**Canadian Nuclear Safety Commission**

**Commission canadienne de sûreté nucléaire**

**Public meeting**

**Réunion publique**

**March 15th, 2018**

**Le 15 mars 2018**

Public Hearing Room
14th floor
280 Slater Street
Ottawa, Ontario

Salle des audiences publiques
14e étage
280, rue Slater
Ottawa (Ontario)

**Commission Members present**

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

**Commissaires présents**

M. Michael Binder
Mme Rumina Velshi
Dr Sandor Demeter
Mme Kathy Penney
M. Timothy Berube

**Assistant Secretary:**

Ms Kelly McGee

**Secrétaire-adjointe:**

Mme Kelly McGee

**General Counsel:**

Ms Lisa Thiele

**Avocate générale :**

Me Lisa Thiele

**TABLE OF CONTENTS**


| | PAGE |
|---|---|
| Opening Remarks | 1 |
| CMD 18-M6.B<br>Adoption of Agenda | 3 |
| CMD 18-M7<br>Approval of Minutes of Commission Meeting held on December 13 and 14, 2017 | 4 |
| CMD 18-M8<br>Approval of Minutes of Commission Meeting held on January 23, 2018 | 4 |
| CMD 18-M9<br>Oral presentation by CNSC staff | 6 |
| CMD 18-M13<br>Oral presentation by CNSC staff | 19 |
| CMD 18-M13.1<br>Oral presentation by Bruce Power | 21 |
| CMD 18-M14<br>Oral presentation by CNSC staff | 44 |
| CMD 18-M12/18-M12.A<br>Oral presentation by CNSC staff | 74 |
| CMD 18-M11/18-M11.A<br>Oral presentation by CNSC staff | 125 |
| CMD 18-M15<br>Oral presentation by CNSC staff | 198 |
| CMD 18-M16<br>Oral presentation by CNSC staff | 216 |
| CMD 18-M18<br>Oral presentation by CNSC staff | 222 |
| CMD 18-M10/18-M10.A<br>Oral presentation by CNSC Staff | 235 |

Ottawa, Ontario / Ottawa (Ontario)

--- Upon commencing on Thursday, March 15, 2018
at 9:01 a.m. / La réunion publique débute
le jeudi 15 mars 2018 à 9 h 01

**Opening Remarks**

**MS McGEE:** Good morning, Ladies and Gentlemen. Bonjour à tous. Welcome to the public meeting of the Canadian Nuclear Safety Commission.

My name is Kelly McGee. Je suis la secrétaire-adjointe de la Commission, et j'aimerais aborder certains aspects touchant le déroulement de la réunion.

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 for the interpretation devices is on channel 1.

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

La transcription sera disponible sur le site Web de la Commission dès la semaine prochaine.

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

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

Monsieur Binder, président et premier dirigeant de la CCSN, va présider la réunion publique d'aujourd'hui.

Président Binder.

**THE PRESIDENT:** Thank you.

Good morning and welcome to the meeting of the Canadian Nuclear Safety Commission, and welcome to all of you who are joining us via webcast and teleconference.

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

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

I would like to start by introducing the Members of the Commission. It is a real pleasure to welcome back Ms Rumina Velshi and Dr. Sandor Demeter, and also to welcome our new Commissioners, Ms Kathy Penney and

Mr. Timothy Berube.

A fifth Commissioner was also appointed by the Governor in Council. However, he was not able to take part this week. His name is Dr. Marcel Lacroix and he will be joining us in the April 4 proceedings.

We heard from Kelly McGee, our Commission Secretary, and we also have with us here on the podium Ms Lisa Thiele, Senior General Counsel to the Commission.

**MS McGEE:** The *Nuclear Safety and Control Act* authorizes the Commission to hold meetings for the conduct of its business.

Please refer to the revised agenda that was published on March 13th, 2018 for the complete list of items to be presented today.

**CMD 18-M6.B**

**Adoption of Agenda**

**THE PRESIDENT:** With this information, I would like to call for the adoption of the agenda, as outlined in CMD 18-M6.B.

Do we have concurrence?

For the record, the agenda is adopted.

**CMD 18-M7**

**Approval of Minutes of Commission Meeting**

**held on December 13 and 14, 2017**

**THE PRESIDENT:** I would like to call now for the approval of the Minutes of the Commission meetings held in December 2017 and January of this year. The draft minutes are outlined in CMD 18-M7.

Any comments, additions?

Just to note that Dr. McEwan and Dr. Soliman and Mr. Seeley, who participated in the December 13-14 meeting, have secretarially approved the minutes.

So for the record the minutes are approved.

--- Pause

**CMD 18-M8**

**Approval of Minutes of Commission Meeting**

**held on January 23, 2018**

**THE PRESIDENT:** Okay. So we now have to approve the January 23rd, 2018 minutes, as outlined in CMD 18-M8.

Again it's the same kind of a process,

they were approved secretarially.

So if there are no comments, for the record the minutes are approved.

Anything else I have to put?

**MS McGEE:** No.

**THE PRESIDENT:** Good. Thank you.

Okay, so the first item on the agenda for today is the Status Report on Power Reactors, which is under CMD 18-M9.

I understand that we have some people joining us via teleconference, so let's test the technology.

NB Power, can you hear us?

**MR. GAUTHIER:** Yes. Good morning. Rick Gauthier, Director of Performance Improvement, Regulatory and Community Affairs. I can hear you loud and clear, thank you.

**THE PRESIDENT:** Thank you.

OPG Darlington?

**MR. VULANOVIC:** Yes. Boris Vulanovic, Director of Operations and Maintenance for the refurbishment projects. We can hear you.

**THE PRESIDENT:** Okay.

OPG Pickering?

**MR. GEOFROY:** Richard Geofroy, Acting

Plant Manager for Pickering. We can hear you.

**THE PRESIDENT:** Thank you.

Mr. Frappier, over to you.

**CMD 18-M9**

**Oral presentation by CNSC staff**

**MR. FRAPPIER:** Thank you.

Thank you and good morning Mr. President and Members of the Commission. For the record, my name is Gerry Frappier, I am the Director General of the Directorate of Power Reactor Regulation.

With me today are our Power Reactor Regulatory Program Division Directors plus technical support staff who are available to respond to questions on the Status Report on Power Reactors which is presented in CMD 18-M9.

Also, we have representatives of licensees available and, as you noted, some are on telecon.

As you will note, the CMD status report was as of March 7th, 2018 and so I would like to provide the following verbal updates to that status report.

First, with respect to Bruce A Unit 2, it was placed into an unplanned outage on March 11th. This was executed to allow installation of enhanced monitoring

on the primary heat transport pumps.

At Darlington Unit 2, the refurbishment unit -- or the unit in refurbishment, on March 8th CNSC inspectors and OPG identified deficiencies in radiation safety practices and OPG took the decision to stop work in all contamination control areas, commonly referred to as rubber areas. OPG Radiation Health Physicist and Radiation Protection Manager are leading full radiological assessments and radiological characterization of every contamination control areas associated with refurbishment work to ensure that appropriate protective measures are in place. All contamination control areas were assessed and returned to service. CNSC staff are following up and these issues will be included in the scope of the current reactive inspection being conducted at Darlington Unit 2.

With respect to Pickering Unit 4, it is currently in a guaranteed shutdown state after entering a planned outage which occurred late on March 7th.

Also at Pickering, Pickering Nuclear management proactively conducted a safety stand-down on the morning of March 12th of all its operations and contractor staff to reinforce the expectation that safety comes first when performing every job. This was in response to an observed negative trend around several work protection wrong unit and device events. Although none of the events

had serious consequences, it did indicate that there was a lack of risk perception and improper verification activities that could have affected personal safety.

CNSC staff had raised similar concerns regarding these recent events as they also observed a negative trend. Staff continue to survey and monitor the effectiveness of the work protection practices that are in place.

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

**THE PRESIDENT:** Thank you.

So let's start with Dr. Demeter.

**MEMBER DEMETER:** Thank you. I will reserve some of the questions for the EIR's that are coming up, but for the Darlington transformer overheat situation, is there a root cause analysis as to why the transformer overheated? Is there any potential this is a systems issue or was it a defective transformer? I just wanted to get some more sense of the root cause analysis for the transformer overheating.

**MR. MANLEY:** Robin Manley, for the record. I am the Vice President Nuclear Regulatory Affairs at Ontario Power Generation.

Before I turn the rest of the answer over

to Boris Vulanovic, Refurbishment, I would simply state that this was a very low safety significance event and there was no impact on public or worker safety, but Boris perhaps could provide more details to your specific question.

**MR. VULANOVIC:** Yes. Boris Vulanovic, for the record.

With respect to the understanding of the root cause for this, we did determine in our investigation that there was a breakthrough in the development of the testing procedure where the circulating current for the new equipment being supplied for this transformer had not been accommodated and essentially we had drawn more than planned current from the transformer, which elevated its temperature and resulted in overheating the insulation in the transformer itself. So we have taken corrective action around that and have also done an extended condition with respect to the breakthrough on that procedure for any testing involved with those transformers and the new equipment being installed.

**MEMBER DEMETER:** Okay, thank you.

**THE PRESIDENT:** Ms Velshi...?

**MEMBER VELSHI:** Thank you.

So I'm very concerned to hear about the Darlington, the Pickering, the earlier Darlington

stand-down that you have had because of safety issues and if one were to take a step back -- and I know we will talk about it when we talk about the Darlington incident, the EIR, but taking a step back, maybe OPG can comment on why these disturbing trends and anything common and how effective are these stand-downs and is it complacency that's being set in and how disturbing is this?

**MR. MANLEY:** Robin Manley, for the record. So I will give a general response and then if you have a specific question around either the Darlington or Pickering then I would turn it to the appropriate person which we have on the phone.

But let me say overall that OPG has set a goal of zero workplace injuries. That's what we aim for. So in order to reach zero you have to have very high standards about what you tolerate and what you don't tolerate. So we take proactive measures as early as we see any kind of trend developing so that we don't get to a serious event, right? So the fact that we track, trend, report on, communicate to our workers, the regulator or publicly when we have low level indicator events is a safety pause, it's a safety reflection action that we take so that we don't get an event where someone is seriously injured, right?

So if you look for example, if I may pick

Pickering's personnel safety performance last year, we went three quarters of the year with no injuries whatsoever. It was the best record in the history of the plant and the overall safety performance of the company as a whole last year was very good. If you look at for example the data that's reported in the Regulatory Oversight Reports at the CNSC every August you will see the trend, that we have an exceedingly good safety performance record. One of the reasons for that is the actions that we take to communicate and say to our staff, take a break, everybody just pause and reflect on what's going on so that we don't get trapped in some sort of production imperative and we don't say we just have to get on with it. No, no, you have to stop, slow down, look after each other. So that's why we take this kind of measure. It's an industry standard best practice tool and we think that it actually helps prevent more serious events from happening.

**MEMBER VELSHI:** So in my previous five-year term here on the Commission I just hadn't seen such frequency of stand-downs and here are three within a few months. So I know you are saying it's an industry best practice to, you know, take a pause. The occurrence of this seems rather frequent; is that a correct interpretation?

**MR. MANLEY:** Well, I would say -- Robin

Manley, for the record -- I would say that our safety performance is improving, not worsening overall, right? If you look at the number of high maximum potential events that could have happened last year, we actually bettered our target, and within the operations of Ontario Power Generation nuclear organization we had a greatly reduced number of high MRPH events last year and that's a reflection of the kind of actions that we take. So the fact that we might have more safety pauses than we had in the past isn't indicative of worsening performance, rather it's indicative of a stronger use of this tool to prevent more serious events from happening.

**MEMBER VELSHI:** So tell me a bit more about the injury at Darlington that's reported in the February 26th. It says there was a trip, worker got injured, but doesn't give any more detail on the nature of the injury. Was this a lost time injury? How serious was this?

**MR. MANLEY:** I'm sorry. Robin Manley for the record. I'm going to ask Boris Vulanovic to expand on that. Thank you.

**MR. VULANOVIC:** This is Boris Vulanovic, for the record.

So the details of the event, this was a Radiation Protection Technician that was working in a

rubber area, a contamination control area, and while traversing, essentially walking through the rubber area tripped over a pallet lifter, fell and caught himself with his hand and in doing so suffered a fracture to the wrist. This did not result in a lost time accident to the worker. They were responded to appropriately by our staff and sent to hospital for evaluation and that's where we had determined that they had in fact suffered a fracture. So they did return to work on their next scheduled shift on modified duties.

To add to this, we take housekeeping very seriously and we do have a program in place addressing these. Immediate corrective actions were taken around the work area that they had, but it is an indication that some of these injuries can happen that simply based on the material condition of the work environment.

**MEMBER VELSHI:** Thank you.

**THE PRESIDENT:** Thank you.

Mr. Berube...?

**MEMBER BERUBE:** I have no questions [off microphone].

**THE PRESIDENT:** Ms Penney...?

**MEMBER PENNEY:** Indeed, safety stand-downs and pauses are best practice and sometimes reflect a good safety culture, which we are going to talk about more this

afternoon. I was interested in your negative trending around the wrong unit and I think I heard "and device events", and so if you could just give me a little bit more information about that.

**MR. FRAPPIER:** Gerry Frappier, for the record. I will ask Mr. Ed Leader, who is our site supervisor at Pickering, to give the CNSC viewpoint on that and then perhaps the Pickering DOM would like to add to that.

**MR. LEADER:** Ed Leader, Power Reactor Site Office Supervisor, for the record.

So my understanding is that the events were related to depending on a procedure rather than the actual work protection instructions on the wrong device. OPG has enhanced the requirements for work protection to use the procedure in hand rather than a reference, so we have seen that as a positive corrective action to enhance the compliance with work protection. The rest of the details I would ask OPG to provide on their own unit event.

**THE PRESIDENT:** Before you go away on this, I distinctly heard that CNSC staff also noticed the trend. I'm trying to understand who noticed the trend first, the staff or OPG.

**MR. LEADER:** I think that -- Ed Leader, for the record. As part of our compliance activities we do

surveillance and monitoring of the operations and when we start to see something that is going in a negative direction we have regular meetings, weekly meetings with the Operations Director of Maintenance and Engineering and we will raise those issues. OPG reports issues first, so I'm not sure who was first, but I believe that our compliance activities are effective in identifying these trends.

**MR. FRAPPIER:** Gerry Frappier, for the record. Maybe just to add, because I have a couple of dates in front of me.

So yes, site staff had talked to OPG management on both February 20th and March 6th. I think that OPG itself has its own sort of information gathering abilities, but all that culminated in a decision on March 12th by OPG to do I think the corrective action and, as was mentioned by Ms Penney, these sort of stand-downs are a very good tool to get everybody's attention and have everybody stop and look at what's going on and hopefully reverse any negative trends. But perhaps our colleague from Pickering would like to add with respect to the specific events.

**THE PRESIDENT:** Just so you understand what my concerns are, we are going to talk about safety culture, so what I'm trying to understand, is it a

compliance culture or safety culture, two different things? We are going to talk about that a bit later on. And it's one thing if the stand-down is because the regulator said you should do something or the safety culture that promotes the stand-down. If somebody can --

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

So I think that's a very good point and its coming to Ms Velshi's point of why we are seeing more of this, is I think we are looking at a trend from being a compliance culture to really ingrained safety culture from the licensee, although they have always had a strong safety culture. In all of these cases of safety stand-down it was the licensee on their own that have decided what steps were appropriate to make, they did not need to be directed by the regulator.

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

I concur with Mr. Frappier's remark. It is our accountability to take the right actions to protect the public and our workers and that's what we do. And perhaps our Operations Manager at Pickering, Richard Geofroy, could expand a little bit about how the leadership of the plant takes these actions and looks for trends.

**MR. GEOFROY:** Thanks, Robin.

So Richard Geofroy, acting plant manager,

for the record.

So a lot has been said on the subject already. I'm not sure I can add too much.

What I will say is that as the operations manager and acting DOM, we do monitor low-level trends very closely. Those low-level events are discussed daily as part of our leadership team meetings. And we look to take action early to take the initiative and prevent, you know, more significant events. So that's built in to our regular processes.

We also communicate those low-level events to the regulator so that they are aware of the events and of the actions that we're taking.

For the specific event being discussed, it essentially was an operator doing a walk-down to verify or to confirm the state of a number of devices that entered the wrong unit. No devices were operated. No one was put at risk as a result of those activities. Rowe raised the issue to his supervisor, and then which we responded to immediately.

End of comment.

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

Back to Dr. Demeter.

Ms Velshi?

Ms Penney?

Okay, I got for Bruce A and B, it says "Unit 2 derated due to turbine steam valve issues." I mean, that's really not helpful description. What valve issues? When you would say issues, tell me what issues we're talking about.

**MR. BURTON:** Maury Burton, for the record. I'm the Regulatory Affairs manager for Bruce Power.

On unit 2, we have -- each unit has four emergency stop valves. And we can shut one for maintenance. So we were having a timing issue with the closing of this valve, so what we did was actually took it out of service, shut it, and derated the unit but continued to operate while we did troubleshooting on the valve. So we're slightly derated with that value in a safe state while we do troubleshooting.

The unit is now shut down and the intent is to perform maintenance and correct that issue while the unit's shut down.

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

Anything else, anybody? Anything else?

Okay, thank you.

The next item is the Event Initial Report regarding a failure of the primary heat transport pump seals at Bruce A unit 4 nuclear generating station.

This is outlined in CMD 18-M13.

Okay, I don't know who is going to make the presentation. I'm going to pass it on to you.

**CMD 18-M13**

**Oral presentation by CNSC staff**

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

Yes, we thought this event was worthy of an EIR, and I would ask the responsible director, Mr. Luc Sigouin, to provide a few more details.

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

Good morning. My name is Luc Sigouin. I'm the Bruce Regulatory Program director here at CNSC. With me is senior CNSC site inspective Jeff Stevenson, as well as Scott Langille, regulatory program officer.

I understand that you have detailed copy of the event initial report, so I'll just go through an overview of the event and that will lead us to be able to answer any questions that you may have.

