. GAGNON:** No preference on that.

**M. LEBLANC :** D'accord. Merci.

**CMD 18-M65**

**Oral presentation by CNSC staff**

**M. MOSES** : Merci, Monsieur le Secrétaire.

Good afternoon. My name is Colin Moses, Director General of Nuclear Substance Regulation and with me here today are M. Sylvain Faille and Madame Natalie Ringuette de la division des permis de substances nucléaires et d'appareils à rayonnement, as well as Mr. André Bouchard and Jonathan Schmidt from the Operations Inspection Division and other CNSC staff supporting our response to this event.

We are here today to provide you with information related to an event reported by Isologic Innovative Radiopharmaceuticals Limited involving one of their workers designated as a nuclear energy worker exceeding the regulatory dose limit for extremities.

On November 6, 2018 the worker was dispensing therapeutic Iodine-131 capsules. This work included some off-normal operations to address faults in the processing equipment. At the end of the day the worker self-monitored and found contamination on his gloves and sleeve covers.

The worker then proceeded to remove the gloves and with his bare hands removed the sleeve covers.

The worker then left the facility without re-monitoring himself for contamination and without reporting the contamination found to the site radiation safety officer.

The following day the worker reported to work. When leaving a restricted area later that morning the worker monitored his hands, reviewing contamination remaining on the skin of his hand. The site RSO was then notified and proceeded to initiate response actions.

The total equivalent dose to the skin of the hand resulting from the contamination has been assessed at 1.7 Sv which is in excess of the annual limit of 500 mSv or .5 Sv.

To date no health effects have been noted and no physical effects of the exposure are expected.

According to the National Dose Registry from January 1st to December 9th, 2018, the worker had received a whole body dose of 1.53 mSv, 79.61 mSv for his left hand and 90 mSv for his right hand. The thyroid screening results completed following the contamination event indicate a committed dose of approximately 0.6 mSv.

As an immediate response, Isologic has discontinued the processing of therapeutic doses of iodine in their current facility. They've also undertaken a review of the potential causes of the event. It is unclear at this point the exact cause of the contamination,

however, the consequences may have been minimized through stronger adherence to monitoring and contamination response procedures.

Isologic has identified a lack of training assessment, detailed operating procedures during equipment to troubleshooting and a lack of supervision during staff transitioning as contributing factors.

Staff continue to review their detailed event report, however, it is worthy to note that these are similar deficiencies to those identified through a comprehensive Type 1 inspection performed by CNSC staff in 2017.

While Isologic has made progress since the inspection, staff remain concerned about the effectiveness of their radiation safety program, in particular, with respect to their worker training programs, operating procedures and management oversight of work practices.

Staff is reviewing the licensee's response to this event and is planning additional compliance inspections to monitor the effectiveness of their corrective actions. We are also considering whether additional scrutiny enforcement is warranted in this case.

In addition to this event, we'd like to inform the Commission that on December 11th we were informed by Isologic that they detected elevated levels of

short-lived Iodine-131, a medical isotope, on their stack monitoring filters. At this stage it is not clear whether this is related to the personal contamination event, however, Isologic has informed us that they have ceased all operations involving iodine processing pending investigation.

CNSC staff are supportive of this precautionary measure and will closely monitor their response to this new event.

CNSC staff remain available to answer any questions the Commission may have.

**THE PRESIDENT:** Thank you. I'll now turn the floor to Isologic Innovative Radiopharmaceuticals. Mr. Gagnon, do you wish to make any comments?

**MR. GAGNON:** No, we agree with all the findings that we've heard from the CNSC.

**THE PRESIDENT:** Okay. Well, let's open the floor to questions. We'll start with you Mr. Berube.

**MEMBER BERUBE:** First of all, CNSC staff, it's probably the best EIR I have seen produced to date, so whoever authored this is in my good books, so thank you for that professionalism. It's very useful to have an insightful document like this that basically categorizes what happened and why it happened to the best of your ability.



Some concerns here, of course, with the monitoring on going out of the building, not having the Iodine- 131 on their hands obviously and probably not monitoring -- not washing their hands either.

What is the possibility of contamination in the employee's home, particularly with children, these kind of things. Has any of that been looked at, considered as part of this? Is that a potential vector for some -- for cross-contamination? I don't know if this has been looked at.

**MR. MOSES:** Colin Moses, for the record. First, I'll let Isologic Radiopharmaceuticals answer that question in terms of their investigation response to this event and perhaps can add some comment afterwards.