In the early morning of March 4th, 2018, Bruce A unit 4 was operating at power when indication of a potential problem with a primary heat transport pump was received in the main control room.

Operators initiated shutdown, and the

reactor was shut down promptly.

One of the four primary heat transport pumps, specifically pump number 4, had a leak on the gland seal. A gland seal serves to keep heat transport fluid, or heavy water, from escaping from around the rotating shaft of the pump.

Approximately five drums of heavy water leaked out through the gland seal and into a diked area with a collection drain designed for this purpose. This area is in the powerhouse part of the station outside of reactor containment.

The leak of heavy water caused a tritium and loose contamination hazard in the area. As a precautionary measure, access to Bruce A was limited to essential personnel only.

Cleanup occurred in accordance with radiation protection procedures, using appropriate personnel protective equipment.

Bruce Power immediately initiated formal investigation activities, and as a result Bruce Power proactively shut down unit 2 on Sunday, March 11th, to take preventative maintenance to address possible issues on one of the primary heat transport pumps on unit 2.

Unit 4 remains shut down as a planned maintenance outage had been scheduled to begin on March

8th.

CNSC staff performed a reactive type 2 inspection on March 8th. We are assessing Bruce Power's actions and inspection results, and will determine what regulatory oversight activities need to be taken.

CNSC staff are available to answer any questions, but I understand that Bruce Power has a presentation for the Commission on this topic.

**THE PRESIDENT:** Thank you. Well, let's hear it from Bruce Power, then.

**CMD 18-M13.1**

**Oral presentation by Bruce Power**

**MR. BURTON:** Once again, Maury Burton, Regulatory Affairs manager for Bruce Power, for the record.

I don't think I'll go through the full presentation here because Mr. Sigouin has covered a lot of it. But there are some pictures here that I think will be very helpful, particularly for the new commissioners so that they understand.

**THE PRESIDENT:** We like pictures.

**MR. BURTON:** Yes.

--- Laughter / Rires

**THE PRESIDENT:** So go through the

presentation.

**MR. BURTON:** And that's why we brought them.

So this first picture shows basically a schematic of the pump. On the left side is the full pump motor assembly with the pump below, and shows the shaft and whatnot. And then on the right-hand side is a close-up of the cross-section of the pump, pump shaft seal, and the pump-to-motor coupling, which the seal of course is the boundary between the heavy water in the primary heat transport and the pump stool region of the assembly.

The next slide here actually shows a close-up of the seal assembly. At this point in time, we have not started disassembling this pump motor due to heat synch considerations with the unit, so in the next couple days, once we get into the proper configuration, we will drain the heat transport system to the point where we can start disassembly. And then once we disassemble the components, we will be sending them to Canadian Nuclear Laboratories to provide a controlled environment for forensics so that we can understand the failure mechanism here.

As the Commission is aware -- maybe not the new commissioners -- but we did have a similar type of event on unit 3 in August of last year while we were

shutting the unit down. The forensics there did not really provide the answers that we were looking for, due to the damage to the components. So in this one, we are hoping to get some more information from the forensics so that we can take proper corrective actions to prevent reoccurrence.

This next slide is just a general picture of the area the pumps are in. At the bottom of the picture is actually -- it's set up as a sump. The plant is designed for these type of events, and that area is designed to contain water in the event of a pump seal failure. There is also collection provisions inside the pump stool. If you have a very big leak or multiple pump seal failure on multiple pumps, you could end up with water in this area, and that's the area right now that CNSC staff was talking about where cleanup activities are taking place to remove loose contamination hazards.

This next slide basically shows some background. I think CNSC staff covered most of this already. The one thing that they didn't mention is that we did activate our emergency response organization. For an event like this, we wouldn't necessarily need to, but in our view, since Fukushima, we've changed over to an all-hazards type approach.

And we believe it's good practice to actually activate these folks to provide assistance to our

staff in the stations so that they can -- everybody understands we have multi-unit stations. So they three other units that they still need to monitor and ensure are operating safely. And standing up the emergency response organization gives that extra staff -- makes them available so that the staff in the station can concentrate on the event and ensuring that the units are in safe states while providing the extra staffing and resources that they need from the outside organization.

This was kind of covered by CNSC staff as well. So we are going to go into a complex troubleshooting process, disassemble the pump and seal and send it off to Canadian Nuclear Laboratories for forensics. And we will be conducting a root cause investigation on this event.

So in terms of consequences, I think Mr. Sigouin covered this. There were no abnormal radiation dose uptakes by our staff, and we have confirmed this through whole body counts and bioassays. A small increase in tritium in the area, and no release to the lake or the environment.

So in this case, as Mr. Sigouin had mentioned, we did limit staff to the area to prevent additional dose uptake until we had the area cleaned up.

Just as part of a history, since Bruce Power took over the site, we do have a maintenance program

that looks at these seals, and we've replaced approximately 100 of these seals through the eight units that we operate. There are 32 pumps, so with 32 pumps means we have 32 seals per station.

The seals generally -- we've seen various performance boundaries by them, but typically they have about an eight-year lifespan or service life before we proactively replace them. So it's usually every third maintenance outage, which are typically on a two-year cycle that we go in and replace these. So 82 percent have been proactively replaced. Others have shown signs of deterioration, which we have instrumentation to monitor in the control room. So this type of event is actually fairly rare that we see a sudden failure like this.

We also have an ongoing motor refurbishment project in place. Most of the Bruce B motors have been replaced at this point in time, and the Bruce A motors are halfway complete. During this current unit 4 outage, there will be at least one motor replaced as well, as part of our ongoing motor refurbishment program.

So ongoing actions. The one thing that we did look at from the unit 3 event was our vibration monitoring equipment that we had in place. For the Bruce A pumps, we only had one probe on the coupling, whereas Bruce B we have four on various places between the motor coupling

and shaft. So we've taken actions to improve the Bruce A vibration monitoring and bring it up to the same standard as Bruce B. That way, we believe we'll get better indication of deteriorating conditions. That's what -- we believe it's a vibration issue that's caused the failures. The forensics will give us more information on that, but that's the working theory at the moment.

So we will be -- we did proactively shut down unit 2, because we did have one pump based on the one probe that we have that was showing higher vibration than normal, so we're taking that -- we've taken that unit down and are going to replace the pump seal and ensure that the alignment of the shaft is within the tighter tolerances that we've set up. That unit will be returning to service in approximately eight days from now, so it was just shut down on Sunday night.

So moving on.

So just in summary, we've done a technical operability evaluation, which is part of our procedures for when we have this to look at operability of all the current units. Based on what we've seen, we did take some proactive measures to shut down unit 2 to ensure that we did not have another one of these events based on the data that we had. Troubleshooting and forensics are ongoing. We will be conducting a root cause investigation. As I

mentioned, the extent of condition review is complete, and actions have been taken to ensure safe operation. And long-term actions will be determined based on the forensics.

The one additional thing that I will mention is once we do have the forensics complete, we will be coming back to the Commission to provide an update on the situation and what we're doing long term to ensure that we do not have an event like this occur in the future.

I'm available for any questions that you may have.

**THE PRESIDENT:** Thank you.

So let's start with Ms Velshi.

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

Potentially how bad could this have been?

**MR. BURTON:** We do have safety analysis that looks at this. And in reality, it's a pretty minor event overall. The bigger concern would be if you had a concurrent event that had fuel damage at the same time, because what would happen then is that you have a pathway to the environment that's outside our venting capability or outside our containment capability. So this is a containment boundary issue, so that's where the big concern comes from for both us and I'm sure CNSC staff. I know that we've had a lot of conversations on this event already

with both site staff and staff here in Ottawa.

So the concern is that we lose the containment boundary. It's a small area for leakage, but at the same time we have also looked at our operating tolerances for radionuclides in the heat transport system and put higher tolerances on in the interim until we fully understand the failure mechanism.

**MEMBER VELSHI:** And is your root cause going to be looking at why all the things you're doing now was not done after the incident last year in unit 3? Because you could have learned all of this from then and prevented it.

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

The actions from the unit 3 were planned and for the unit 4 the enhanced monitoring was planned to be installed in the upcoming -- well, the current outage. And unit 2 it was planned for its next maintenance outage. The op ex or operating experience that we had, we made the determination at the time -- which if you say hindsight is 20-20, it may have been wrong -- but it said the occurrence of this is so rare it did not warrant immediate shutdown of the units.

**MEMBER VELSHI:** Staff, any comments on that? And again, it's hindsight, but could this have been anticipated?

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

So as mentioned, this kind of failure is extremely rare. So when it happened in the summer, it got everybody concerned. It is a pathway outside of containment boundary for anything that would have been in the heat transport system. So there is certainly concern.

Given the rarity of the event, the fact that they were planning on making the fixes that we're talking about now in essentially the week after this, the incident had in turn happened, seemed a reasonable timeline to ourselves as well, including let's not forget the unit 2, which wouldn't have been done by now either. It was being planned for a future maintenance.

So there's always a bit of a question there of time at risk for things. But certainly given the experience that had been had on these seals, it did not seem an unreasonable risk to allow the licensees to take.

When the second occurrence happened, then we were quite satisfied and happy that they took the decision to bring unit 2 down immediately as opposed to waiting a few months. Perhaps the root causes analysis will show that there's some reason why all of a sudden this event is happening more frequently than past experience.

**THE PRESIDENT:** So just people talk about

the rarity, it doesn't happen very often. Is this pump purely for Bruce or the other operators -- Darlington, Point Lepreau, or internationally -- this is a GE pump. Is it uniquely designed for the CANDU machine or those seals exist in many, many other places and in which case you should have better data on how often that happens elsewhere.

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

Maybe I'll start, and then either Bruce or maybe Mr. Eric Lemoine would want to add to it.

So certainly op ex is shared and pumps and whatnot would certainly be one where operators worldwide would share any information that makes sense.

This is not a unique-unique situation, but there are certain aspects of it that are different than other CANDUs. Certainly from a CANDU 6 perspective, like what we have at Point Lepreau, this entire pump is within containment, so it's not straddling the boundary between containment and outside containment.

Darlington has a very similar design, however once you get into the details -- they're still a bit beyond me -- of the actual seal, it is a little bit different.

And with that, I would perhaps ask -- I

don't know if Bruce wants to comment on it first, but.

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

We actually do have the operating experience numbers. We looked at that from the unit 3 event, and at the time we only looked at the Bruce and Darlington units, because they are somewhat unique in the world where the pumps are actually outside of containment. So we were looking at it from a containment boundary issue.

And with the recent unit 4 event, we've now had four pump seal failures in over 350 years of reactor operation, so there was one at Darlington in the past, one in early operation of unit 2, and then the recent unit 3 and unit 4 failures. So if you look at it, four failures over 350 operating years, it's a rare occurrence. But as I mentioned earlier, it's something that is anticipated in our safety analysis and training of our operations staff, and we do have procedures to deal with it.

The actual seals are similar to what is used in Point Lepreau and CANDU 6 units internationally. But as Mr. Frappier mentioned, they are inside containment so the containment boundary issue is not a concern there for those units, where it is for ourselves and Darlington.

So we obviously want to get the forensics done, and we will be sharing the operating experience of

those forensics with not only OPG but Point Lepreau and other CANDU operators, because they use similar seals.

**THE PRESIDENT:** Sorry, I'm not understanding. So if the pump is inside the container, why wouldn't you still worry about this, and how would you detect it? How quickly do you detect this?

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

It's very quickly detectable. We do have alarms based on the inner seal pressure. So that is monitored in the control room. So when you see a rapid change in that pressure, we will get an alarm. And that's how the unit floor event basically propagated, was the operator got an alarm and responded appropriately to it.

As far as concern again, you do not want these seals to fail even if your pumps are inside containment, but from a public dose type of concern, being inside containment gives you that extra boundary of protection.

So it's a bigger concern for the Bruce design and the Darlington design than the other designs. However, yes, you do not want these seals to fail at any point in time.

**THE PRESIDENT:** Thank you.

Dr. Demeter...?

**MEMBER DEMETER:** Thank you.

Sort of a two-part -- first, I just need a clarification on what's meant by loose contamination, what that constitutes.

But the question I have is, so you have this leak and the number of people affected was 30, and given the nature of the reactor decay of tritium, once you put on the PPE the dose should be like zero, mainly beta. But there were still some dose received by individuals. Are these the individuals that were leaving when the alarm went off that the...

Given the nature of tritium and dose, I am trying to figure out how, you know, he got any dose out of this and what is the sequence between noticing it happened, how long it took to evacuate people without PPE, and what's the -- the loose contamination is just something that might help contribute to the question.

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

I'll address the loose contamination part first. In the heat transport system, because we do have contact with fuel and there are both activation products from the system itself and you do occasionally get failed fuel, so those things you do get some vision products in the heat transport system at times. You will get some loose contamination that once you dry out, for lack of a better word, will be there from when after you clean up the

water.

So it's really getting those activation products, which could be cobalt-60 or other, and possibly some vision products from -- we call it failed fuel, but it's minor, either fretting damage or other minor imperfections in the fuel bundles themselves that allow activation products to get out from the fuel sheath.

As for the timing, I do not have the timing available. I'm not sure if CNSC staff do, but I don't have that at hand for the activation time. I see Mr. Stevenson is kind of waving, so he must have that information at hand. So I'll pass it over to CNSC staff for that one.

**MEMBER DEMETER:** Before I -- so now understand some of those contamination may pose some gamma risk as well as the beta.

So what I am really trying to drill down to is I know that those dose limits were exceeded. I'm trying to figure out whether there was any dose at all and where that dose came from and who these 30 people are.

**MR. BURTON:** Yeah, and for that, like the area where the pumps are that I showed you in the picture earlier, there are doses from just -- from normal operation. It is -- and it's mainly activation products that are -- because you're in the area where you're very

close to the reactor. And the shielding, although it is good in that area for biological purposes, you still have some dose that -- the gamma dose that is going to be always in that area. So that's where some of the dose will come in.

I'll pass it over to Mr. Stevenson for the timing part of it.

**THE PRESIDENT:** Let's say from a perspective -- go ahead, please.

**MR. STEVENSON:** Jeff Stevenson, Senior Site Inspector, for the record.

So just to bring us back to the timelines that you're interested in, so this event happened on Sunday night on March 4th. So there were no people in the area at the time that the week developed and the operators in the control room knew that there was a problem with the pumps, and based on the experience from Unit 3, all the first responders were sent to the area expecting a heavy water leak.

So the PPE that they were using at the time were double plastics, which is the standard PPE for this type of event. And even though they're wearing the PPE, it does have a dose reduction factor of about 100 for tritium protection. So with the tritium hazard in the air, you would still get some tritium uptake because the dose

reduction factor from the plastic suits will take it down, but as we note, it is very minimal based on the measures that were put in place.

**MEMBER DEMETER:** So did they go in with respirators?

**MR. STEVENSON:** Jeff Stevenson, for the record.

So the double plastic suit is a full-body respirator that's connected to an external air header.

**MEMBER DEMETER:** Yeah, I think I understand. So the dose was actually to the people who went to investigate and mitigate it, and the dose would be a combination of whatever tritium got through their PPE and the gamma?

**MR. STEVENSON:** Jeff Stevenson, for the record.

Yes, that's correct. It's about 60 percent of the dose came from tritium and about 40 percent of the dose came from the external gamma.

**MEMBER DEMETER:** Okay, thank you.

**THE PRESIDENT:** Thank you.

Mr. Berube...?

**MEMBER BERUBE:** Yeah, given that this triple-seal failure is rare, and it sounds like it is and it makes sense from an insurance standpoint, we have seen

two in six months, which leads me to believe that the envelope on operating might be too long for maintenance shutdown and actually looking at these things.

I don't know if staff would concur on that. This may be an anomaly or this may be symptomatic of a larger issue.

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

So certainly there would seem to be something that has changed that you all of a sudden get this rate and, as we mentioned, CNSC is going to continue with our inspection, with a reactive inspection on this, but also with a broader assessment.

And your point as to whether they have changed the maintenance approach will certainly be something that we would be looking at. There's also a potential for tolerance build-ups that perhaps have changed with that.

I'm not sure if Bruce Power wants to speak of anything that they know of at this point. From our perspective at this point, we're still looking into it, so we will come back to the Commission once we have a better sense of both why this all of a sudden happened and then obviously what are the appropriate remedial things to be doing.

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

Not a whole lot to add there. As far as seal life that is something that we will be taking into consideration in the root cause. As I mentioned earlier during my presentation, we typically see good seal health for a period of eight years. Beyond that it gets -- we have seen deterioration in performance.

So our current maintenance plan is to not allow these seals to operate beyond eight years. We will be looking obviously at that during the root cause.

The seals in particular that we're talking about here were both replaced in previous maintenance outages. So the Unit 3 seal only had one year operation on it and the Unit 4 seal itself, I don't have the exact operating period on it, but I do not believe it was longer than two years. So that's something that we need to take into consideration during the root cause.

And the forensics is the maintenance program itself and ensuring that we are replacing these things at an appropriate time period.

**MEMBER BERUBE:** Just in addition to that, given that we have seen this twice now in the last six months, roughly, what is the worst case scenario for a leak in this case? Are we looking at a problem with, you know, enough water in the primary heat transport system at all,

or did we detect well before that? You know, how certain are we that this is not an issue?

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

Certainly any time we have a containment boundary issue there is concern from our perspective. There is concern for what could happen, like in the case here where there is certainly some tritiated water that's been released into the reactor building, if you like.

But also, we take a look at what are all the different accident potentials and if a certain accident happened at exactly the same time as this could it be worse? And the answer is "yes".

The key thing here is that with this type of failure you're releasing the water, the coolant water within the primary heat transport system, which normally does not have too much contamination in it, but under certain accident scenarios might have quite a bit of contamination. That would be the biggest concern we have. Again, though, it's even more rare to have this failure at the same time as you'd have some kind of fuel failure.

I think for immediate mitigation in that, in one of the items Mr. Maury (sic) had mentioned is that they are tightening up their allowances for contamination within the primary heat transport, so they'll run that

cleaner than, strictly speaking, is required. So that if there is a leak again, it minimizes the amount of radiation that would be escaping into the -- where the pumps are located.