**MR. GAGNON:** I'll defer the response to Valerie Phelan which is our corporate RSO.

**MS PHELAN:** Yeah. I just wanted to double check. Can you hear me properly?

**THE PRESIDENT:** Yes, we can.

**MS PHELAN:** Okay. Great.

So yes, so in terms of contamination of the home, unfortunately by the time the site RSO and all the issues surrounding, got around to testing the person's vehicle and everything we could not find any traces of iodine. So the wipe test results came back negative, the

background, but that may have been due as well to the delay in the response to checking the vehicle which was done I believe more than a week post the actual day that the individual left.

**MEMBER DEMETER:** Just further to that. And this individual had family members or anything like that we have to consider...?

**MS PHELAN:** He has a wife. He's a young individual, they have no children yet, so yes.

**THE PRESIDENT:** Dr. Demeter?

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

A number of questions. First of all, what did the thyroid monitoring of the individual show?

**MS PHELAN:** So, he received the highest intake at 6.2 kilo becquerels. This was -- then after he was removed from work in the lab we've continued to monitor him on a daily basis and we saw the typical decrease from the residual thyroid iodine.

**MEMBER DEMETER:** Okay. So, he did receive a thyroid dose at the level that you mentioned.

**MS PHELAN:** Yes.

**MEMBER DEMETER:** For Isologic, what is your routine for -- you're in the business of high volume radiopharmaceuticals, more than just I-131.

**MS PHELAN:** Yes.

**MEMBER DEMETER:** Do you have a documentation procedure where people have to monitor their hands and check off? Is there a paper trail?

**MS PHELAN:** Yes, there is monitoring at the exit to the restricted area and at the end of the day there is a document people -- where they return their dosimeters at the end of the day that they initial that they have checked themselves off before going home.

**MEMBER DEMETER:** Okay. And did this result in an audit of other potential individuals that might have been contaminated, this event, did it result in a broader audit to look at practices?

**MS PHELAN:** We looked as well at the other individual who was there who did not have a thyroid uptake and there was no contamination and that individual was in the room as well doing some work on that same day.

We did monitor as well -- we're also looking at practices and strengthening the practices. So, immediately after that for I-131 specifically we've asked them to do a separate monitoring as well within the office area prior to the end of day where they actually have to write down all the information and do a full body check with a pancake probe.

Now we are moving to having an alarming detector as well inside the office area which is at a lower

background near the area where people bring their dosimetry back and they will have to have somebody confirm that the number they have written down is correct. There will be postings on the wall as well what to do if the alarm goes off. And this will be applied not just to I-131 but the rest of the facility as well.

**MEMBER DEMETER:** Okay. And you've stopped the production of I-131 in the tablets or in the pills. Do I understand that?

**MS PHELAN:** M'hmm. Yeah, all production is stopped. No diagnostic and no therapeutic production at all, no more.

**MEMBER DEMETER:** So you're not dispensing liquid iodine?

**MS PHELAN:** No.

**MEMBER DEMETER:** I was --

**MS PHELAN:** We never dispensed -- yeah.

**MEMBER DEMETER:** I-123.

**MS PHELAN:** No.

**MEMBER DEMETER:** No. Okay. That's it for now. Thank you.

**THE PRESIDENT:** Dr. Lacroix?

**MEMBER LACROIX:** I still don't understand how you can leave a nuclear facility without monitoring yourself. Why did it happen?

**MS PHELAN:** That's a very interesting question and we've kind of been asking the individual ourselves that. From what we've been able to get from him, he seemed to either -- had thought somehow that he found the contamination and assumed that it was all on the sleeve, so when he took off the sleeve that he was going to be fine. Perhaps a bit of panic.

This was a new individual, which again points to us in terms of the supervision and the follow-up of newly trained staff and the assessments on not just the procedure you're doing today but other associated procedures, such as, what happens in the case of where this individual was perhaps scared because of the alarms, like how high -- the instrument must have been screaming quite a bit, you know, what do you do.

There's a procedure, he was trained on it, but why it didn't click in at that moment is... You know, had there been perhaps a senior person there with him, again supervision, perhaps he could have just relied on that individual to help him, okay, see, we'll do this, this is what we need to do and not be in a panic of, oh, I don't what to do. Oh yeah, I found it, it's here, I'm taking it off and now I'm just leaving.

It's still unclear exactly what was in his mind when he decided to just leave the facility.

**MEMBER LACROIX:** CNSC, are you trying to find out what happened, why this individual left the premises without monitoring?

**MR. MOSES:** Colin Moses, for the record. So, of course, that's part of the questioning that our inspectors did when they did that site visit following this event and I'll turn the question in a moment back to Mr. Jonathan Schmidt who was present during the inspection.

But as I indicated in my opening remarks, a lack of procedural adherence, weaknesses in the training, weaknesses in management oversight, those are symptomatic of broader program issues and that is the focus of our review following this event.

For example, at this facility they do have a site RSO but that RSO is only dedicating a portion of their time to oversight of this program. They're only present during the night shift, weren't present when this contamination occurred.

And so, there are a number of factors I think we're contributing that we want to ensure that the licensee's implemented corrective actions, not just to address a repeat of this exact occurrence, but to address broader symptomatic issues.

And I'll turn the question back to Mr. Schmidt.

**MR. SCHMIDT:** Jonathan Schmidt, for the record. So I was the lead inspector that followed up and did an investigative inspection on November 16th regarding this event and we did interview the individual who was exposed -- extremities were exposed at length and went through his operations for the whole day and spent significant time talking about the exiting of the site.

And in the interview it became clear that he wasn't really sure why he didn't monitor. So he expressed that he believed the contamination was on his sleeve and by removing the sleeve he thought he had dealt with the issue.

We did note a few things in our inspection report. One of them is that at the time -- this is at the end of the day shift -- the licensee works a night time shift and a daytime shift and iodine is during daytime production. So at this time there are no senior staff members there when this individual left who is very recently new to the iodine production, they were trained in October, 2018. This could be a contributing factor, the newness and the fact that there's no one there to go to to ask advice for at the time that the monitoring occurred.

**THE PRESIDENT:** Ms Penney?

**MEMBER PENNY:** I had a question about how we calculated the calculated dose to the skin of the left

thumb and how do you get the thyroid dose? I just -- I'm new, I don't know those things.

Thanks.

**MR. MOSES:** Colin Moses, for the record. So, of course, the calculation is performed by the licensee and validated by our experts in radiation protection. I'll refer the question back to them to explain their validation.

**MR. ESTAN:** So in this case the skin dose was calculated using a piece of software called Varskin which is created by the USNRC. So the variable here was to determine the appropriate thickness of skin to use for the calculation, as it changed the result quite a bit. So we used ICRP-89 which publishes skin thicknesses for different parts of the body and we used the average skin thickness for a male for the fingers and that's how we got to the result of 1.7 Sv.

And I think I'd probably let Valerie answer the question for the dose for the thyroid.

**MS PHELAN:** So, the dose for the thyroid is based on basically a measurement done externally with the sodium iodide detector and that result comes in at kilo becquerels and that result is then further converted to an internal dose by using conversion factors of sieverts per becquerels.



**THE PRESIDENT:** So, on the dose calculation how do you account for the fact that you're not measuring it until a day later and how much would have been washed off?

**MS PHELAN:** For the skin, our best estimate is what he had if he did, for example, he went home and he had more than that. We assumed that nothing came off. So you kind of do a worst case scenario that he's just been wearing this amount for the last 48 hours and nothing came off. So it's getting a higher cumulative dose.

**THE PRESIDENT:** Thank you.

Before we go for the next round, so why did it take you a few days before you reported it to the CNSC?

**MS PHELAN:** So at the time -- so the individual did not report on the first -- on that day, so the next day he did report to the site RSO, but that site RSO works night shift so it happened at the end of his shift.

He gave -- he sent off some information to me. I was performing an audit at one of our other sites, Isologic has seven sites across Canada, so I was in Ottawa at the time and I was observing some individuals in the lab during a night shift so I wasn't looking at my emails. I'm

also not sure whether I had my phone on me in the lab.

So I did check -- when I finished the next day, my night shift after the end of the day find the email Dave, realized the numbers that he was giving me seemed like it would be a significant, so I had to do a few preliminary calculations to figure out whether this was reportable and sent the message to the CNSC.

However, I'm not sure exactly why I was not phoning the duty officer right away and I just sent to the licensing officer the information.

I also received another incident at the same time from a package, tampering -- evidence of tampering of one of our packages from our site in Sunnybrook on F-18 and then when I did respond to that one with the duty officer I had mentioned both issues to the duty officer. So that was I guess the following day on the 8th of November.

**THE PRESIDENT:** But would the RSO not know that, the duty to call the CNSC immediately?

**MS PHELAN:** Yes. I am not sure. Sometimes most of the CNSC communication is going -- says to go through the corporate RSO, but I have on occasion actually -- the site RSO never actually contacted directly the duty officer unless I asked him to one time because I could not and I did ask him to. So I believe in this case

he was always just waiting to get me to do the contact to CNSC.

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

**MEMBER BERUBE:** Yeah, just one observation here. We're asking, you know, why did this guy do this which is just common for people that when they have shock the first reaction is denial, you know, and then to run from the issue, right. So this man looks like he did what most people do when they're really scared, get into shock and unfortunately that's not good for any of us.