If I could come back to your previous question, though, I'd just like to give an opportunity to our technical lead on this, Mr. Eric Lemoine, to perhaps comment on that.

**MR. LEMOINE:** So in terms of worst case scenario, in terms of how much water leaked, so in the safety analysis it assumes 100 mega-grams has leaked and that there are 43 fuel defects in the reactor.

In this particular case, there was the event in August. There was less than 7 mega-grams that were released. In the event from March 4th there was around 1 mega-gram that was released.

**MR. GRANT:** For the record, Wade Grant, if I can add to that.

Your question about cooling of the reactor, the normal make-up capabilities for a reactor about 50 kilograms per second, so as long as the leak rate is below that there is no concern with respect to fuel cooling or inventory.

The leak rate, in the worst case scenario analyzed in the safety case, which is quite extreme, in

this case only assumes about 7 to 10 kilograms per second. So the reactor never has a concern with respect to fuel cooling or inventory make-up.

**THE PRESIDENT:** Okay, we'll wait for the full report. But we still haven't heard from Ms Penney.

**MEMBER PENNEY:** A quick new Commissioner question. What do you do with the five drums of heavy water?

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

Those drums will be taken to -- they will be kept within the station and what we will do is we will run them through. We have a clean-up and upgrading facility so that we will clean-up, make sure there is no dirt or impurities, and then upgrade it. Once you get outside containment, we run with fairly pure heavy water, so we have an upgrading facility to bring it back up into our tolerances. So it will be -- essentially, it will be recycled.

**MEMBER VELSHI:** So what exactly were the doses that were received by the workers?

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

The doses that were received are listed in the event initial report and I'll just read them out to you. The total dose attributed to this event for all workers, which were 30 workers, was 0.9 mSv, and the

highest individual dose was 0.245 mSv, and these are well below regulatory limits.

**MEMBER VELSHI:** Thank you.

And a quick question for OPG. So is Darlington taking any immediate action on this?

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

So as soon as this event occurred we were notified of the event as OPEX get shared throughout the industry. We have had our pump engineers in contact with Bruce Power and we have been in contact with our chief nuclear engineer to make sure we understand the event as it evolves. We have, in fact, shared OPEX on these kinds of events in the past.

We've done some preliminary review of the information that's been made available to us today.

As was mentioned earlier, while we have at Darlington, similar pump seals, they are not identical and we have already in practice, in place today, a variety of measures for evaluating the condition of our own pump seals and making sure that they are fully operable, preventative maintenance programs, replacement programs, et cetera. In fact, we are in the process of piloting a new pump seal design on one of our units to see if that will be a good replacement for the existing design, because we're always looking for opportunities to improve and, you know,

proactively prevent this kind of thing from happening.

We'll continue to share OPEX with Bruce and whatever learnings that are applicable to us we'll put in place.

**THE PRESIDENT:** Well, it gives us an opportunity to ask Point Lepreau. Are you also looking into a possibility at your plant?

**MR. GAUTHIER:** Just for the record, Rick Gauthier, Point Lepreau.

We also, through our robust operating experience program, we are aware of what's going on at Bruce Power. As Maury had mentioned, we have similar seals at Lepreau. We have not experienced the same problems at Lepreau at power. We have not had any forced outages from seal failures, but we continue to monitor what's happening.

Our system health monitoring program that goes on daily, we look at parameters for our seals and we see no anomalies. We wait for the forensics that are going to happen at Canadian Nuclear Labs for any future actions that we would take.

**THE PRESIDENT:** Okay, thank you. We need to move on.

The next item is the event initial report regarding an internal contamination event at the Retube Waste Processing Building for the Darlington Refurbishment.

This is outlined in CMD 18-M14. Mr. Frappier, it's still your file.

**CMD 18-M14**

**Oral presentation by CNSC staff**

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

You have the event initial report with you but I would ask Ms Nathalie Riendeau, who is our Director for Darlington, to introduce it.

**MS RIENDEAU:** Bonjour, Nathalie Riendeau.

I have also with me today our Power Reactor Site Office Supervisor, Ms Kim Hazelton, and Senior Site Inspector for the Darlington site office, Ms Suzie Karkour, and colleagues from TSB to assist us in answering your questions.

So you have a copy of the event initial report. So briefly, on February 6, 2018 two nuclear energy workers in the retube waste processing building -- this is part of the refurbishment Unit 2 -- were exposed to alpha contamination. So in the immediate work area the alpha classification was not representative of the actual alpha hazard.

So upon discovering the individuals were

contaminated, OPG immediately reclassified the work area and expeditiously implemented corrective measures. The workers were removed from radioactive work and OPG conducted follow-up monitoring on the workers to determine if there was an uptake.

Currently, OPG is finalizing the dose assessment to determine the radiation exposure to the workers but the results to date from whole body monitoring, whole body counts, some bioassay results indicate that the dose impact from this event is going to be very low, actually well below any administrative and regulatory action levels.

CNSC staff followed up on the measures implemented by OPG and our site inspectors are currently conducting a reactive inspection with the support of our colleagues from the radiation protection division. OPG is also conducting an investigation into the cause of the event.

So we are available for any questions. There is also -- OPG is also here to answer your questions.

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

Let me start with Dr. Demeter.

**MEMBER DEMETER:** Thank you.

I have to say I find this event quite concerning. I think the most concerning part is the

failure to initially recognize the potential for an alpha hazard, which led to the reclassification, irrespective of the dose that people receive the potential was there.

So I need to understand what went wrong with not understanding pre-hoc what the alpha risk would be. And if we can't answer that question then I'm even more concerned.

But it was clear that at the time of the event, the alpha classification there was not representative of the alpha hazard. That's a very concerning statement because you shouldn't be coming into this, in retrospect saying, oh, the hazard analysis should be upfront. So that maybe that's a question to OPG what went wrong.

**MR. MANLEY:** Robin Manley, for the record. Before I turn the answer over to the OPG staff that we have on the phone, which includes at Refurbishment our Senior Health Physicist, I will just make a few high level remarks.

So I share your concern that, you know, we have to understand the radiological hazard condition of our plant. We take the radiation protection of our workers very seriously. Our goal is not to have any unplanned radiation exposures, the same as our goal is having zero workplace injuries. And we do have a very good record of

not having unplanned exposures.

As was mentioned, the uptake that occurred in this case did not have high-dose consequences, but nonetheless, you know, we have to make sure that we don't have those kinds of exposures. And we've responded immediately with compensatory actions to prevent a reoccurrence. Part of that includes the investigation that's underway and we'll use whatever causes are identified to put in place any additional protective measures.

So to expand on that and speak to the specifics, I am going to turn it over first to Boris Vulanovic, the Director of Ops and Maintenance at refurb and he may draw on other staff available.

**MR. VULANOVIC:** Okay, thank you. Boris Vulanovic, for the record.

So I did want to set a little context around the event, and then I will draw upon Ian Edwards, our responsible health physicist for the refurbishment project.

So this event did occur in our retube waste processing building. It is a purpose-built building for the refurbishment project to allow us to reduce the reactor components for shipments and storage. Within this building the uptake did occur to two individuals within a

specific contamination and control area that facilitates the lidding of the filled shipment containers that were slated for shipment to our retube waste storage building.

So as Robin had mentioned, we do take these types of issues very seriously. Though the dose consequence to the workers was within their radiological exposure permits for the work they conducted, and our program did allow us to respond properly, you know we do take this very seriously. In building our program we did take the OPEX from the Bruce, as well as utilize the EPRI industry guidelines in putting our program together. In fact, and I feel confident, that it allowed us to respond rapidly in this case.

Now, I would like to turn it over to Ian Edwards, the responsible health physicist for a breakdown and some details, and timeline of the event. Then we can address the question around where we saw the breakthrough that resulted in this contamination.

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

Just to expand a little bit on what Boris has said, the design of this tooling system and the best way to protect workers is through engineered barriers. The design of this tooling system involves very robust localized ventilation, as well as debris covers that fit over the flasks as they are being loaded to eliminate or to

minimize the risk that any contamination comes out to the work station where the workers are present.

The first set of material that was processed in this building were the end-fittings which had been severed from the reactor phase. Throughout this process we were performing daily surveys, checking for both beta, gamma and alpha, regular airborne surveys, and every indication we had was that this system was working very well and that contamination levels were extremely low, and there was no indication of any airborne hazard.

With the start of the pressure tube processing we recognized the potential for -- we're changing what we're doing and therefore the potential increases. So for the first filled container that came out we had workers in plastic suits, we had additional monitoring in place and, again, we saw no significant quantities of contamination present and no indication of an alpha hazard.

So on February 5th we were processing the second container, which is where this incident occurred, and all the information we had to date supported an Alpha Level 1 classification. So when this work started some of this contamination was present, but it was within the bounds that would normally be allowed for work of this nature based on what we knew.

When these workers left the work area and they alarmed one of our monitors, again, part of our program, we followed-up with more detailed surveys and eventually go to know full body count. As soon as we recognized that there was some internal -- that the conditions were not what we had seen up until that point, that triggered the immediate response to go perform much more detailed surveys.

Even prior to finding the alpha, the immediate response to the internal uptake was to increase the protective clothing, putting people into plastic suits, and effectively making it an Alpha Level 3 area until we could prove otherwise.

Of course, the smear results we got back indicated that that is where we were, and from that point forward we had those controls in place to ensure that we were responding appropriately to the hazard.

So the program was there, the anticipation was built into our work planning, into our work instructions. What we missed was we were characterizing based on our daily surveys and everything we had seen supported an Alpha Level 1. I think that the failure here was to -- in that the conditions changed more rapidly than expected, and we missed this one.

But we did have all the other elements of

an alpha program in place, so that as soon as we recognized something had changed we were able to respond immediately to both limit the dose and the extent of time at which this misclassification occurred.

So while this is a serious event and it's prompted a great deal of reflection on how we run our program with respect to alpha and contamination control in general, ultimately the elements of the program were in place to mitigate and minimize the consequence of it the best.

**MEMBER DEMETER:** So, and this is for Staff, what I'm hearing is that the retained daily surveillance and monitoring was inadequate to pick this situation up until people were contaminated. Correct me if I'm wrong.

I mean, they do the routine monitoring and the routine surveillance, and it missed this -- the level of contamination is not important, I'm trying to think of preventing any contamination. Correct me if I'm wrong.

**MR. FRAPPIER:** Gerry Frappier, for the record. I'll ask Kim Hazelton to add to this. But just to be clear as to, you know, what we heard there, so they were doing the monitoring, they were doing the swiping, and they had indications that there was not very much alpha present.

What was missed was the fact that although

they had changed to pressure tubes, perhaps other containers that they were looking at pressure tubes or perhaps a build-up, I'm not sure which yet, that they had indications that the alpha level was going to be very very low.

Conditions changed, and they did not pick it up rapidly enough through monitoring or swiping, and in fact ended up with some employees who, two employees, who had a result of alpha uptake. But I also want to point out that the programs were in place to detect that right away and make appropriate measures to go back to what, and in hindsight they should have never left, which was having workers in suits.

Perhaps I'll ask Ms Hazelton if she wants to add from a site perspective?

**MS HAZELTON:** Thank you. Kimberly Hazelton, for the record, Power Reactor Site Office Supervisor. So to our compliance oversight of this area we had recently performed a Type 2 inspection of the radiation protection practices in the retube waste processing building. That had been performed just in January, and at that time the findings were that the characterizations of the contamination control areas were -- performed complaint with the regulatory requirements.

We do perform surveillance and monitoring

and field inspections and other inspections, sampling the activities that go on. But what has been indicated, there are changing conditions and we are not aware of -- we're not monitoring 100 per cent of the practices going on.

We did, very quickly, share with other CNSC Staff at headquarters when we were informed of the situation. I believe it was on February 8th we became aware of this, and we did institute follow-up activities and an enhanced compliance oversight with respect to this.

Those activities included increased field presence. We have performed follow-up field inspections to confirm the immediate corrective actions that OPG did put in place. As has been previously mentioned, we are conducting a reactive inspection to confirm the program effectiveness at implementation with respect to the characterization. This will be looked at in this reactive inspection.

**MEMBER DEMETER:** Sorry, I'm still -- so is there a way to do routine surveillance and monitoring that should have picked this up in real time? There might have been simultaneous picking it up and people potentially being contaminated, but I'm still not confident that the routine surveillance and monitoring -- when you have a changing situation you have different tubes coming in, or is it a minimal detected activity issue or is it...?

It's still after the fact, even though they were in compliance, and that still is not comforting.

**MR. FRAPPIER:** Gerry Frappier, for the record. Perhaps I'll ask Caroline Purvis, who's our Director of Radiation Protection, to comment on whether there was potentially or is there potentially better sort of ways of making sure you predict and catch this before there's exposures.

**THE PRESIDENT:** So let me jump right in. I'm not buying any of this. I'm not buying -- I'm totally comfortable with the reaction. What I don't understand, how we got there from Day 1. Who is the person that decided that this is Alpha 1 when it should have been Alpha 3?

Purely on the experience in Bruce, purely on that, just on that, why not start with extra precautions rather than go with the less precaution? Somebody explain to me. I'm not interested in the reaction. The reaction was good, everybody reacted properly.

What I want to know is how in the planning for that project there was not accounting to what happened in Bruce?

**MR. MANLEY:** Robin Manley, for the record. How about if I start with that? Again, I'm going to call on the team back at refurbishment to expand on it in some

detail.

So with your forbearance, I'm gong to look back on the history a little bit of OPG's alpha radiation monitoring program, which I know very well.

So back in 2009, prior to the Bruce event occurring, OPG had an alpha monitoring program of some capability and we received industry operating experience and guidance from EPRI and others as to enhancements that should be made to make sure that we stayed at best industry practice.

Then we started to implement further enhancements to our alpha monitoring program in 2009, which included additional alpha contamination monitoring equipment, airborne alpha contamination monitoring, what kind of alpha levels to establish in a plant, training, survey frequency, et cetera.

So those measures were being enhanced at the time of the Bruce event occurring and we used the Bruce OPEX to further develop and refine our program. We also used the guidance provided by the CNSC through your 12(2) directive that you issued at that time, which had a series of particular measures that we and all other Canadian nuclear power plants were asked to respond to.

We developed a response that covered all of the bases, and CNSC inspected and was satisfied with.

That program has been in place ever since and has been successful in preventing any unplanned alpha exposures. If I can quickly speak to like dose limits and that sort of thing. If you think of 50 millisieverts as the annual limit and unplanned exposure level at 1 millisievert, we haven't had any unplanned exposures to alpha contamination.

So that program has been in place and has been robust and successful in protecting the workers at Ontario Power Generation.

Now, as we were coming into the refurbishment program, of course we were well-aware of the Bruce operating experience, and it was part of our program to use that operating experience in the development of the specific measures, radioactive work planning, engineered barriers, dissymmetry, et cetera, that we would need in place.

So this is not a case of not taking account of industry OPEX. What I will tell you is that as you are actually doing the job on a day-to-day basis you have a variety of means of measuring the radiation hazard that is present at the work site. You can do airborne contamination monitoring live time with alarming monitors, and we have those. You can do routine surveys and you can take the smear samples from those surveys, you can count them in alpha counters and characterize what kind of alpha

hazard you've got.

What is difficult to do is to do live time smear sampling. You know, you've got workers actually working hands-on on equipment. How do you actually get a continuous hands-on monitoring?

So you can have a surface contamination that can be present in the workplace and you don't necessarily have a live-time indication of that, unlike with gamma monitoring where you can have a gamma monitor right on the worker that's alarming in real time.

So if, in your actual work, the worker practices result in a worker's transferring contamination, getting it on their hands, touching their face, something of that nature happening, you don't necessarily have live-time capability to detect that.

So just to use that as the sort of general context for how we operate, I'm now going to pass it back over to Boris to speak to the specifics of this case.

**MR. VULANOVIC:** Boris Vulanovic, for the record. You know, to address the OPEX and the proactive measures we did take, as Ian had described, we had moved into the -- this was during our pressure tube waste reduction series, and for the initial lidding of the first container we did in fact put measures to treat it as an Alpha Level 3 and took conservative measures to have the

workers within plastic suits and, at that time, did perform characterizing surveys and did determine that it was within Alpha Level 1 contamination criteria.

At that point, we moved the surveillance of surveys to our regular surveillance smears that we do take in those work environments. This lidding occurs about every 48 hours and is about a six-hour evolution, and it was 48 hours later on the second container that came out that a higher level of contamination was present on the container.

The investigation, you know, that we've done has determined that the tooling configuration and the waste chute that the components were coming down ended up spreading an unexpected contamination to the container. So we've taken that back for future series around what modifications we may do to the tool to alleviate that.

But in this event, as Robin had discussed, this was not an airborne contamination issue, but was the result of the worker practices transferring this contamination to their hands and then to their face that did result in the personal contamination event when exiting, and then the internal uptake that they did have.

**THE PRESIDENT:** But let me understand. You started by treating this as a Level 3 Alpha and then you decide there's no need for that, and you switch to

Level 1. Why would you do that? Are you getting efficiency in speed, is that what you're doing?

I'm trying to understand why you didn't stick -- because one tube will not give you a good sample, you have to wait for some -- a little bit more than 01 to go from 3 to 1.

**MR. VULANOVIC:** Boris Vulanovic, for the record. So this was one container with multiple tubes but, you're correct, one cycle. The survey results were what indicated the conditions in there under the assumption that the tooling was performing with the ventilation systems to control contamination.

The lesson we did learn in this that you were highlighting, is a requirement in these changes to utilize pre-work surveys for this type of work for more than one cycle to confirm that. That is a measure we've put in place and a lesson we did learn specific to this event.

**THE PRESIDENT:** So just back to Staff. Should you have known that or do you rely on the characterization of OPG? Again, the alpha event in Bruce was a Level 3, the environment, is that correct? Why wouldn't you insist that that's going to continue as a Level 3 in the air for a lot longer than one cycle?

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

record. I'll get Caroline Purvis to provide details of our view on the safety program.