The follow-up actions, of course, need to be addressed and I think this is the bigger factor, right, is how do we actually prevent this kind of thing from happening again, especially with new employees, they have to be monitored initially, especially in environments that they're unaccustomed to, even if they're trained well you still have to monitor their performance for a while because until they get to a point where they're really proficient and they're relaxed with what they're doing it's very easy to make mistakes, of course, and I think this is what we're seeing here.

**THE PRESIDENT:** Dr. Demeter?

**MEMBER DEMETER:** Just some clarification from CNSC. Is this site licensed as an individual site or

is it licensed as multiple sites under one licensee?

**MR. MOSES:** Colin Moses. I'll let Ms Natalie Ringuette answer that question.

**MS RINGUETTE:** Natalie Ringuette, for the record. The license issued to Isologic as a processing licensee has several sites authorized under the same licence.

**MEMBER DEMETER:** Okay. And so I need some clarification on the RSO. So you've got multiple shifts, a day and a night shift I gather.

**MS RINGUETTE:** Yes.

**MEMBER DEMETER:** Do you have a dedicated RSO at your site or do you assign those duties to a tech who's doing some work and acts as the RSO if need be? Because what I heard is that there was no RSO available during the day shift when this happened.

**MS PHELAN:** Yes, that's correct. So the only site -- each site has one RSO and the RSOs are also techs, even the RSO he has some duties specifically assigned for site RSO which is night shift and during the day some of those duties are just, you know, assigned to the techs that are working in the lab.

**MEMBER DEMETER:** So, your business is making and running pharmaceuticals and you've got no one in the day as a designated RSO at the site; is that correct?

**MS PHELAN:** That's correct. I do -- yeah. I do sit as corporate RSO at the site, but I am still corporate RSO and not site RSO.

**MEMBER DEMETER:** Okay. I understand that individual techs can manage spills and there's management of an issue, it does seem really strange that this is the business you're in, radiopharmaceuticals, and there's no one at least designated as the RSO during the day on a day shift. That's very unusual.

**MR. MOSES:** Colin Moses, for the record.

That's also an area of concern for us, and maybe I'll let Mr. Gagnon answer in terms of the overall oversight and resources dedicated to ensuring radiation safety at their facilities.

**MR. GAGNON:** André Gagnon, for the record.

A couple of clarifications. I mean, all sites are not the same.

When we talk about the Burlington site, this is the only site that produces iodine. This is a production site for iodine, and it does it for across Canada.

Some smaller sites have very different kind of operation compared to what we have in Burlington.

If -- from what I understand

radiopharmaceutical distribution, that happens overnight. It starts at 10 o'clock at night and by 8, 9 o'clock in the morning, the whole day, most of the time, everything's finished with compounding and distribution.

In case of Burlington, we have a site that opens up and does other activity during that day like iodine. Iodine is seen as a specific business unit and operates on its own within the site.

So that's no RSO, as Valerie mentioned, oversight at all time on all shifts, but most of the sites are pretty well covered with the RSO coverage during the day except for Burlington when -- if Valerie's not there.

**MEMBER DEMETER:** And a question for CNSC staff.

This is one product line of many that this company's involved with. Has it led you to look at their other practices with positron emitting and technetium based products that they're doing and is there any concerns about other practices that may -- this may predict?

**MR. MOSES:** Colin Moses, for the record.

Yes. The -- as I indicated in my opening remarks and in some of my responses, we have some concerns with the overall program integrity with respect to their oversight of radiation safety activities. Those concerns apply across the board.

With that said -- and sorry, I should add when we conducted that comprehensive Type 1 inspection, we looked at all their operations at all their facilities to assess whether the oversight was sufficient and identified some deficiencies there as well.

And Isologic has undertaken a review and restructure of their program.

The challenges they were counting at that time is they made a number of acquisitions, and so the programs that were in place at the sites were not consistent and they had challenges with worker following procedures, complying with the overall corporate program.

And so they have done some restructuring in that regard.

With respect to this facility and the iodine production at this facility, this is a new undertaking by Isologic. It's been an area of significant regulatory focus since we first identified the challenges at our Type 1 inspection.

It has been an area of a number of focused inspections since that time, but we remain concerned that they have the effective resources dedicated to overseeing a program across all their operations.

With that said, our concerns really are focused at this time on this service line and this

facility.

**MEMBER DEMETER:** Okay. It sounds like there were broader oversight issues.

One question for Isologic. What portion of the Canadian market were you supplying iodine to? I'm trying to figure out the potential impact on patient care of I-131 if you're no longer supplying it.

**MR. GAGNON:** André Gagnon, for the record.

It's difficult to assess at this point. I would assume between 30 to 40 percent of the marketplace -- the market.

**MR. MOSES:** Colin Moses.

If I could add, Isologic did inform us of their decision to cease operations, and because of our concerns we're supportive of that.

We understand Isologic had made arrangements with other competitors or other suppliers of iodine to ensure that there is sufficient supply in the -- in Canada for Canadian markets, but perhaps they can speak to those arrangements.

**MEMBER DEMETER:** Okay. I'm good. Thank you.

**THE PRESIDENT:** So how long do you think you're going to be shut down for?

**MR. GAGNON:** We will be shut down until



I'm convinced that the risk level is very, very low. I'm not very happy with the situation.

The fact is, we've invested large sums of money to make the state of the art production facility with hot cells, with something, and we wanted this to work. The program needs to work.

Compliance, to me, is key, but at the end of the day, if employees are at risk, well, we can't give any choice to the employees whether we have to put safeguards in there that employees cannot, will not, should not and cannot move through a door unless they go through a scanning machine, whatever it is that we need to do.

And that's what I've asked for my team to do, and we will provide that in the future.

**THE PRESIDENT:** Mr. Moses, you said this is a repeat event, so have they had similar incidents?

**MR. MOSES:** Colin Moses, for the record.

So no, they haven't had a similar incident, to my knowledge, but maybe I'll let Ms Ringuette speak to their compliance history.

There have been a number of events when you look at together point to some of those indicators that I've noticed before, although there hasn't, to my knowledge, been very specific event exactly to this nature, but.

**MS RINGUETTE:** Natalie Ringuette, for the record.

This is the only event that I'm aware of that there was an exceedance of regulatory dose limit.

**THE PRESIDENT:** And what would this be on the INES rating that you use for your incidents?

**MR. MOSES:** Colin Moses, for the record.

So I'm not 100 percent sure. We could validate that and get back to the Commission. But I do know that, typically, when they look at the ratings if it's an exposure to a nuclear energy worker there's a certain level of -- I think it's 10 times the limit that might trigger an INES Level 1 or 2.

But certainly it is a significant exceedance that is of concern to us.

**THE PRESIDENT:** Thank you.

Dr. Lacroix.

**MEMBER LACROIX:** I'm still trying to understand how the contamination occurs in the sense that does Iodine-131 diffuse through the skin?

**MR. MOSES:** Colin Moses, for the record.

I'll let Mr. -- perhaps Ms Valerie Phelan might be best placed to answer that.

**MS PHELAN:** Yeah, so the iodine -- 131-Iodine is a very volatile compound, so always there's a

risk whenever there's iodine -- let's say something is contaminated even within like on your -- on your person, some of it will be off gassing, which pertains to the risk for inhalation.

As well, on the skin there have potentially been some concerns of iodine. I don't think it's any worse than other open source radiopharmaceuticals where you can get contamination on the skin.

It's sodium iodide with a buffer that keeps the pH fairly high, so around 10, a bit less than 10 -- between 7 and 10. So however that chemically would react to skin would be the same whether it's radioactive or not. But the radioactivity is -- becomes an issue as well with the off-gassing of iodine due to its volatility and uptakes from contamination events.

**MEMBER LACROIX:** But why were the hands still contaminated after 24 hours? Does it mean that the person didn't wash?

**MS PHELAN:** No, he said he did wash. Even on -- I believe we went through the records of his description of his -- the whole scenario step by step of his day, that he washed his hands at one point before removing the contaminated sleeve, but we don't know whether the contamination occurred prior to that or from actually touching the contaminated sleeve.

So it's -- yeah. It's -- sometimes it's difficult to remove radioactive contamination, but had somebody been there and started cleaning right away -- and we usually tell people to clean a few times, you know, mild soap and water, lukewarm water, but not to irritate the skin because, of course, if we irritate the skin then we get more absorption happening.

So perhaps if somebody had been there and had helped him clean off, perhaps a large portion of it would have come off at that time. But at this point, once you've cleaned to -- down as much as you can with any radioisotope contamination on the skin, if there's still something remaining and to further try to remove would damage the skin, we have to stop.

**MR. ESTAN:** I'll just add to that. Diego Estan, Radiation Protection Division, for the record.

Yeah. So certainly in some cases the contamination can become fixed on the skin. This was definitely the case here.

Again, we don't really know what happened at the beginning with the incident, but by the time they started measuring, it was pretty much all fixed contamination and it was simply decaying -- physically decaying as per the eight day half-life of Iodine-131, more or less. Yeah.