But just to come back to your point. The big difference between Level 3 and Level 1 is of course the workers in Level 3 have to be in full plastic suits with a separate source of air that goes into them. It's much more cumbersome, difficult, both the employee and certainly from a productivity perspective. So if it's not necessary, then we would agree that it's better for workers not to have that.

However, as they mentioned, this was characterized as a Level 3. Within their program they would have the capability of making decisions. Perhaps Caroline Purvis can explain a little bit about how those decisions are made and what's CNSC's role in any of that.

**MS PURVIS:** Caroline Purvis, I'm the Director of the Radiation Protection Division. I think I'll start by saying that the CNSC has made our expectations very clear as it relates to monitoring and control. We ensure that licensees understand the requirements that we put for them in 2010. Implementation also has to be industry best practice.

Were there indications perhaps that the levels could have changed? I think that's up to OPG to identify. My expectation would be that when you're

applying force or destructive energy to break-up pressure tubes there is the potential for alpha contamination.

Was there a change in conditions that related to the transfer of work from end fittings to pressure tubes? I think that remains to be seen in our inspection that we're going to go and conduct next week.

I'm not sure I can provide many more details. I haven't been privy to all of the information. What I can say is our expectation is our licensees will review the work, they'll have baseline characterization, which will inform worker protection. If there is new work or changing work, those characterizations should be reviewed and validated.

The last thing we want licensees to do is to rely on assumptions.

Thank you.

**MR. FRAPPIER:** Gerry Frappier, for the record. Just to add, because I know there's some questions left unanswered, and we feel that as well, and that's why we are still progressing with our investigation into this; our reactive inspection, and then our overall assessment.

As we've mentioned in the EIR, we would fully expect, once we know the answers to a lot of these questions, to come back to the Commission to make that known to yourselves as well.

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

Ms Velshi.

**MEMBER VELSHI:** Thank you. So moving away from hazard assessment or identification, I want to get to the whole reporting and timelines. OPG, you yourself said that this was a very serious incident.

As I look at the event report, it says, you know, CNSC was not notified of it, they just happened to kind of stumble on this at a meeting a couple of days later. I also see language such as, "CNSC requested OPG to file this report."

So I'll start with OPG. Can you comment on, given the seriousness or potential seriousness of this, given how much pain we've all gone through with the Bruce incident, the recognition that this would be a high-profile event, why was there no proactive reporting and follow-up? Even as I look at your stand down, it didn't happen for over a month after the incident.

So talk to me about the reporting requirements and the urgency around it, and then I'll get Staff to comment, please.

**MR. MANLEY:** Robin Manley, for the record. I'll start and, again, there's an aspect of that that the plant guys will answer.

So the CNSC REGDOC-3.1.1 lays your

specific reporting requirements for when a formal event report is required. In addition to that, we do proactive notifications to CNSC Staff through a variety of mechanisms and, of course, they're present at the site and refurbishment and the 10 variety of meetings, and CNSC Staff can speak to that better than I can.

So the particulars on this case is when you have a radiation event that could potentially result in a large dose, the health physicist evaluates it and goes, okay, am I potentially above a legal limit? We were, at no time, having an indication that we were going to be above a legal limit. That was not a concern that would trigger an immediate event report in terms of the 3.1.1 reporting.

So then there's also potential to notify under exceedance of an action level. You do need to do a more detailed dose assessment to know whether you're down at the action level reporting. Again, the indications were that we weren't. But if at any point we had reached an action level, we would have notified CNSC formally under that reporting mechanism.

The mechanism that we did end up reporting under is essentially one of -- it's an items of interest to the CNSC. That is one which is, frankly, a little bit harder to judge.

There are times when we have past

precedent to know that a specific kind of thing is going to be of interest to the regulator from the Section 18 of REGDOC-3.1.1. So we've got past history that that kind of scenario results in a formal report to the regulator.

There's other ones where we don't have past history of that kind of event triggering a formal notification, so we don't yet know that that's one that they want us to report under that clause. So there's a learning opportunity in that regard as well, and so we've had that.

So I will tell you that in the past, you know, unplanned exposures that were low-level, that were below an unplanned or below an action level did not trigger a formal report to the regulatory. So, you know, when CNSC said, hey, we want a formal report, of course, you may have one. So, you know, we've not got that additional OPEX as well.

**MEMBER VELSHI:** Staff?

**MR. FRAPPIER:** Gerry Frappier, for the record. I'll ask Nathalie Riendeau to provide the details. But I would just say that although what Mr. Manley has said is certainly technically correct, we were quite disappointed that we had to push to say this is of interest to the regulator. It would have seemed to us obvious that it was of interest to the regulator.

But to give you a bit more details, I'll ask Nathalie Riendeau.

**MS RIENDEAU:** Thank you. Nathalie Riendeau, for the record.

As per our initial report, staff became aware on February 8th. They immediately sought additional information to gather an understanding of the occurrence and we requested a meeting with a number of questions and the meeting was held on February 13th. Subsequent to the meeting, having received this additional information, CNSC staff requested that the event be reported to the CNSC. Like yourself, our concern was not the dose consequence from the event because early on it was determined that it would likely be low, but it was how the occurrence presented itself. So we had discussions with OPG staff and requested that they submit a report and then we pointed them to Clause 18.

**THE PRESIDENT:** I'm not buying the technically correct. If they are technically correct you should change the technical, but there is no substitute for common sense. This is the biggest project going on in infrastructure and to not understand the interest by staff, the thousands of people who are going to get involved in all of this, is selective thinking here and reporting. So I'm not buying this. And you people -- in fact, OPG

reports on somebody falling off a scaffold and minor, minor injury in your report. Only here you decide that this alpha dose is not important. I'm not buying it for a second. And if they do, you have to do something about the technical requirement.

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

So certainly, as we mentioned, we are hopefully going to package all of this stuff together as we look through and see. And certainly one of the areas that we are concerned about is the reporting structure and if something like this can be amiss we probably will need to look at REGDOC-3.1.1 and perhaps make some changes there, but that is I would say a future consideration, not something I can say right now.

**THE PRESIDENT:** [Off microphone].

**MEMBER VELSHI:** No, thank you, because you are going on the same line I am. So I understand what staff is doing about this. I find it very hard to accept OPG's argument on this that it's a call of judgment and maybe we needed more OPEX before we knew we needed to report this. I think you need to do a lot more soul-searching on this as well, that how could we not have seen this as being a serious enough incident to report to the regulator immediately or soon after. Given the high

profile alpha contamination has had, the time it has taken on the agenda and the public angst it has caused, I am just surprised that you didn't think this was potentially of great interest and I think as part of your lessons learned you need to reflect on that.

**THE PRESIDENT:** Thank you.

I think we -- Ms Penney...?

**MEMBER PENNEY:** No, thank you.

**THE PRESIDENT:** Mr. Berube...?

**MEMBER BERUBE:** I just want to follow in that ilk and that is to say that here it looks to me like a case of mistaken assumptions on what we would be dealing with in this particular facility and not enough experience in terms of what was going to come out of the reactor. Looking at a different site doesn't necessarily mean that we are going to have the same conditions happen within this particular site. So really the issue was probably a reclassification too quick for expediency purposes. And I'm curious, because we haven't gotten into the actual specifics of the actual workers themselves, are these contractual workers that were working on the site? Also, you know, what is the nature of the training if they are contractual workers and, you know, what monitoring experience and what radiological training they have to actually protect themselves?

**MR. FRAPPIER:** Gerry Frappier, for the record. I would ask -- perhaps Boris Vulanovic could respond to the status of the workers and what training and who actually does the alpha swipes and determines the alpha levels.

**MR. VULANOVIC:** Boris Vulnavoic, for the record.

So the workers involved were workers or employees of the Aecon joint venture that are performing the retube project for OPG. The two workers in question were orange qualified, so they had the ability to work in a radiological area, but they were provided direct radiological protection from our Radiation Protection Technicians. It would be those technicians under our program that would be performing the smears and surveillances that would feed into our determination of the work area.

I will turn it over to Ian Edwards, my responsible Health Physicist, to add details as required.

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

So Boris is correct that the orange badge training provides a basic introduction to working in a nuclear facility, the radiological hazards, and provides the workers with the information they need to perform basic tasks they get through the plant. The expertise on the

radiological hazards is provided by the radiation technicians. So they perform the workplace surveys, they provide direction to the workers on where they should and should not go, and then if there are any concerns, in this case when they had the monitor alarm, it's the radiation technicians that perform the follow-up and assist the workers to respond accordingly.

**MEMBER BERUBE:** I would just ask a little more specifics on exactly what is entailed here with the radiological technician green man obviously certified to actually supervise. Is that person in the room, in the facility full-time with those individuals or are they in and out or what is the nature of that supervision?

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

The nature of the supervision depends on the specific hazard and nature of the work. In this case the technicians are in the building. They are providing oversight through our teledosimetry system, which allows them to monitor the gamma measurements on the workers' EPDs and provide direct communication with the workers themselves. So the technician at the panel is providing the direct oversight and we have what we call a rover model where we have technicians that check in periodically with workers moving from site to site as the work progresses. In this case with very consistent gamma radiation hazards

and low contamination levels, that would be the model that we use. So the technician was in prior to the work and they checked in with the workers as they were completing the work.

**MEMBER BERUBE:** So my last comment on this. It's clearly that a lesson to be learned from this is that, you know, really it's a warning sign because the work environment, especially in these kinds of situations, is dynamic, it can change pretty quickly, right, so to classify without checking on a continuous basis and making assumptions could lead to some serious problems. In this case the dose was low. However, that doesn't necessarily mean it's going to be that way all the time. So in future I think we need to be a little more diligent in making assumptions on this basis. Thank you.

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

Your point is very well taken and that is one of the lessons we have learned about increasing the oversight both in the building in general and of this work specifically, because even if I classify this as an alpha level 3 area and have those controls in place, we still need to provide adequate oversight of the workers to make sure that those controls are effective and they are not being exposed to a hazard. So regardless of how the classification is made in a particular work site, we are

definitely moving towards more increased oversight of workers to prevent these kinds of uptakes in the future.

**THE PRESIDENT:** Thank you.

Back to Dr. Demeter.

**MEMBER DEMETER:** Thank you.

So I guess my take-home message and what I'm hearing is that -- and it depends on the type of work, the unit of work, but it seems like the default should be you have the highest level of protection until you have proven at a certain unit of work that it can be downgraded. Here, there was a batch and that it wasn't rechecked with the next batch. So I'm not sure if the unit work is a tube or a batch or whatever you're doing, but it sounds like the default should be very conservative and stay at 3 until that particular unit of work can be shown to be safe to be downgraded to a 2 or 1. It seems like here it was a 3 until that batch and then for the rest of the work, whether it was that batch or another batch, it was at the same level. I think there has to be a much more stringent default to 3 until it can be proved that that particular work at that particular time fits a 1, understanding the PPE required is more obstructive and it's less efficient, you know, and I'm very happy that the dose here was very small, but the potential internalized alpha is a big security and safety issue for plants and you don't want to

be in the position of having a large dose from alpha because you changed the batch and it was still a 1. So I'm not sure if there is a regulatory push that we could say it's 3 and reduce the unit of work before you change it to a 1 based on a much more limited span versus another batch. It seems like 3 should be the conservative starting point and there really has to be a push to push it down.

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

As mentioned, we are still looking into this, so I would hold off sort of formulating completely your conclusion until we get all the rest of the information. But certainly, is there a need for more regulatory oversight or whatever will certainly be something we will be considering and seeing what is an appropriate response.

**THE PRESIDENT:** But for Dr. Demeter's point, right now this is just the beginning of a big, big refurbishment project. So moving forward, is OPG going to treat it as Level 3? Moving forward -- right now I think it is in a stand-down, if I understand correctly. So what is the situation now and what is it going to be like moving forward?

**MR. MANLEY:** Robin Manley, for the record. I will ask Boris Vulanovic to speak to the status of the

work and the increased level of protective measures that we are taking.

**MR. VULANOVIC:** Boris Vulnanovic, for the record.

So for this pressure tube work -- and it is the highest contamination series for Unit 2 -- that work is completed. So we are moving into right now our calandria tube insert removal and then into calandria tube removal. The dose and contamination risks are smaller, but for that location within the RWPB we have taken those measures to treat those as alpha Level 3 until we have, you know, concerted evidence to the contrary around that. So we are in fact putting those measures in place for us for the project going forward.

**THE PRESIDENT:** Thank you.

Ms Velshi...? Any other questions? Questions?

Okay, I think that's enough for now. Thank you. Thank you very much. We are going to take a 15-minute break.

--- Upon recessing at 10:49 a.m. /
Suspension à 10 h 49

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

**THE PRESIDENT:** The audience is starting to shrink.

The next item on the agenda is a decision item on the regulatory document REGDOC-1.1.1, Site Evaluation and Site Preparation for New Reactor Facilities. This is outlined in CMD 18-M12 and M12.A.

I understand, Mr. Robertson, you will make the presentation. The floor is yours.

**CMD 18-M12/18-M12.A**

**Oral presentation by CNSC staff**

**M. ROBERTSON:** Bonjour, Monsieur le Président, Membres de la Commission.

My name is Hugh Robertson, Director General of the Directorate of Regulatory Improvement and Major Project Management.

With me today are Ms Karen Owen-Whitred, Director of the Regulatory Framework Directorate; and Dr. Doug Miller, Lead Technical Advisor for the Directorate of Regulatory Improvement and Major Project Management.

As well, we have other CNSC staff

available to support and answer any questions you may have.

We are here today to request Commission approval of REGDOC-1.1.1, Site Evaluation and Site Preparation for New Reactor Facilities.

Regulatory Document 1.1.1 describes the requirements and guidance for site evaluation and site preparation for new reactor facilities. The content also addresses how site evaluation information obtained during site preparation activities is used and revisited in subsequent lifecycle phases of construction and operation.

If approved by the Commission, this regulatory document will be an important addition to the CNSC's regulatory framework. It will be used by applicants to evaluate all potential sites and select the most appropriate site and to prepare their application for a licence to prepare site. It will also be used by CNSC staff to assess such applications in preparation for providing a recommendation to the Commission on approving the application.

Before discussing the document in detail I will pass the presentation to Ms Owen-Whitred so she can briefly review the role of regulatory documents and where this document is situated within the CNSC regulatory document framework.

**MS OWEN-WHITRED:** Thank you.

For the record, my name is Karen Owen-Whitred and I am the Director of the Regulatory Framework Division.

To enhance accessibility of our regulatory expectations, the CNSC structures our regulatory documents according to the framework shown here. This slide shows where REGDOC-1.1.1 fits within the CNSC's broader document framework. It is situated within section 1.0 Regulated Facilities and Activities, in the subsection for Reactor Facilities. This section also covers licence application guides for reactor facilities for other lifecycle stages such as licence to construct a nuclear power plant and licence to operate a reactor facility.

I will now present the past history and current status of this regulatory document and talk about the new information that has been added.

If approved, this document will replace RD-346, Site Evaluation for New Nuclear Power Plants, which was published in 2008.

Site approval has always been required for reactor facilities in Canada. All of the current nuclear power plants submitted extensive information for the CNSC's review and approval before those power plants were built. This regulatory document provides applicants with additional information on how to meet the requirements of

the *Nuclear Safety and Control Act* and other relevant federal legislation.

REGDOC-1.1.1 refers to both nuclear power plants and small reactors as "reactor facilities". All criteria in this document can be applied to small reactor facilities using a risk-informed approach.

In addition, the lessons learned from the nuclear event in Fukushima, Japan, in 2011 have been taken into account. Applicants are expected to provide site characterization information that includes: consideration of multiple and simultaneous severe external events that could exceed the design basis; multiple and simultaneous reactor accidents; and information about emergency planning and preparations for extreme events earlier in a project.

Over the next few slides we will explain the details of the REGDOC that is provided today for Commission approval. Specifically, we will present the objectives, the process and results of public consultation, including the key concerns from the public comments and how CNSC staff have addressed them. We will provide a brief explanation of how this Regulatory Document, if approved, would be implemented. And finally, we will finish our presentation with CNSC staff's conclusions and recommendation.

I will now pass the presentation to

Dr. Doug Miller, representing the Directorate of Regulatory Improvement and Major Project Management.

**MR. MILLER:** Good morning, Members of the Commission. For the record, my name is Doug Miller and I am the Lead Technical Advisor for the Directorate of Regulatory Improvement and Major Project Management.

If approved, this document will become an important element of the CNSC's lifecycle approach to the licensing of reactor facilities.

Please note that the animated highlights that will appear soon simply highlight the specific phase that is being discussed.

These slides illustrate the CNSC's lifecycle approach to the licensing of nuclear power plants and small reactor facilities and indicates where this regulatory document fits into the lifecycle and how it can be used by applicants and CNSC staff.

The "lifecycle approach" facilitates the CNSC's review of all safety and control measures and solicits public and Indigenous engagement throughout the lifecycle of a nuclear facility, from site preparation to decommissioning.

The lifecycle starts with site evaluation and licence to prepare a site, which is addressed in this regulatory document, REGDOC-1.1.1, Site Evaluation and Site

Preparation for New Reactor Facilities.

Next is the construction of the reactor facility. RD/GD-369, Licence Application Guide: Licence to Construct a Nuclear Power Plant, is currently in the process to be republished as REGDOC-1.1.2, Reactor Facilities: Licence to Construct a Nuclear Power Plant.

REGDOC-1.1.1 and REGDOC-1.1.2 are being developed in anticipation of applications to build new reactor facilities. Together, these regulatory documents will introduce regulatory efficiencies and will improve harmonization and coordination efforts.

The site characterization information obtained during site evaluation is taken into account in the design of the reactor facility. The design is assessed in the review of an application for a licence to construct the reactor facility.

For operation of the reactor facility, REGDOC-1.1.3, Licence Application Guide: Licence to Operate a Nuclear Power Plant, is used to prepare and evaluate licence applications for proposed new facilities and also for applications for renewal of licences for existing facilities. The site characterization information obtained during site evaluation is re-evaluated over the lifecycle of the reactor facility.