**THE PRESIDENT:** Ms Penney.

**MEMBER PENNEY:** I'm just trying to determine what next steps are in terms of what -- is there a submission to CNSC to request returning -- returning to production? What are the next steps?

**MR. MOSES:** Colin Moses, for the record.

So with respect to this event, we've received a detailed event report. We had a number of follow-up questions to which we've just received some additional responses.

We're reviewing the adequacy of that and may likely have some subsequent questions related to that event.

I also mentioned in my opening remarks a recent event that happened on Tuesday that we were made aware of on Tuesday, and that will factor in to our overall response.

In particular, the decision to shut down iodine, the reason we're supportive of that decision is because they haven't yet identified the source of the release. They haven't identified the cause of the release. And until we have confidence that they can undertake those operations, we wouldn't be supportive of them restarting operations.

At this point there is no approval

required of the Commission because we haven't mandated that shutdown, but we are reviewing appropriate enforcement actions and may decide to pursue those.

**THE PRESIDENT:** Mr. Jammal?

**MR. JAMMAL:** It's Ramzi Jammal, for the record.

It's very important to put this in perspective. It's the licensee's responsibility to make sure there is adequate inventory so that we're not impacting patient care.

That does not mean that the licensee is just responsible to ensure -- safe operation is their responsibility. So they took their own action, but I think the Commission should provide direction to the licensee that inventory is maintained in a safe manner.

When I say inventory is maintained, it's up to them right now to ensure that inventory can be brought from outside Canada, can be processed somewhere else or can be done in a different manner.

We lived an issue before, and this is why I'm making this comment with respect to the assurance that the health of Canadians is being assured.

That does not mean that the licensee is not fully responsible for safe operations, but it's up to them right now to ensure that there is enough inventory,

and that's why I'm going on the public record to make sure that there is enough inventory to supply for -- mainly for therapeutic purposes.

**THE PRESIDENT:** Mr. Gagnon, comment on that?

**MR. GAGNON:** Mr. Gagnon, on the record.

We will continue to make sure -- first of all, maybe a -- the report says also that we are in transition where we have a new room, a new setup to start. That new setup should start, I believe, some time in January or some time whenever we resolve our issues.

For the moment, patient will not or should not be affected, as there is another distributor in Canada or supplier in Canada that we are using to supply iodine to our customer for the moment. So this shouldn't be a problem at this moment.

The other issue we have presently is the reactor problem in the world where there's issue with iodine being able to be processed. It seems to be better now, but that was an issue we had a few weeks back.

So for the moment, I think we have everything covered and supply should be fine for the next few weeks without a problem.

**MR. JAMMAL:** It's Ramzi Jammal, for the record.

So if there is then inventory, Madam President, my recommendation as Chief Regulatory Operations Officer that they will establish a training program for the individuals who will be dedicated to do I-131 processing at their facility, take advantage of the existing inventory, provide the training and provide to the CNSC evidence that the training has taken place from the RSO level to the workers level and take advantage of the available inventory so that -- that's my recommendation to the Commission.

Of course, the Commission will determine on its own what needs to be done.

And that's their responsibility.

**THE PRESIDENT:** And I think what we've heard is training is one -- one of the elements. There are many others that need to be addressed as well.

And I want to make sure that it's -- you know, we're not just focusing all our efforts on training.

So let me ask both you, Mr. Jammal, and Mr. Moses what are your recommendations as to what the next steps should be from -- even from an enforcement perspective.

**MR. MOSES:** Colin Moses, for the record.

I'd hesitate to speak to recommendations for enforcement. Ultimately we will look at the tools that we have available and decide on the most appropriate ones



to use in this case.

**THE PRESIDENT:** I'm sorry. When I meant enforcement, I meant as far as action that the licensee should be taking.

**MR. MOSES:** Thank you.

And so I absolutely agree with Mr. Jammal. I think I've identified main areas of weaknesses. My recommendation would be that the licensee first look at the resources that they're providing to effectively oversee the programs, that the licensee establish -- review the effectiveness of their training program and their staff monitoring procedures and that the licensee deliver improved training to all their licensees.

We also want to better understand the causes of the recent release, and so they would need to investigate that specifically.

And I'll let Mr. Jonathan Schmidt -- he might have some specific factors that were identified through the inspection that he'd like to note here.

**MR. SCHMIDT:** Jonathan Schmidt, for the record.

So during the inspection, we interviewed the staff involved in iodine production, the ones that were available. We also interviewed the site RSO.

And we identified that at the Burlington

site, there appears to be a lack of continuous oversight, which we've already talked about, so that seems to be a big factor which talks to the resource -- the availability of resources to implement the program.

And I think it's also clear to us that the roles underneath the radiation protection program, so the oversight roles and responsibility of the Site RSO compared with what the Corporate RSO is doing is not clear, what are the responsibilities of the senior individuals who may be supervising the work as far as safety of the worker and implementing the radiation protection program, so those were some key findings that, if the appropriate oversight is in place, then this not following procedures and not carrying out work safely can be prevented by pointing out where areas of improvement can take place.

**THE PRESIDENT:** Mr. Jammal.

**MR. JAMMAL:** It's Ramzi Jammal, for the record.

I will support my colleagues with respect to the actions being provided, Madam President. However, I would like to push the fact that we're going to have to have a long-term actions being put in place and very short-term action being put in place.

Many of us who were in the field, there is practical solution, that it's the responsibility of the

licensee to dedicate now individuals solely -- again, I'm providing a recommendation. It's up to the Commission to accept what I'm providing.

So my recommendation would be, in addition to the program evaluation and as Chief Regulatory Operation Officer, I'm providing the following recommendation so that a short-term solution, it's licensee's responsibility to dedicate individuals who will do nothing but being trained for I-131, oversee the production of I-131, get evaluated, and then they are dedicated.

We will provide you an update to the Commission via a memorandum via the secretariat that the short-term implementation is done to the satisfactory of staff and then we'll move on to the long-term element with respect to the program.

Again, this is not a removing responsibility by the licensee for their safety and the responsibility is for safety at all times, but we are taking risk -- assessment of the risk and to ensure there is adequate supply and the training is being done while inventory is available for Canadians.

**THE PRESIDENT:** Thank you.

Mr. Gagnon, any comments from you on what staff is recommending?

**MR. GAGNON:** André Gagnon, for the record.

Obviously we already are committed to dedicated staff to that business unit. We have transformed that unit probably a year ago to a -- we call it iodine production unit, so definitely the staff that's going to be there is going to be trained there. And this -- this unit is going to be seen differently as other units are because of the level of risk. And indeed, that's where we're going with our -- the production of iodine in Canada for us. Yes.

**MR. JAMMAL:** It's Ramzi Jammal, for the record, Madam President.

So by when are you going to get this training done?

**MR. GAGNON:** I would say immediately. My -- I would defer to Valerie to tell me when, actually, she has scheduled the training to start right away.

**MS PHELAN:** So we've had a lot of -- we are working right now, actually, on strengthening and developing new procedures and forms, so as soon as these -- and involving the individuals who are working currently in the -- what we call the I-131 team in developing them as well to try and get a little bit more buy-in into the procedures and the -- what needs to be done for radiation safety specifically with regards to iodine production.

And then as soon as these have been --

drafts have been sent to the CNSC, once these have been reviewed by them, commented, we will approve them and finalize them and deliver training to all the staff.

As well not just training on paper, but we are looking at starting up the new facility, and there will be dry runs made with no radioactive material. And these will also be vetted in person for the actual process as it's happening, and not just the process and review of procedures and training on paper, but as well more on-the-job training checklists along that line.

So that will not be done until -- when we are ready for the new production.

The expectation is to wait for starting up production again in the new rooms that we have been designing in the past -- this past year, so that's the intent.

**THE PRESIDENT:** I'm sorry. So from all that, I really didn't get a sense of timing as to when. Is this all when you expect to move in to your new facility and a prerequisite to that is to make sure you've got your procedures updated, people trained and the appropriate oversight available or is there something more urgent that needs to be done now?

**MS PHELAN:** I mean, at this point we can train -- individuals are being trained on the end of day

monitoring because this is something that's applying across the board, not just for the iodine team, because for the time being right now the iodine team is not doing any work. We are not doing any production. We will not be handling directly any iodine products.

So it is the time to -- and my intention as Corporate RSO is to not allow the therapeutic production to occur until we have a -- one of the other issues that was brought up by Colin Moses on the release, so the investigation that needs to happen on this.

I would not expect any iodine production to happen until the new facility is ready, which timelines at this point are towards the end of January of 2019, which gives us time during this time to confirm investigation, update SOPs, training of individuals and having all that in place prior to any iodine actually being handled in any way, shape or form.

**THE PRESIDENT:** Thank you.

Mr. Jammal?

**MR. JAMMAL:** It's Ramzi Jammal, for the record.

My recommendation would be as Chief Regulatory Operations Officer to the Commission, Madam President, is the licensee must inform the Commission via the secretariat if they foresee any shortage of supplies to

Canadians. And that should be an obligation on the licensee to inform us so we can reassess with respect to the training. And we do not want to be on a critical path with respect to safety, number one. Second is supply -- is safe supply for the Canadians.