For licence renewal, licensees use

REGDOC-1.1.3 in conjunction with REGDOC-2.3.3, Periodic Safety Reviews, to prepare an application for renewal of a licence to operate a reactor facility. Once again, at this stage in the facility's lifecycle, the site characterization information is re-evaluated.

Although decommissioning occurs at the end of the reactor facility's lifecycle, REGDOC-1.1.1 ensures that applicants start thinking about and planning for decommissioning at the beginning of the lifecycle. This ensures that appropriate plans and decisions can be made early and then updated over the life of the facility. REGDOC-1.1.1 provides information that allows applicants to make the appropriate decisions early and to update those decisions at the appropriate times.

As you can see, the information concerning site evaluation and in particular site characterization information is considered throughout the entire lifecycle of the reactor facility.

I will now present the context for the development of this regulatory document.

The document before you today describes the requirements and guidance for evaluating a site as part of the decision process for selecting a site to build a new reactor facility in Canada. It also describes the expected content of an application to obtain a licence to prepare

that site.

This regulatory document codifies the current practice for such applications. The current practice is derived from what was called site approval for the existing nuclear power plants and reflects the requirements in the *Nuclear Safety and Control Act*. The benefits of this document are to provide clarity of expectations and to ensure consistency in practices.

The document points to applicable CNSC regulatory requirements and to specific industry and international standards from organizations such as the International Atomic Energy Agency (or IAEA); the CSA Group which produces the CSA standards; and from other recognized standards such as dam safety guidelines from the Canadian Dam Association, fire protection standards from the U.S. National Fire Protection Association, and environmental codes of practice from Environment and Climate Change Canada.

As mentioned earlier, this document may be used by applicants to evaluate sites that are under consideration for building a new reactor facility and to select one of those sites for the proposed construction of a new reactor facility.

When a site has been selected, the applicant will use the information in this regulatory

document to prepare their application for a licence to prepare the site. The main activities are clearing the site and building basic infrastructure.

In this document, Appendix A contains a licence application guide that describes the safety and control measures that must be addressed for a licence to prepare site. CNSC staff will use this regulatory document to assess such applications prior to bringing their recommendation to the Commission for licensing decisions.

Here we are going to look at the site evaluation over the lifecycle of the reactor facility from a different perspective.

First, there are some key inputs:

Based on site characterization, an understanding of potential external natural and human-induced events and the potential facility and site activity impacts is obtained, assuming normal operation and accidents/malfunctions.

From this, we can also obtain an understanding of the potential effects on health, safety and the environment.

Throughout the lifecycle of the reactor facility, environmental monitoring ensures the licensee is periodically checking to see if the assumptions made at the site evaluation stage remain valid. The licensee also

checks to see if there are any changes to the potential consequences.

Engagement with Indigenous peoples and consultation with all members of the public occurs throughout the lifecycle.

At the site preparation phase, the site evaluation supports the application for a licence to prepare site, for example, the environmental characterization and external events.

At the construction phase, the information is used to confirm assumptions from the application for a licence to prepare the site, and the results provide input into the design of the structures, systems and components for the reactor facility.

At the operation phase, the information is used to confirm assumptions and to support periodic safety reviews. The site evaluation also provides information for future assessments for the life of the facility.

From the start of operation until the reactor facility reaches the end of its lifecycle, the information from the initial site evaluation is updated as necessary and used by the licensee to make decisions on any adjustments to the facility design or programs.

The site evaluation also provides information that will be taken into account in the eventual

decommissioning.

Now we turn our attention to public consultation.

A 90-day public consultation period was held on the draft document from August 11th to November 14th, 2016. During this consultation period, comments were received from eight respondents, as shown on the slide.

Greenpeace and the Canadian Environmental Law Association provided one joint submission.

The CNSC received a submission from one company involved with small reactors, that is, StarCore Nuclear.

The CNSC received almost 500 individual comments. However, some comments were identical or equivalent comments from different stakeholders. The CNSC grouped these comments into 152 distinct comments.

Following the consultation period, submissions from respondents were posted for two weeks on the CNSC website for feedback on the comments received. This activity took place from December 7th to 29th, 2016. Seventeen additional comments were received. All of these additional comments were a joint submission from the Canadian Environmental Law Assocation and Greenpeace.

Through 2017 to the present, stakeholder

comments have been addressed and the document has been restructured.

CNSC staff addressed all of the stakeholder comments. Most comments were readily resolved. CNSC staff either revised the document to address the comments or provided an explanation of why they were not accepted.

CNSC staff found the comments to be helpful, especially in clarifying the intent or in identifying areas where editorial changes strengthened the text.

No single dominant issue was identified through consultation. In view of the large number of comments, CNSC staff grouped them into six main concerns.

For some concerns, different stakeholders had very different views, as you will see in the next few slides.

Industry stakeholders questioned the scope of the document, specifically the structure, clarity and effectiveness.

Specific comments identified redundancy and duplication in the document; that site evaluation is a precondition for site preparation but those topics appeared in reverse order in the public consultation draft; the scope of the document hinders its clarity and

effectiveness.

CNSC staff responded to those comments by restructuring the regulatory document to remove redundancies and duplication; changing the order of the information so that site evaluation appears before site preparation; revising the text to use cross-references where possible, especially with regards to REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures.

The revised structure of the document was presented in January 2018 to all stakeholders who commented. That is, the new table of contents was sent, along with the old table of contents and a "mapping" of the information. No negative feedback was received by the CNSC from the stakeholders who were given the new table of contents.

Also, all stakeholders who commented at public consultation were provided with the final draft in preparation for this Commission meeting.

CNSC staff would like to confirm that despite the restructuring and reordering of the document, the actual information did not change. Most of the text in the final draft presented to the Commission today is identical to the text in the draft document posted for public consultation, except for changes arising from the

comments received during public consultation and some additional editorial changes.

Industry stakeholders expressed concern about the scope of the information requested for future lifecycle phases.

Specific comments included "REGDOC-1.1.1 asks for too much information on future lifecycle phases" and that "combining all phases of the licensing process in this document makes a rather lengthy document with considerable redundancy/replication... and blurs the requirements for each stage of licensing."

CNSC staff responded to this concern by revising the document for clarity regarding the applicability of REGDOC-1.1.1 to all lifecycle phases and by revising Appendix B for easier reading and reference.

Specifically, Appendix B in the public consultation draft has been split into Appendices B through G; these appendices provide additional details on environmental considerations that are specific to reactor facilities.

Also, changes have been made to the document to clarify the use of site evaluation and site characterization information in construction and operation and more clearly notes the sections of the document relevant to construction and operation.

This document clarifies that site evaluation information is carried through to all subsequent facility lifecycle phases, including construction and operation. In accordance with CSA Standard N288.6, Environmental risk assessments at Class I nuclear facilities and uranium mines and mills, the site evaluation information is periodically re-evaluated. The re-evaluation should focus on confirmation of the site characteristics, and assessing the effects of the updated information. Design modifications or updates to operations, or both, may be needed.

Industry stakeholders expressed concerns about regulatory responsibility, as did Greenpeace and the Canadian Environmental Law Association.

Some specific comments were as follows:

"REGDOC 1.1.1 overlaps responsibilities between the CNSC and other government bodies to regulate safety";

And also, "The need to meet redundant requirements imposed by the CNSC and other provincial or federal safety agencies will create confusion and force licensees to replicate research and submissions";

And finally, "The second sentence of section 9.4 in the public consultation draft lists matters considered by the province in determining offsite

protective measures. There are two notable omissions: social expectations for public safety and the consequences of malevolent events."

CNSC staff responded to these concerns as follows:

There is shared jurisdiction with the province or territory in the areas of conventional health and safety, and in environmental protection. The CNSC coordinates their efforts in these areas with the province or territory.

Secondly, the offsite emergency preparedness plans are the responsibility of the province or territory. CNSC ensures that arrangements are in place between the applicant and the province or territory as part of a licensing review. The CNSC expects that emergency plans cover the "credible worst-case" scenario and that these plans are adaptable to respond to any accident.

There were no changes to the regulatory document regarding social expectations or consequences of malevolent acts. Social factors are considered by the applicant and the province or territory when setting the emergency planning zones. Malevolent acts are not considered for determining the emergency planning zones or offsite protective actions but are covered under each applicant’s security programs. The CNSC expects that each

applicant's emergency plans cover the "credible worst-case" scenario, which may include malevolent acts.

Stakeholders also had concerns with the exclusion zone and emergency planning zones. Industry stakeholders submitted comments that were related to dose and other criteria being used in the determination of the exclusion zone. Greenpeace and the Canadian Environmental Law Association commented that the document should be amended to acknowledge real-world accidents such as Fukushima when determining the exclusion zone.

CNSC staff responded that the information will remain in this regulatory document because applicants need to consider the exclusion zone and emergency planning zones early in the project. CNSC regulatory documents RD-367, Design of Small Reactor Facilities, and REGDOC-2.5.2, Design of Reactor Facilities: Nuclear Power Plants, are referenced in REGDOC-1.1.1 where appropriate to support determination of exclusion zones and emergency planning zones.

The exclusion zone is based on the design basis accident. More information is available in those other regulatory documents for both design requirements and for consideration of multiple unit events in the design.

We would like you to note that the "protective zone" has been reworded as "emergency planning

zones".

Finally, CSA N1600, General requirements for nuclear emergency management programs, has been added to this regulatory document as a reference.

Greenpeace and the Canadian Environmental Law Association commented that the draft document ignored lessons from the Fukushima nuclear event of March 2011.

CNSC staff responded that REGDOC-1.1.1 does address lessons learned from Fukushima, findings from the CNSC Fukushima Task Force Report, and the subsequently issued action plans.

As described earlier in this presentation, applicants are expected to provide site characterization information that includes consideration of multiple and simultaneous severe external events that could exceed the design basis; multiple and simultaneous reactor accidents; emergency planning and preparations for extreme events discussed earlier in a project.

The objective of the site preparation stage is to assess whether the site is suitable for the construction and operation of a nuclear facility. This includes whether it is feasible to undertake emergency measures given the population density, population distribution and other characteristics of the region, such as road infrastructure.

Information on population and emergency planning can be found in this regulatory document, and additional information is available in REGDOC-3.5.1, Licensing Process for Class I Nuclear Facilities and Uranium Mines and Mills.

There were opposing views from two groups of stakeholders regarding the topic of selecting a specific reactor technology before submitting an application for a licence to prepare the site.

Industry stakeholders stated that the document requires assessments and analysis based on a detailed reactor design well before an applicant might reasonably be expected to have chosen a design.

However, Greenpeace and the Canadian Environmental Law Association hold the opposing viewpoint. They stated that: "The document states that it does not presuppose or limit an applicant's intention to implement a particular kind of technology in future licensing phases. However, in many situations the particular technology -- and its associated hazards -- have implications for site suitability."

Where did I go? There's something missing. Okay. Something is wrong here.

Okay. So industry stakeholders questioned the scope -- no, that's not right. Okay.

So with regards to this, the applicant must be able to provide enough information that the nuclear and hazardous substances released will be within the limits claimed in the environmental assessment. It is not dependent on detailed information for a specific reactor facility design. However, the limits established during the EA and licensing will have to be met throughout the lifecycle of the project.

And now I will turn the presentation back to Karen Owen-Whitred.

**MS OWEN-WHITRED:** Thank you.

Karen Owen-Whitred, for the record.

With regards to implementation, this regulatory document, if approved, is expected to be published on the CNSC's website in the Spring of 2018 and made available to applicants, licensees and other stakeholders. At that point, it will replace RD-346, Site Evaluation for New Nuclear Power Plants.

This document formalizes the CNSC's requirements and guidance on site evaluation and site preparation for a new reactor facility in Canada.

If approved, CNSC staff would use this document to assess applications for a licence to prepare site.

The document also provides supporting

technical information for future lifecycle phases.

To conclude, it is CNSC staff's opinion that REGDOC-1.1.1 enhances the regulatory framework:

- by providing clarity to applicants and other stakeholders on evaluating a site for the construction and operation of a new reactor facility;

- by formalizing and codifying CNSC's expectations related to site preparation;

- by contributing to greater regulatory certainty for applicants and licensees; and

- by ensuring transparency for the Canadian public and international community on CNSC's regulatory requirements and guidance in this area.

As mentioned, if approved, this regulatory document is expected to be published in Spring 2018.

Based on our conclusions, CNSC staff recommend that the Commission approve this regulatory document.

We thank you for your attention and remain available to answer any questions you may have.

**THE PRESIDENT:** Thank you.

So let's jump right into the question session with Ms Velshi.

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

So let me start off by commending you for

both a very good CMD and an excellent slide deck. This was very helpful and just the whole process for public consultation seems very robust and thorough.

So can you comment on the different stakeholders who commented, who provided feedback? Were there any kind of conspicuous by their absence? That's one. It was good to see StarCore Nuclear as sort of a potential new licensee and it's probably their first exposure to the regulatory document framework, what their feedback was just around the usability of these. And then I will get to my next question after that. It was just more around the process.

**MR. ROBERTSON:** Hugh Robertson, for the record.

I think we had a fairly good cross-section of the industry, the public, and as you said also with one of our small modular reactor vendors. But I'll turn that over to Dr. Miller to describe that process.

**MR. MILLER:** Doug Miller, for the record.

I believe that appropriate attention was paid by stakeholders across the -- those who have interest in the nuclear sector. So there was none conspicuous by absence.

**MEMBER VELSHI:** Thank you. And you said other than kind of reordering things and maybe some

editing, there really wasn't much change from the preliminary draft that you sent out. So are there would you say really significant residual concerns with stakeholders? And we'll put the specific reactor technology aside where you'd got two very different opinions. But would you think there are really in the stakeholders' minds some big show-stoppers with this REGDOC?

**MR. ROBERTSON:** Hugh Robertson, for the record.

We believe we've addressed all outstanding concerns with this document.

**MEMBER VELSHI:** So "addressed." I mean, as I looked at the disposition of the comments, quite a few are "we do not agree." So I'm not sure whether that necessarily means that we've "addressed" ...

**MR. MILLER:** Doug Miller, for the record.

What we did find was that while the comments were polarized, we were able to provide an explanation of why there was no change.

So for example, on reactor design you do need some information to support both EA and how this supports environmental assessment. A black box does not suffice, but at the same time it's not reasonable or realistic to expect a fully detailed design at the site

preparation stage.

There's others where we made it clear that, for example, with emergency preparedness the CNSC does have a role and a view, but it is primarily the responsibility of the province or territory. So we had to indicate the CNSC has to respect its jurisdiction and that of the province and territory.

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

I would just add from a kind of an overall regulatory framework perspective that we do -- the CNSC staff do take consultation on our regulatory documents very seriously and we undertake it very sincerely. And what I mean by that is when we receive comments, we try to strike that right balance between accepting comments where clearly there has been a suggestion for improvement on the document, we're very open to that. We're not under the mis-impression that we are going to get it 100 percent right all of the time on our first draft, if you will. So we do try to accept all of those comments that through discussion we can see will better improve the regulatory document.

That being said, and Dr. Miller's already provided a few specific examples, there are cases where for a variety of reasons we as the regulator hold firm to the

content that was in the original consultation draft. And that's what you've seen in this case, some areas where we did not accept the comments received. And in those cases, as has been said, we make every effort to explain very clearly why we didn't accept the comments.

**MEMBER DEMETER:** Thank you. Just first for a point of clarification, based on reading the document, do I assume that small modular reactors, if they meet the megawatt thermal definition of a small nuclear reactor, would fit under that? Are they considered separately or are they considered as part of this document, siting an SMR.

**MR. ROBERTSON:** Hugh Robertson, for the record.

Yes, this would apply.

**MEMBER DEMETER:** Okay. Thank you, then.

So and then my other question is just help me with an example. On page 43 of your draft REGDOC, this is section 4.9.1. It says:

> "The applicant shall demonstrate that all reasonable precautions are being taken to control and monitor the release of nuclear substances or hazardous substances to the environment resulting from site

preparation activities ..."

Can you give me an example of nuclear substances that might be released in the site preparation that just -- are these sealed sources that you're talking about or -- it just seems an unusual substance to have in a site prep.

**MR. MILLER:** Doug Miller, for the record.

It's that during site preparation on a site where there's also an existing reactor facility, you may during excavation encounter some nuclear substances. And then if you did, while you were excavating, you would have to have the appropriate protective clothing and the appropriate measures to deal with that circumstances. We don't expect it to happen, but if it were on an existing site, that would have to be taken into account.

**MEMBER DEMETER:** Okay, that's a good example. Thank you.

**THE PRESIDENT:** Thank you.

M. Berube?

**MEMBER BERUBE:** Well, first of all, I wanted to congratulate you on the strategy of this. The cradle to the grave management is a very sound way to actually begin with this particular type of regulation, in my opinion.

One of the questions I had, looking at it

very quickly -- and this may be a little naïve because I'm new -- is that I wanted to ask you specifically are there any exemptions to this regulation in terms of military or other applications that may be outside of the scope. What would they be?

Second of all, are there certain threshold limits that we would consider to be under this regulation or does this apply to every type of reactor technology that we might deploy?

**MR. ROBERTSON:** This is not a regulation. It's a regulatory document --

**MEMBER BERUBE:** [indiscernible - multiple speakers]

**MR. ROBERTSON:** Hugh Robertson, for the record.

And I'll pass it over to Dr. Miller to ...

**MR. MILLER:** So this regulatory document would not apply to, say, a military installation. But we do know from cooperative work with DND that they essentially follow Canadian regulatory expectations such as would be in this document.

As far as the threshold goes, for reactor facilities specifically, there is no threshold. But we would apply this document in what we'd call a risk-informed manner, where the extent of information needed is

proportional to, say, the study area that would be established for the facility.

**MEMBER BERUBE:** Thank you for that. Because of the fact we haven't specified technology here and we have no idea what we're going to be looking at 50 years down the pipe, I felt it was a valid question to know, you know, are we thinking about, you know, what is deemed to be a safe threshold. Okay.

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

Perhaps I could just take this opportunity to further clarify the CNSC approach in terms of regulations versus regulatory documents.