**THE PRESIDENT:** Thank you.

Members. Mr. Berube.

**MEMBER BERUBE:** Just one other question. Maybe I missed it, but what is the current disposition of the affected employee? What's going on right now?

They're off work. What are you doing with them?

**MS PHELAN:** Yes, so right now they are working -- actually, they are the ones working on the SOPs, procedures, helping to develop them, are more involved mostly doing paperwork, desk-related applications. So they're not working in the laboratory at this time. And not until the end of the year, as the dosimetry period is for the whole fiscal year. And we are looking at applying to the CNSC to request him perhaps to go back into the lab in 2019, but will not do so unless we get permission.

**MEMBER DEMETER:** So the other part to the business are largely gamma emitters. Has CNSC noticed any issues with whole body or extremity dose from these facilities for nuclear energy workers?

**MR. MOSES:** Colin Moses, for the record.

I'll let Mr. Jonathan Schmidt speak to the review of that.

**MR. SCHMIDT:** Jonathan Schmidt, for the record.

So we have established a quarterly meeting with Isologic to talk about various topics, and one of those is the dose to workers. So at that meeting, we review with them the whole body dose and the extremity dose.

And we have noticed in discussions that there have been a number of action levels that have been exceeded regarding the extremity dose. And we've had discussions about that and we understand that Isologic is putting in place certain measures and they're tracking parameters to help reduce that dose. It's probably best to ask Isologic to respond specifically on the measures that they're taking.

**MEMBER DEMETER:** Please do, I mean, if you've exceeded some action levels with extremity doses, is it lack of staff rotation, is it ... what is the reason for that?

**MS PHELAN:** Perhaps I can answer that a little bit better. So Valerie from Isologic.

So we have been -- identified at the



beginning the way the rotations were done with compounding and dispensing with only two compounders spending the whole night compounding products. We've since then broken it down into four compounding schedules that are rotating more individuals as well as the type of products that are being made in each rotation are different, providing a little bit of relief on the products that provide either because of the activity or the number of products that typically are ordered is large volume, those rotations only will happen less frequently for each individual.

We're also monitoring individuals' ratios, so how individuals are, what's the average millisieverts received per curie handled. We see some individuals that are doing very, very good. Comparing that to other facilities that do the same kind of work, our average seems to be the average ratio.

However, we have a few individuals that are above that. So it's also being tied into performance for the individual staff, and trying to identify -- we're setting up some detectors to try and identify more what's happening. Is there contamination happening in the hoods.

We're also -- we've introduced some slightly better shielding, so for example, a shielding tungsten pot that has a slightly more narrow opening for the vial septum. Because of the aseptic techniques, the

way you have to go into the vial with the syringe can lead to some exposures to the hands. And we noticed that -- did some testing and noticed a 20 per cent reduction in exposure between the standard pot that's being used with a wide open area at the top where the vial septum is versus the new tungsten. So we are starting to introduce these into the process.

**MEMBER DEMETER:** So I think overall my message is that there's significant amount of work to be done in radiation protection, especially if you're in the business of predominantly dispensing radiopharmaceuticals. This skin contamination and the action levels for extremities are concerning.

**MR. GAGNON:** Andre Gagnon, for the record.

Just want to add a couple things to this. The fact is, just to put things in perspective, in Canada before you had multiple companies or vendors that were providing the service we do. We now are the only company that provides across the large central Canada, Ontario and Quebec, radiopharmacy services. So what you have now is a concentration of radiopharmacy services. It's probably one of the largest pharmacies in the world, where we provide probably 1,300 doses a day in Burlington. Overall about 2,500 patient doses a day every day at Isologic.

So obviously there's a lot of work and a

lot of thought are going into how to conduct business. We're looking -- we've looked at robots for different things. That's why we have a robot for iodine. There's many things that we're looking at in order to protect our employees and try to do more. But and actually, it's a work in progress all the time. It's a dynamic business. We're trying to do better all the time, so.

But just to put things in perspective, it's a lot of doses. It's like I said probably one of the largest pharmacies in the world that provide doses for the Ontario area.

**THE PRESIDENT:** So thank you for that. This, as you can see, is one of great concern to the Commission and to the staff. We will be deliberating on what we've heard and then come up with the appropriate action plan and recommendations.

So again, thank you to staff for a very good CMD on this, and thank you for your participation.

This concludes the public meeting of the Commission. Thank you, all.

--- Whereupon the meeting concluded at 3:54 p.m. /

La réunion est terminée à 15 h 54