So as you know, the CNSC, there's a *Nuclear Safety and Control Act* and associated regulations which lays out, of course, the legislation for the nuclear industry in Canada.

And then we use regulatory documents basically to further explain the requirements that are laid out in legislation. So you'll see a second one today as well. And it's an attempt to, as I've said, further explain the CNSC's expectations in particular areas. But the regulatory documents are not themselves regulations, just to clarify that.

**THE PRESIDENT:** Ms Penney?

**MEMBER PENNEY:** Hi. Thanks.

So I have a number of questions trying to put this in the context of how I understand getting projects approved in Canada.

So I'm looking at your figure, which is helpful, which is site evaluation over the life cycle. And I guess first question would be at what stage does an environmental assessment get done. Maybe can we start with that? Can I do a multi-tiered question?

**MR. MILLER:** Doug Miller, for the record.

The process starts with a licence application. We have indicated in the document that you can submit basic information for your licence application and that is sufficient to then trigger the federal environmental assessment, currently under CEAA 2012. Then they indicate the schedule of submissions and we track and review that way.

And I would ask if Mr. Michael Rinker would have anything to add.

**MEMBER PENNEY:** Can I just clarify? So a licence application for site preparation, is that what we're talking about?

**MR. MILLER:** Yes, exactly.

**MEMBER PENNEY:** Thank you.

**MR. RINKER:** Mike Rinker, for the record.

I'm the director general for the Directorate of Environmental and Radiation Protection.

So Dr. Miller's correct, the first application is what triggers the federal environmental assessment act. So currently it's the *Canadian Environmental Assessment Act*, 2012. It is undergoing some proposed revisions.

There is -- as an example, there are three environmental assessments that are undergoing now. And under the current legislation, it is the Commission who is the decision-maker under that federal legislation. I'm not certain if that will stand. There is proposed legislation for which there will be a different process. But nevertheless, the CNSC staff and the Commission would be involved in that proposed process as well.

**MEMBER PENNEY:** Thanks.

If I can ask a section question, if that's all right, Mr. Chairman.

Public interest determination. At what stage are you making -- is a public interest determination made?

**MR. RINKER:** Mike Rinker, for the record.

So that is something new that's being considered in the new impact assessment legislation. There isn't necessarily a specific public interest determination

made under the *Canadian Environmental Assessment Act* of 2012. And there isn't under our legislation.

But we do work quite diligently to engage communities, Indigenous groups, and the public to get an understanding of what are societal expectations around these projects. As an example, we are about halfway through some environmental assessments now, and we've been in communities almost a dozen times per project to try to understand what are the concerns, particularly to local Indigenous communities. And we expect the proponent of these projects to also have a reactive understanding of what those concerns are and perhaps modify their project accordingly.

However, there isn't that final public acceptance decision that would be proposed for the Minister of Environment to take.

**MEMBER PENNEY:** Okay, so I understand that public interest determinations, then, would be made by the CNSC currently at the earliest stages. So you've got a proponent bringing in a project, say it's a small nuclear reactor for a new location. And they may or may not get caught by CEAA, whether it's now or later. But say if they don't, then right now what I'm understanding is that a decision about whether to move to the next stage is made at the site ... help me.

**MR. RINKER:** Mike Rinker, for the record.

So there would be an environmental assessment decision, but also there would be a decision by the Commission to issue or not that first licence to prepare a site. So that's what licence that is -- would be issued by the Commission. And it would be issued taking into account the views of the public and Indigenous communities who would present before you. So you would take into account their views when you make your decision.

**MEMBER PENNEY:** So what I hear you saying is currently if there is not CEAA trigger, the actual decision, which is equivalent to a public interest determination, is made at the site --

**THE PRESIDENT:** We do not do public interest --

**MEMBER PENNEY:** No, but someone has to decide at some point that this project is allowed to move forward.

**THE PRESIDENT:** No, only -- the only mandate we have right now under CEAA 2012 is safety, impact on the environment, and security.

**MEMBER PENNEY:** Right.

**THE PRESIDENT:** So there is no public interest there.

**MEMBER PENNEY:** But the decision to issue

this licence and basically a project to move forward through site preparation, and presumably to the next stage which would be construction, right, there's another licence I understand for construction, and another licence for then operation, which makes sense ... which makes sense. But if a proponent is committing funds at the early stage to do site preparation, it's under some expectation that they're going to be allowed to move forward with construction, if you know what I mean. So a decision has been taken at that stage to allow the project to move forward. Am I understanding that?

**MR. RINKER:** Mike Rinker, for the record.

So the environmental assessment under CEAA would look at the full life cycle of that project, so the effects of site preparation, construction, operation, and eventual decommissioning. And so that EA decision made under the current legislation -- which I think does not have that specific in the public interest test as well, although it has consultation involved -- that would be made. But the licensing decision is only on that first licence. And if there was something found during that period of licensing for which we thought safety was at risk, we may not issue that --

**MEMBER PENNEY:** One more question. So does CEAA 2012, as it stands right now, does it capture

small nuclear facilities?

**MR. RINKER:** Mike Rinker, for the record.

It captures all reactors, yes.

**MEMBER PENNEY:** Okay, thank you.

**THE PRESIDENT:** So let me jump right in. And that's my problem with this REGDOC. You know, we're looking always for clarity of process, particularly if we're going to have some SMRs coming here who are not really familiar with the CNSC process.

The real world, we first hear about a project, somebody send us a letter and they say -- so there's always like a project description. But I'll put this aside. But we all know there's a project description comes in before even an application for a licence for a prepared site.

What my trouble here is between site evaluation and site preparation there's a big EA. And maybe and it's not mentioned in all your diagrams. There is a little -- there is a little mention about do you want to know about the EA going in another REGDOC. But I thought that even on your slide 14 when you show the whole life kind of consideration, it's not for the site evaluation. It's the site EA that eventually comes in.

We just went through in Darlington, you know, we've gone through this new build EA. And you

remember all the problems that went with all of this. All the way for off-site to decommissioning, all was in this EA. And only after you do the EA will they consider a licence to prepare site.

And I don't understand why you didn't put it in your chart somewhere and why not explicitly explaining to everybody that all the site evaluation you're going to do is input into an EA. I didn't find it explicitly, particularly in the application, particularly everywhere that I thought you could be a little bit more forthcoming about the relationship. What am I missing?

**MR. RINKER:** I'll start.

Mike Rinker, for the record.

So maybe clarity in illustration is something that the front row can address.

But I want to make clear that the current project list for nuclear facilities includes mines, processing facilities, reactors, as well as waste facilities. And this document is scoped to reactors. And for that -- because environmental assessment applies across the full fuel cycle, we do have a single regulatory document for environmental protection, environmental assessment that any industry, whether it's mining or others, can point to. And they will find our process under the *Canadian Environmental Assessment Act*, 2012. They'll

also find out process for EA under the NSCA in one location.

**THE PRESIDENT:** I understand that. But when you read that slide 14, as an example -- by the way, it's all the slides here going through the whole life of the facility -- and you read at the beginning that site evaluation and site preparation looks like almost like the same process. It does not indicate that in between site evaluation and site -- and the licence application for site preparation there's an EA required. It can be an EA under CEAA, it can be EA under NSCA, but an EA is required. And how can we, you know, kind of ignore that in every process we describe?

**MR. ROBERTSON:** Hugh Robertson, for the record.

Perhaps we weren't clear enough in the deck. But I think in section 2.1, that's where we tried to be clear in what the expectations are. Now, if we didn't get that right, we're willing to look at that --

**THE PRESIDENT:** No, but even in description of how do you do site evaluation it doesn't conclude everywhere this will be inputted into the EA where all the other environmental and emergency plan and malevolent, all the rest of this stuff will be in there.

**MR. MILLER:** Doug Miller, for the record.

In section 2.1 of the regulatory document that was just referenced and in section 3 and including figure 1, we try to explain that the information that's collected during site evaluation following section 3 of the regulatory document in its entirety plus Appendices B through G provide information for both the environmental impact statement that's prepared under CEAA 2012 and also addresses the regulation on the description of the site evaluation program under the licence to prepare a site. So that very large body of information which is captured through section 3 and the appendices is then used and leveraged for both reviews.

**THE PRESIDENT:** Yeah, but Doug, even if you look at your -- on your diagram of slide -- what page am I on here -- on page 9, right. So you look at site evaluation process feeds into the licence to prepare a site. Independently, like the EA, the EIS doesn't look like it feeds into also that. It's like two stand-alone processes.

**MR. ROBERTSON:** Hugh Robertson, for the record.

Yeah, note taken, and we can -- we'll take a look at this make sure we're explicit in those expectations there.

**THE PRESIDENT:** I understand that you

wanted to make sure that later on, when new legislation comes in and EA will become IA, you want to only change only one regulatory document. But life going to be different under the IA. And some of the early planning that will go before we even get into the site preparation, those all will have to be almost like rewriting of this particular REGDOC, I believe.

So right now we need to be very, very clear what the rules are under CEAA 2012, because they'll be good for at least two more years, if -- depending on the legislation agenda. So I didn't think that some of this -- I think there's room to improve the clarity, let me put it this way.

And yeah, that's my rant.

I'm back to Ms Velshi.

**MEMBER VELSHI:** Thank you.

You had said at the outset that this REGDOC really doesn't change requirements as they stand today. So I'll use a couple of examples, and if you can help me understand if there would be a difference. If Bruce Power were to do their periodic safety review today and this would be a modern standard that they would be assessing against, would there be new gaps that would be identified for the site compared to if they had done it three months ago?

**MR. FRAPPIER:** Gerry Frappier, for the rector (laughs) for the record, rather. I'm the director general of the Regulatory Power Reactor Program.

The short answer would be no. There may be -- so we would expect for -- if this document goes forward, that during periodic safety reviews, this document would be one of the ones that would be to be considered as you do your periodic safety review. May result in sort of reorganizing the information a little bit more to sort of reflect the document, but as part of the PSR, they have to ensure that the external hazards are known, what kind of changes to the environment might be -- have taken place or could be predicted to be taking place.

So if you look in the Bruce one that we talked about yesterday, the concern around climate change might change temperatures of the Great Lakes and Lake Huron in particular. So that's already captured as something that they are going to have to look at.

**MEMBER VELSHI:** Good, thank you.

And then on a similar line, if we talked about the Darlington nuclear -- new nuclear plant, and I don't know what the shelf life is of their licence to prepare a site, but would that change as a result of this new REGDOC?

**MR. MILLER:** Doug Miller, for the record.

With regard to the Darlington new nuclear project that licence expires in 2022. At the time, we would expect that they would go back and do a re-confirmation of the assumptions made in the EA, and supporting licensing, and identify if anything has changed. They will have to look at site-specific characteristics and meteorology and see if there is anything that has of importance.

**MEMBER VELSHI:** And they would have needed to do that, regardless of whether there was a new REGDOC or not, right?

**MR. MILLER:** Yes.

**THE PRESIDENT:** Dr. Demeter...?

**MEMBER DEMETER:** Thank you. I just have a small clarification question left. Thank you for the document.

On page 4 of your slide deck it said that REGDOC 1.1.1 will replace previous RD-346 site evaluation. Did REGDOC-346 also include site preparation? Because if it doesn't, what document is it replacing for the site prep?

**MR. MILLER:** RD-346 was our first version of site evaluation, and section 3 updates that to address Fukushima and to codify what was done for Darlington new nuclear project.

The site preparation stage, section 4, codifies what was requested during the Darlington new nuclear project. There was some very basic information in a licensing process regulatory document but we have codified and captured what the practice was.

**MEMBER DEMETER:** So the site prep component is in that new codification of previous practice, which wasn't as packaged as such?

**MR. MILLER:** Doug Miller, for the record.

Yes, it is codifying the practice in a sense.

**MEMBER DEMETER:** And from a regulatory burden point of view, from industry's point of view, is this process streamlined? Is it more or less, from their point of view?

I can't ask industry but I am just curious from your point of view. From their point of view, what do you think their reaction is to the regulatory oversight burden?

**MR. FRAPPIER:** Gerry Frappier, for the record. Perhaps I can add a little bit here.

So currently the process when we're going through a licensing, whether it be the Darlington new build or the Bruce and Pickering that are going on now, there is no REGDOC. As mentioned, for the site evaluation there is

an RD-316, but the actual place, as far as the licence goes, would be captured in a letter that the regulator would have sent to the licensee that says, "Here's all the things we want to see".

So the advantage of this thing is before they even start the process they will have visibility as to what all is going to be required.

As the President had mentioned, we would know if there is a project coming up and they are looking to put in an application. We would send them -- in the past, we would be sending them a letter that was quite lengthy, had a whole bunch of references to other documents and all that that would essentially capture what this document has now done in a much more thought-through way and in an organized way.

Whether it's more efficient or not for the licensees, I think you'd have to, you know, ask them. But my feeling would be that it will be, because they can predict a lot better what they are going to be asked to submit.

**MEMBER DEMETER:** Thank you.

**THE PRESIDENT:** Thank you.

Mr. Berube.

**MEMBER BERUBE:** Just one more question, just on the general crafting of these kinds of documents,

knowing full well that they can't be perfect and that they are susceptible to change, at this stage, of course, where we are, you're asking for approval on this particular document.

That being said, are you currently aware of any limitations of this documentation in which we are going to have to act in the near future to change it, and if so, what would they be?

**MR. TORRIE:** Brian Torrie, for the record. I'm the Director-General of the Regulatory Policy Directorate.

All of the REGDOCs that we put out are evergreen, in the sense that we can change them at any time based on whatever is coming, but we can't -- we can't assume, for example, the impact of legislation that the bill before Parliament right now is going to be the way that it's going to be when it actually gets approved.

So that's why we refer to CEAA 2012, or federal environmental assessments legislation in the REGDOCs now. But as soon as there are changes, we can easily -- relatively easily make those changes to the REGDOCs to make them appropriate for whatever other legislation is going on.

I guess to answer your question, there aren't any limitations we see other than the impact

assessment legislation in terms of the current REGDOC that's before you.

**MEMBER BERUBE:** So just to be clear, in your opinion at this point in time, this is about as good as this document is going to get?

**MR. TORRIE:** Yes, this may be one of the best REGDOCs ever. Thanks.

--- Laughter / Rires

**MR. TORRIE:** Till the REGDOC this afternoon anyway.

--- Laughter / Rires

**THE PRESIDENT:** Okay. Ms Penney...?

**MEMBER PENNEY:** Okay. So what we all want is clarity for proponents, right? For sure, as a regulator you want them to understand what you're expecting of them and it should be clear and crisp. And I think the concept of carrying over information from one stage to another is a really good one, right, so that you are most efficient as possible.

With respect to concern six around specific reactor technology, now that I understand that all reactors whether they are small or large will require a CEAA assessment which will happen after site evaluation and before site disturbance, so no shovels of dirt will be moved until a CEAA review has been done, I can't imagine a

CEAA 2012 review happening without knowing what kind of reactor you're proposing to build. So I kind of see concern six as kind of a moot point, isn't it?

**MR. MILLER:** Doug Miller, for the record.

Applicants have a choice of specifying a specific technology and using the information on impacts on the environment from normal operation and accidents and malfunctions. Alternatively, they can, say, identify three or four reactor technologies and develop what is called a plant parameter envelope that takes into account the maximum releases from all the technologies considered. So there may be four different types. They might be quite different.

In the information submitted for both the EA and licensing, they can indicate "this is the range of releases of nuclear and hazardous substances". That will dictate the bounds for the environmental assessments and impacts on valued components and will also end up providing information for licensing.

That information then is what they commit to over the life cycle of the project, is that through construction it's verified those assumptions were made. So they can take a composite approach. That is what was done for Darlington new build.

But you are checked on that and if there

is a change to be made, well, then there's questions.

**THE PRESIDENT:** Just I noticed that both Greenpeace and CELA oppose that concept. But what I don't understand, we went to court on this in Darlington and the court accepted the bounding concept; is that not correct? So I was surprised to see this argument coming up again as opposing to the bounding concept and insisting on precise technology.

So what -- did you have a discussion with them around them or just all paper, back and forth?

**MR. MILLER:** Through this we have sent the draft regulatory document to all stakeholders, and it included the public comments table and how we have dispositioned. We believe that our answer is sound because, on the other hand, other stakeholders indicated it wasn't practical to have such level of information early on in a project and our response is that you do have to have some level of design information to reasonably predict impacts on the environment.

**MEMBER PENNEY:** It's an ongoing debate in many industries with respect to environmental assessment at what stage you have the detailed information, right. But we have been doing this for 25 years now, so we should be, you know, accepting of that bounding. So the way you described that, Dr. Miller, I get that. It makes sense to

me.

**THE PRESIDENT:** Okay. Ms Velshi, Dr. Demeter, Mr. Berube?

**MEMBER PENNEY:** One more.

So did I hear that this might apply, this REGDOC might apply to mines?

**MR. MILLER:** This document doesn't specifically address mines, but it could be used as guidance for other Class I nuclear facilities, both Class 1A and Class IB. So it's out there to consider.

**MR. ELDER:** Peter Elder, for the record. I am the Chief Science Officer.

The comment about mines was that there is -- this document makes reference to another document, 2.9.1, which is on environmental protection, and it does cover all types of facilities. So in terms of -- it's the one that explains the current environmental assessment process.

So one of the -- we recognize the comment about how you do them linking each other. One of the comments we got from industry was to "don't duplicate between documents" because then it's easier for them to, say, point, rather than don't duplicate.

So we'll try to clarify and see if it's clarify some of the language on the pointing, but that

really was to say that the main document on how environmental protection, including environmental assessment that's on -- is REGDOC-2.9.1.

**THE PRESIDENT:** Just to reinforce my argument, EA is common to all of them. Even in a mine you have to do an EA, but the site preparation for a mine is a different concept than a site preparation for an NPP.

**MR. ELDER:** There is a variation in terms of what you -- you have to understand the site. Obviously, is that, in a mine, you're going to where the ore is.

**THE PRESIDENT:** Right.

**MR. ELDER:** But you still have to understand the hazards that exist on that site, and that is common.

One other thing we said is when we did this, is looking at what was required under the NSCA, knowing that, yes, CEAA also exists, environmental assessment exists, our experience from going through the Darlington new build and a deep geological repository for OPG is that the overlap between what we need to assess on a SCA and what is needed for CEAA, there's about a 90 percent overlap in the information on the site. So if CEAA didn't exist, we would still need all this, most -- almost all this information.

There is very little delta, and that is

what we have to look at in terms of the new environmental -- the new impact assessment legislation is that delta is going to be a little bigger, and that's what we are concentrating on understanding, going forward.

**THE PRESIDENT:** Can I ask a question on your consultation summary on page 13, on comment 8, "Two licensees are concerned with the forcing of requirements from the regulation into the safety and control area". What does it mean?

**MR. MILLER:** Doug Miller, for the record.

Some stakeholders have expressed that they would rather see the information organized by, according to the Regulations, i.e., for this regulation, what do I need to submit?

In this case we have developed safety and control areas for a way to organize information because there are some regulations, such as 4(e) of the site preparation regulations that talks about the impacts of the activity on people and the environment and the mitigation measures that are taken into account. That, in a sense, to address that, is section 4 of this regulatory document in its entirety. So while you could do that it becomes rather cumbersome. There is clause 4(a) which is the site evaluation work that has been and will be done. You could refer to section 3 of the regulatory document, plus the

entire appendices. It's just that there are some specific clauses that are very general that would make it very awkward to say, well, for this regulation do everything, but essentially that's what the regulation means, though.

**THE PRESIDENT:** Okay. One other question with CELA and Greenpeace arguing. There is a recommendation on page 19 and you know where this is leading: CNSC should release its rationale and justification for not subjecting existing sites to modernizing siting standards. What do you say to that?

Their argument basically is the Pickering site is no longer a viable site, right? So is anything in this regulatory document that kind of says, well, yeah, you should review that Pickering site?

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

So, as mentioned a little bit earlier, the site -- sorry, the request for relicensing at Pickering, if you want to use that as an example, would have to look at the external hazards and things of that nature. This document, of course, is not released yet, so we certainly cannot make it applicable to Pickering. But the intent is that they would be looking at the things that are in this document right now.

So certainly it's anything that is of

concern should be on the table with the Commission at its hearings with respect to whether a licence for Pickering is appropriate or not.

**THE PRESIDENT:** Thank you.

Questions, Ms Velshi, Dr. Demeter?

I think we are done. Thank you very much.

We are breaking for lunch and we'll be back at 1:15. Thank you.

--- Upon recessing at 12:17 p.m. /
Suspension à 12 h 17
--- Upon resuming at 1:17 p.m. /
Reprise à 13 h 17

**THE PRESIDENT:** Okay. We are back.

And we will move on to the next item on the agenda which is a decision item on the regulatory document, REGDOC-2.1.2 Safety Culture. This is outlined in CMD 18-M11 and M11.A.

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

**CMD 18-M11/18-M11.A**

**Oral presentation by CNSC staff**

**M. LAMARRE :** Merci, Monsieur le Président. Bon après-midi aux Membres de la Commission.

Mon nom est Greg Lamarre. I'm the Director General of the Directorate of Safety Management. With me here today are beside me Mr. André Bouchard, the Director of the Human and Organizational Performance Division; beside Mr. Bouchard is Ms Karen Owen-Whitred who you heard from this morning, the Director of the Regulatory Framework Division; behind us Dr. Tanya Hewitt, Human and Organizational Factors Specialist; and other CNSC staff who are available to support and answer any questions that you may have.

Before we get started I'd like to disclose an error that was made in the CMD and it's at two different sections. So, I'll point you to the Executive Summary on page 7 and I'll allow you just a minute to get there.

It's the same error in both sections, but if we go to the Executive Summary on page 7 and it's the third paragraph from the bottom, the paragraph that starts:

"If REGDOC-2.1.2 is published,..."

So, it says there:

"...CNSC staff anticipate Class I

nuclear facilities and uranium mines and mills licensees may have to modify existing safety culture assessment and improvement tools."

That should, in fact, only reference nuclear power plants and that is consistent with the content of the regulatory document proposed here today.

So, the REGDOC is correct. The wording in the CMD, both on page 7 as well as in section 3, Implementation, page 15, inaccurately point to anticipated changes for Class Is and UMMs. So, I just wanted to put that errata on the record.

Safety culture has been around for over 30 years. As we heard this morning, yesterday, safety culture continues to play a very large part both in the nuclear industry as well as in every other sector, from transportation, aerospace, health care and oil and gas.

Over the years the CNSC has played a key role in the evolution and maturing of this subject area. Today we're here to open a new chapter in this evolution with the presentation of a draft first regulatory document, REGDOC-2.1.2 Safety Culture.

I'll now turn the presentation over to Ms Owen-Whitred to continue.

**MS OWEN-WHITRED:** Thank you.

For the record, my name is Karen Owen-Whitred, Director of the Regulatory Framework Division.

We are here today to request Commission approval of REGDOC-2.1.2 Safety Culture which sets out requirements and guidance for fostering a healthy safety culture amongst licensees.

CNSC staff recommends that the Commission approve REGDOC-2.1.2 because it makes a significant contribution to enhance nuclear safety in Canada. A healthy safety culture is key in maintaining the safety of workers, the public and the environment.

The REGDOC is the result of decades of engagement with industry on this important topic.

If approved by the Commission, this REGDOC will be an important addition to the CNSC's regulatory framework by clarifying safety culture concepts, adopting a comprehensive perspective that incorporates security culture with safety culture, and by describing CNSC expectations, requirements and guidance based on a graded approach commensurate with risk.

I will now outline today's presentation. I will briefly review the role of regulatory documents and situate REGDOC-2.1.2 within the CNSC's regulatory document framework.

Next we will provide an overview of safety culture and provide the background context for the development of this REGDOC.

The presentation then goes into detail concerning the contents of the REGDOC and provides an overview of the current safety culture engagement within Canada's nuclear industry.

This REGDOC has undergone extensive and meaningful stakeholder consultation which is described when we discuss the two-phased public consultation process.

Staff will then discuss implementation and oversight strategy for the REGDOC.

Finally, we will finish our presentation with CNSC staff's conclusions and recommendations.

To enhance accessibility of our regulatory expectations, the CNSC structures our regulatory documents according to the framework shown here. This slide shows where REGDOC-2.1.2 fits within the CNSC's broader document framework. It is situated within Category 2, Safety and Control Areas in the Management Systems series, 2.1, which is comprised of two regulatory documents.

Please note that REGDOC-2.1.1 Management Systems is currently under development which is why we have shown it greyed out on this slide.

I will now turn the presentation over to

Mr. André Bouchard, Director of the Human and Organizational Performance Division.

**M. BOUCHARD :** Merci, Karen.

Bonjour. For the record, mon nom est André Bouchard. I am the Director of the Human and Organizational Performance Division at the CNSC.

Over the past 30 years we have developed a solid understanding of safety culture nationally and internationally in nuclear and other industries.

From this slide, we understand that safety culture draws from many elements. This slide highlights a few of these elements. The asterisks represent specific to security culture elements such as the existence of a credible threat.

Simply put, safety culture is how safety is realized in everyday work from the CEO to the shop floor. Some of these elements are easily observable and measurable, like knowledge and competencies, decision-making and how information is shared or protected. Other elements are much deeper, less accessible and often not conscious such as perception, shared understanding, trust and respect. Often we're not aware of how safety culture influences our thoughts, behaviours and performance.

In the next slide we will look at the

interface between safety culture and security culture.

This slide is the same slide as previously shown. We can look at the same concepts in other ways to understand that safety culture and security culture are co-existing and mutually supporting. The majority of the framework applies equally to both safety and security.

Security culture here is represented in yellow and includes all of the elements within the slide, including three security-specific indicators which are the existence of a credible threat, screening practices and protecting sensitive information.

Safety culture is represented here in blue. It also includes nearly all of the elements within the slide while giving special attention to security-specific indicators to ensure they are not overlooked, nor do not compromise safety but, rather, integrate and complement safety elements.

When combined yellow and blue make the colour green which here represent an amalgamation of culture that acknowledge an interplay between safety and security. For example, good communication, clear roles and responsibilities, effective decision-making apply equally to both safety and security. This integrated culture ensures that the performance of people, processes and technology is both safe and secure.

From this point on when speaking about safety and security culture, we will be referring to safety culture.

Now let's look at some events that have advanced our learning in safety culture. Since the Chernobyl accident in 1986, safety culture has been recognized as having a significant impact on safety. For the nuclear sector, this event changed how the industry looked at safety, moving beyond the technical component into the human and organizational aspects.

In the next three decades other nuclear events deepened our understanding of safety culture. The 1999 Tokai-Mura criticality accident in Japan brought to light that safety culture is important even in small nuclear settings. In 2002 Devis-Besse had been recognized within the nuclear industry as a top performing plant while a leak corroded the reactor head. And Fukushima in 2011 identified systemic cultural elements beyond the boundaries of the licensee's organization.

Events in other sectors also contributed to the learning. The space shuttle Challenger in 1986 and Columbia in 2003, Deep Water Horizon in 2010 and Lac-Mégantic in 2013.

Although the expression safety culture was initially applied in nuclear, these events demonstrated

that this subject cuts across all industry sectors from large organizations to small shops and it goes beyond the technical risks into the human and organizational issues.

September 11, 2001 has also been recognized as the pivotal event increasing attention on security culture. In the end, these events proved beyond a doubt that culture is a key contributor to safety and security.

We will now look at how the IAEA has addressed safety culture in its documentation.

This slide provides a sample of key relevant documents published by the IAEA since Chernobyl. The documents are listed in a hierarchical order starting from the fundamental safety principle SF-1 at the very top of the IAEA document pyramid.

This list contains documents specific to safety culture as well as documents specific to security culture. Note that security culture documents listed here date back nearly a decade. In 2016 the IAEA published safety report series 83 named, Performing Safety Culture Self-Assessments. This document would be referred to as SRS 83 in this presentation.

The REGDOC contain a longer, more comprehensive list of relevant IAEA documents on safety and security culture.

Now let's discuss what has been done in Canada during that time.

In the mid-90s issues with organizational performance at Canadian nuclear power plants drove the CNSC to move from focusing on technical aspects to look at human and organizational issues. As a result, the CNSC initiated a research project aimed at developing a method to assess licensees' safety culture. This research demonstrated that through a rigorous method it was possible to assess safety culture.

Between 1997 and 2009 CNSC staff conducted 11 safety culture assessments at various nuclear facilities. In 2004 several CNSC licensees and other industry's representatives attended the CNSC's safety culture symposium. The CNSC distributed copies of draft safety culture self-assessment guides and communicated its vision that licensees were to engage in such self-assessments.

Also in 2004, reacting to the concerns raised by 9/11, the IAEA instituted the Code of Conduct for Radioactive Sealed Sources whereby member states are to recognize the importance of fostering a safety and security culture. The CNSC instituted sealed source tracking to meet these expectations in 2006.

Now let's look at some oversight

activities the CNSC has undertaken.

Since 1997 CNSC staff has been actively engaging licensees in several activities, meetings and conferences to promote the fostering of safety culture, trending of events and inspection findings against safety culture framework, capturing observations from site inspectors through daily oversight work, on-site review of licensee self-assessment practices including reports and action plans implementation.

Additionally, CNSC staff report performance to the Commission through licence renewals and regulatory oversight reports, CMDs.

In the next slide we will look at some of the key milestones in the development of this REGDOC.

This slide provides a timeline of key milestones in the development. In 2009 the Commission directed the CNSC to perform a safety culture assessment at Pickering A. The results of this assessment were communicated to the Commission.

That presentation in parallel with the U.S. Nuclear Regulatory Commission publication of a policy on safety culture in 2010 triggered the decision to publish a CNSC policy, or document on safety culture. There was also interest in publishing the 2004 self-assessment guide. Consequently, in 2012 the CNSC published a discussion paper

for consultation.

Even though the Fukushima event took place in 2011, the lessons learned from this event in the areas of safety culture came a few years later. Since 2013 staff increased its efforts nationally and internationally to learn best practices and develop standards that would help draft the current safety culture REGDOC.

In parallel to this effort, Canada ratified the Convention on the Physical Protection of Nuclear Materials in 2013. This Convention identified fundamental principles which includes security culture.

In 2015 Canada hosted the International Physical Protection Advisory Service, IPPAS Mission. The Mission report contained recommendations suggesting that the CNSC should consider using the development of its REGDOC-2.1.2 on safety culture as an opportunity to explicitly refer to nuclear security culture and its importance, and licensees should consider formally enshrining the importance of nuclear security culture.

The CNSC's response to the IPPAS Mission was to use REGDOC-2.1.2 to address these recommendations.

In October, 2017 the Class I and Uranium Mines and Mills Regulations were amended. One of the amendments required the submission on the proposed management system for the activity to be licensed which was

to include measures to promote and support safety culture.

Let's move from the history now of safety culture to what is being proposed here today.

Staff is recommending a policy-like approach. The proposal set a goal-setting objective to foster, monitor and assess safety culture. The CNSC already has this regulatory approach in the way it regulates the principles of ALARA, as low as reasonably achievable, in radiation protection. The ALARA principles drive licensees to continuously review their practices with a focus on lowering radiation doses.

Regulators' oversight of ALARA reinforce this by challenging assumptions and monitoring progress towards this goal. The evergreen goal proposed by this REGDOC lays the basis that supports the need for licensees to understand, learn and improve their organizations' safety culture.

The REGDOC captured this policy approach, which would bring the CNSC in line with IAEA recommendations for regulators' safety culture oversight practices.

I will turn the presentation over to Dr. Tanya Hewitt for a description of the REGDOC.

**MS HEWITT:** Thank you, André. For the record, my name is Tanya Hewitt and I am a Human and

Organizational Factors Specialist here at the CNSC.

I will now focus on various aspects of REGDOC-2.1.2, Safety Culture. If it is approved, the REGDOC will engage all licensees in fostering a healthy safety culture in their organizations, and enhance the CNSC regulatory framework by: providing explicit expectations for fostering, monitoring and assessing safety culture, including the integration of safety and security culture; and, providing guidance and information on what requirements or guidance applies to whom.

We will now look at sections of the REGDOC. REGDOC-2.1.2 has three main sections. The introduction covers the purpose and scope of the document as well as relevant legislation and national and international standards.

The second section is on fostering safety culture. Fostering safety culture is key in how organizations should approach safety culture. Fostering, cultivating and nurturing have all been terms associated with safety culture, trying to capture concepts such as introspection and self-reflection, which are core safety culture ideas.

The third section is devoted entirely to safety culture assessments. These are significant undertakings for organizations with a process that includes

everything from initial planning to communications to data collection and analysis.

Safety culture assessments are important activities for an organization. They can allow a deeper understanding of their workplace and they can reveal insights and comprehension that would otherwise be very difficult to access.

The approach taken in the REGDOC is detailed in two technical rationale documents which are appended to the CMD: the first one entitled, Rationale of Security Culture Inclusion in REGDOC-2.1.2, Safety Culture, will be referred to as CMD Appendix A in this presentation; the second one entitled, Synopsis from Science and Benchmarking Supporting REGDOC-2.1.2, Safety Culture, will be referred to as CMD Appendix B in this presentation.

We will now look at the principles that inform the REGDOC. These principles are the foundations upon which the REGDOC was built. These are articulated in the introduction and are woven and referenced throughout the REGDOC. We will talk about each principle in turn over the next two slides. All principles are informed by SRS 83.

Principle 1, Existence. Independent of whether or not an organization is aware of it, ponders it, or has any activities dedicated to it, every organization

that has a group of individuals has a culture.

Principle 2, Influences. The influences on culture are numerous. It is worth noting that the CNSC views workers as anyone who works for or in support of the organization, from the CEO to the corporate staff, to the frontline. The idea is not necessarily to control and fix as much as to reflect and understand.

Principle 3, Complex and Changing. In this context complex refers to relationships between people and processes, people and technology, people and machines, people and other people, all with competing goals and pressures, all while constantly adapting to create the best outcome at a given time.

Quoting from SRS 83: "The greatest risk in trying to understand culture is to oversimplify it." This principle also stipulates that safety culture changes over time, necessitating ongoing monitoring and periodic assessing.

The remaining principles speak to the more operational aspects of assessing and monitoring safety culture.

Principle 4, Monitoring and Assessing to Understand. Linked with the changing nature of safety culture in Principle 3, Principle 4 explicitly states that assessing and monitoring is needed to understand the

organization's safety culture.

Principle 5, the Importance of a Framework. The framework is the "what" of safety culture assessment. A framework is typically a set of statements against which the culture is evaluated. These principles form the approach taken to this REGDOC which has few requirements, but is rich in guidance and information.

Building on the principles, REGDOC-2.1.2 does have two requirements. Note that these requirements are focused on process, not on outcome. For each of them, the target licensee community is clearly identified. More information on all of these sections can be found in CMD Appendix B.

The first requirement, fostering a healthy safety culture will apply to Class I licensees as well as uranium mines and mills. Guidance supporting this requirement starts with safety culture governance documentation. This is a documented commitment, espoused by senior management and accessible by all workers that promises a collective commitment to safety while commensurate with the risk of the activity.

Guidance also includes ongoing monitoring of safety culture. This is harnessing existing processes to provide insight into the state of safety culture. The REGDOC provides examples of processes that could be looked

at through a safety culture lens, such as any feedback mechanisms and any performance indicators. The maturity model in Appendix B can be a useful tool to help with fostering safety culture.

Following a risk-informed approach, the requirement to conduct comprehensive, systematic and rigorous safety culture assessments at least every five years is applied only to nuclear power plants. There is ample guidance supporting this requirement. Section 3 of the REGDOC covers the how to assess safety culture, specifically the process and the data collection methods in some detail. This section is grounded in SRS 83.

The goal of such assessments is to provide an organizational mirror and allow deeper insights, self-reflection, and overall learning. The first appendix of the REGDOC is the safety culture reference framework. Licensees are free to use whichever framework they choose so as long as a mapping to the reference framework in Appendix A is provided.

In the reference framework the first level is the five IAEA characteristics, which have been in use for decades. Below the characteristics in the reference framework is a further level of granularity called indicators, most of which are also based on those of the IAEA.

Three security-specific indicators on the existence of a credible threat, screening practices, and protecting sensitive information are also included in this framework. The maturity model in Appendix B can be a useful tool to help with assessing safety culture. For safety culture, compliance is merely a starting point.

Next, we will look at the engagement of various licensees with respect to these requirements. Many Class I and uranium mines and mills have or are in the process of developing the basic building blocks of fostering safety culture. This is largely because CSA Standard N286-12, Management System Requirements for Nuclear Facilities, is already in or is in the process of being added to their licence condition handbooks.

Section 4.2 of this standard explicitly mentions recognizing the importance of and monitoring safety culture through the management system. Power plants use an industry publication on safety culture monitoring panels to realize ongoing monitoring of safety culture.

Regarding the safety culture assessment, all power plants have processes to assess safety culture and all specify a frequency. While not a requirement for non-NPPs, some other licensees also have processes to assess safety culture. So the basic building blocks are there.

The existing methods and processes can be enhanced by looking to best practice, such as SRS 83 and collaborating across nations and industries. There are a growing number of meetings and documents being written on safety and security culture where researchers and practitioners share best practices.

Overall, the Class I and UMM licensees are at a good starting point with the basic building blocks already in place. REGDOC-2.1.2 will provide a mechanism for ongoing improvement.

REGDOC-2.1.2 is meant to be useful for all licensees, including nuclear substance and Class II licensees. For this cohort of licensees REGDOC-2.1.2 provides foundational information with ample reference to SRS 83 as well as many references to learn more about safety and/or security culture.

Additionally, Appendix C on specific behaviours describes how various indicators may be realized in practice. It provides a useful tool for formalizing safety culture concepts. For example, a pilot project in Class II has made use of Appendix C already for a subset of licensees, namely isotope protection facilities.

This concludes the presentation of REGDOC-2.1.2. and Licensees Current Engagement.

We will now cover the extensive

consultation undertaken by the CNSC on safety culture leading to this REGDOC.

This slide presents the key public consultation activities that were conducted for the first phase, that being the discussion paper on safety culture.

The CNSC launched a discussion paper on safety culture in 2012. What the What We Heard Report outlined the key comments heard through the consultation, and in November 2013 the CNSC decided to go forward with this REGDOC.

The development activities for the REGDOC included, for example, technical discussions with the IAEA, other regulatory bodies, industry partners, and with other countries from 2013 to 2016. In September 2016 the draft REGDOC-2.1.2 was published for public consultation.

This slide represents the key public consultation activities that were conducted for the second phase, that being REGDOC-2.1.2. The first activity was a 127-day public consultation period on the draft regulatory document.

The CNSC received 169 comments from 13 respondents, all from industry and unions, during this period. Most of these submissions opened with expressing the importance of safety culture to their organizations.

A face-to-face meeting was held during the

public consultation period for commenters to ask questions and help clarify potential comments in January 2017. As a result of the comments received, the CNSC held a workshop on June 27th and 28th, 2017 to discuss the draft regulatory document and present proposed modifications to address the comments received. The workshop was attended by 27 external participants, including both industry and unions.

The revised REGDOC was sent to licensees November 30th, 2017 and industry sent responses to this on January 9th, 2018.

In the following slides the feedback from stakeholders will be described in more detail.

The next part of the presentation examines the five key themes raised during public consultation. More information on these topics can be found in CMD Appendices A and B.

We will walk through each topic in detail in the forthcoming slides, providing the relevant background and how the CNSC addressed the concern.

The first key theme related to the scope of the document. This is not to be confused with the scope of a safety culture self-assessment. The main concern raised was how does a given requirement or guidance apply to a given licensee or what applies to whom? As a response, CNSC Staff modified the document to include clear

statements in each requirement section regarding to which licensee the requirement and guidance applies and for whom it is information.

The second key theme is related to the REGDOC using a definition and a framework different than those in use in industry. In general, the various industry stakeholders expressed that they were familiar with their own definitions and wanted to keep them. The core aspects of various definitions of safety culture are very similar and share common goals. There is more on this in CMD Appendix B, Section 1.3.

Stakeholders were also familiar with and wanted to keep their industry safety culture framework written by INPO, the Institute of Nuclear Power Operations. Generally speaking, frameworks for safety culture vary across industries, although those used in the nuclear sector are very similar.

CNSC staff's response to both these concerns was not to change the CNSC definition or framework to suit the licensee, but to allow the licensees flexibility to keep their definition and framework. Licensees will need to map their framework to the reference framework in the REGDOC so as to ensure that this flexibility still meets the intent of the REGDOC.

The third key comment was on the inclusion

of security culture with safety culture in this REGDOC. The concerns with the inclusion of security culture were twofold. Firstly, stakeholders perceive that security culture and safety culture are separate concepts, and what's applicable to one concept is not necessarily applicable to the other.

Secondly, stakeholders expressed that the term security culture is not as mature a concept within the nuclear industry as safety culture. So it would not be reasonable to have the same regulatory expectations.

Security culture and why it needs to be integrated with safety culture in this REGDOC is treated in-depth in Appendix A of the CMD.

In short, safety and security culture need to coexist and are mutually supporting.

For the areas that are in opposition, it is all the more reason to treat both safety and security simultaneously as the tendency of one area, such as safety and the freedom to share information, will infringe upon the other area, such as security and the need to know. Not recognizing these potential conflicts and not mitigating them ahead of time could lead to problems for either safety or security, or both.

CNSC staff introduced text to clarify the relationship between safety and security, and revised the

framework to recognize the similarities in safety and security in most of the indicators revealing only three that are unique to security: the instance of a credible threat; screening practices; and, measures to control information.

CNSC staff also stipulated in Section 3.2 of the REGDOC, preparing for the safety culture assessment, that licensees may choose to undertake separate security culture assessments from their safety culture assessments.

The fourth key comment was on the periodic safety culture assessments. As there were many comments on this topic, the fourth key comment will span two slides. Stakeholders expressed that the requirement to conduct safety culture assessments that were empirical, valid, practical and functional, was viewed as excessively quantitative and scorecard-like. Licensees also expressed concern that this approach could be used to compare licensees.

As a result, the CNSC staff revised the assessment wording to be comprehensive, systematic, and rigorous, and modified the bullets that help explain what these mean in the context of a safety culture assessment.

Overall, the approach was explained to be robust, using both quantitative and qualitative methods to arrive at a credible and trustworthy mirror of the

organization, one that is not overly subject to bias or problematic data collection and analysis.

The second part of the fourth key comment concerned the frequency of assessments, which at three years were seen to be burdensome and impractical, and the submission of a summary report to the CNSC, which was seen not only as a modest administrative burden, but also to adversely affect future assessments. The latter needs further explanation.

Safety culture assessments depend upon people feeling safe and secure in sharing their opinion about their organization. This demands a very high level of trust between the assessment process, including how this information will be treated and the participants. Should this trust be broken and the opinions be taken out of context, there is increased probability that the staff who shared such opinions will refrain from doing so in any future safety culture assessments.

Regarding the frequency, CNSC Staff changed the requirement from three years to at least once every five years with guidance that they should be carried out as operational needs dictate. The requirement to submit summary reports to the CNSC was removed.

CNSC Staff will continue its current practice of reviewing safety culture assessments on site.

The fifth key comment concerned the maturity model. As this needs more explanation, this topic will also span two slides.

The maturity model is not a requirement for any class of licensee, but is guidance for all licensees. A maturity model is a tool for safety culture self-reflection. It is a set of organizational mirrors by which licensees can gauge where they are as an organization and where they would like to be.

Maturity models vary, but the CNSC, following the guidance in IAEA Safety Report Series 11 and IAEA-TECDOC-1329 chose a three-stage maturity model. The first stage is rule-based where people view safety as purely compliance and do things only because they are told to do so. The second stage is target-based whereby the organization uses goals and benchmarks as the motivating factors. The third stage is based on continual improvement whereby every member of the organization is fully engaged and the organization can be described as a learning organization. This slide conveys the key information communicated in Appendix B of the REGDOC.

Stakeholders' positions were divided on the inclusion of the maturity model. Nuclear power plant licensees found the maturity model to be unclear. They questioned its value given the safety culture assessment

process, implying that it was a separate framework and focusing on strictly pass or fail. They asked that it be removed entire from the REGDOC.

Other licensees and union representatives found that it was helpful and valuable. They wanted it kept in the REGDOC.

CNSC staff split the maturity model into two parts. The maturity model in Appendix B, referenced on the previous slide, is recommended for all licensees. The indicator table of the maturity model, which describes what various indicators may look like at all three levels of maturity, was recommended only for Class II and nuclear substance licensees. It is Appendix C of the REGDOC.

This concludes the section on stakeholder consultation.

I will now turn the presentation back to André to discuss implementation.

**MR. BOUCHARD:** Thank you, Tanya.

Pending approval of the REGDOC, the next steps can be summarized as follows: publishing REGDOC-2.1.2, Safety Culture, on the CNSC website, which will make it available to licensees and stakeholders. CNSC staff will follow the standard implementation process, that is Class I nuclear facilities and uranium mines and mills will receive a letter requesting a gap analysis and

implementation plan.

Staff will review and monitor licensees' implementation plan, and inform Class II and nuclear substances licensees of the existence of REGDOC-2.1.2, bringing to their attention a number of useful references, including Appendix C of the REGDOC which was specifically tailored for them.

We will now discuss how the CNSC will actually oversee licensees' safety culture.

Looking to the future, staff will carry on its current practices established since 1997, actively engaging licensees in several activities such as meetings and conferences to promote the fostering of safety culture, trending of events and inspection finding against safety culture framework, capturing observations from site inspectors, on-site review of licensees' self-assessment practices, including reports and action plan implementation and reporting performance to the Commission through licence renewals and Regulatory Oversight Report CMDs.

I will now turn the presentation back to Karen to conclude.

**MS OWEN-WHITRED:** Thank you.

In summary, REGDOC-2.1.2, Safety Culture, is an important document in helping to ensure that Canadian nuclear facilities continue to remain safe and secure. It

furthermore helps to ensure that the managers of nuclear facilities and their respective staff continue to be collectively engaged in fostering healthy safety cultures in their organizations.

The document builds on the CNSC's extensive knowledge and experience in this area. It is aligned with national and international practices and has been developed through benchmarking, research and extensive public consultation.

The REGDOC engages both those stakeholders experienced with safety culture and those new to the formal topic area in fostering, monitoring and assessing safety culture. The document assists licensees in seeking continual improvement of safety performance.

To conclude, if approved, REGDOC-2.1.2, Safety Culture, will improve clarity and strengthen the CNSC's regulatory framework. Based on our conclusions, CNSC staff recommend that the Commission approve this regulatory document.

We thank you for your attention and remain available to answer any questions you may have.

**THE PRESIDENT:** I was told that industry may want to intervene here on this document.

**MR. MANLEY:** Thank you, President Binder. It's Robin Manley, for the record. I am the Vice

President, Nuclear Regulatory Affairs at Ontario Power Generation. And if you don't mind I would like to comment on a few aspects of the REGDOC. I appreciate the opportunity to do so.

First, I will say that OPG completely agrees with the objective of the REGDOC to foster, monitor and assess safety culture. Nuclear safety culture is critically important in the nuclear industry, as CNSC staff have described. All of our staff are taught about it and our leaders continually stress the paramount importance of nuclear safety, and the safety culture as "the way we do things around here" underpins all aspects of nuclear safety.

I would like to recognize that the process used to develop this REGDOC certainly included several significant opportunities for stakeholders to engage with CNSC staff and provide input and commentary. OPG participated in that, along with other NPP licensees as well as other non-NPP licensees.

I would like to highlight that in this case the points that I'm going to make today are those of OPG. I am not proposing to speak on behalf of broader industry.

OPG notes that the CNSC did indeed make considerable changes to the REGDOC along its development

and in our view this improved the REGDOC. OPG still has a variety of concerns with the REGDOC and primarily its implementation and I believe CNSC staff are aware of all of these as we provided them during the various opportunities to comment.

I have four areas I would like to comment on in order of significance.

First, sufficient time to implement security culture assessments.

OPG is committed to addressing all the fundamental principles in the Convention on the Physical Protection of Nuclear Material, including Principle F: Security Culture, that the CNSC referenced in their CMD. The assessment of security culture has been built into our continuous improvement plans. However, as CNSC staff have noted, such assessment is new to the industry and the overall framework of security culture is less mature than that of safety culture. For example, we do not have a validated assessment tool to implement at this time. Therefore, when we come to submit our implementation plan, OPG will be requesting CNSC to consider the resources, time and cost associated with its implementation and to allow sufficient time to build the necessary infrastructure, including development and delivery of training and the piloting and then validation of an assessment tool in order

to ensure its effective implementation.

The second point I would like to make is around the CNSC's safety culture framework.

The nuclear industry and regulators around the world, including OPG and CNSC, have been involved in an initiative for the harmonization of safety culture frameworks. OPG is committed to the implementation of industry best practices in this area.

The CNSC framework in Appendix A is different than industry standard in this area and the REGDOC and the CNSC presentation to the Commission indicates:

> "Licensees have flexibility to use definitions and frameworks that meet the intent of those in the REGDOC"

CNSC staff disposition of one of the industry comments -- it's 265 -- on this topic adds that:

> "Licensees are free to use any framework they feel suit their needs, including those that ... go above and beyond, so long as it addresses the CNSC framework."

OPG intends to rely on the REGDOC wording that the CNSC framework is only guidance and not mandatory. That's because considerable time and money has been spent

on developing the nuclear industry framework for assessment that we have today and that we have validated and tested survey tools to use to assess our culture. Modifications to our existing safety culture assessment framework would misalign us with the industry standard and peer nuclear power plants elsewhere in the world as well as using resources to revise methodology which we feel would be better spent actually fostering and monitoring a strong safety culture. We do not see any safety benefit or value-added by the exercise of aligning to or mapping to the CNSC framework.

The third point I would like to make has to do with the safety culture maturity model, that's Appendix B.

Considerable comments have been provided to the CNSC to remove, revise or clarify the use of the safety culture maturity model for NPPs. The revised REGDOC is improved in that regard. It acknowledges that the model's indicators and specific behaviours in Appendix C are most useful for the information of Class II and nuclear substances licensees which have perhaps less experience in safety culture assessment than NPPs. The revision created an Appendix B with a generic and limited three-stage descriptive safety culture model. It is not clear to OPG how this is intended to be used by licensees or by CNSC

staff. We view it as unnecessary and we do not intend to use it at this time as we believe that we have a mature and validated safety culture assessment tool. We would instead focus our continual improvement efforts on other new aspects of the REGDOC, most particularly the security culture aspect.

The fourth and final comment I would make has to do with prescriptive wording of some of the REGDOC guidance.

OPG acknowledges that through the workshop process CNSC staff addressed a significant number of industry concerns with particularly prescriptive and impractical wording in earlier drafts. As usual in this sort of work, eventually CNSC staff have to make the final decision on the wording and we don't always agree. A number of remaining statements have been left in guidance sections of the REGDOC that we are concerned will add significant administrative burden without safety benefit. Most likely in our implementation plan we will make note of how we propose to address this wording. In the interests of time I will simply give you one example.

It is not clear to us what additional effort by NPPs the CNSC will expect to defend our methods to the CNSC in the guidance statement on page 9 at the top, the second bullet under "rigorous" in the REGDOC that:

> "The methods are defensible and described in sufficient detail so that they can be replicated by different individuals and across time".

I would say to you that safety culture assessment is not physics. It is as much an art as a science and it's not done in the laboratory.

In conclusion, OPG notes that there will be a moderate cost to implementing this REGDOC. We would like to have seen an analysis of the corresponding safety benefit. OPG remains committed to fostering a strong safety culture, performing periodic assessments and continuous monitoring, and learning from industry best practices for continual improvement. Thank you for the opportunity to comment.

**THE PRESIDENT:** Thank you.

So let's jump into the question session, starting with Dr. Demeter.

**MEMBER DEMETER:** Thank you for the presentation and the document. It has been, as I can see, five years of work, six maybe.

The comment from OPG that OPG has a standard framework for a safety culture that is slightly different or different than the CNSC, OPG, is your standard

a worldwide nuclear industry standard?

**MR. MANLEY:** That is correct.

**MEMBER DEMETER:** Okay.

**MR. MANLEY:** We use the INPO -- this is Robin Manley, for the record. We use the INPO framework.

**MEMBER DEMETER:** So the question for staff is if there is an international standard that is being used for safety culture analysis, why is CNSC's standard framework different?

**MR. LAMARRE:** Greg Lamarre, for the record.

As Mr. Manley said, there is an INPO standard. That INPO standard applies to the nuclear power plants that abide by it. The REGDOC -- there's a couple of things I would like to highlight, as was mentioned in the presentation -- crafted a REGDOC here based upon best industry practices across all industry sectors so that it would be applicable not only to the nuclear power plants but to smaller licensees as a guidance tool as well. That's not something that INPO is specifically structured to provide.

The other important piece obviously is that that INPO framework does not currently have a security culture assessment framework in it and that's one of the reasons why REGDOC-2.1.2 does differ in some specific ways

from the INPO framework.

But I would go back again to the comments that have been made by staff and by OPG that there is some latitude there to do a mapping to show that the framework that's currently in place by the industry maps against those framework elements within the appendix and to present that as an equivalency with the caveat that the security culture assessment methodology, as Mr. Manley has indicated in his remarks, isn't yet fully developed and mature needs to also be considered.

I would pass it on to Monsieur Bouchard or Dr. Hewitt to provide any further comments as well.

**MR. BOUCHARD:** André Bouchard, for the record.

So there exist several frameworks. There is no current universal framework to speak of that could be used from a safety culture standpoint. The IAEA -- and we do acknowledge what was said by Mr. Manley -- the IAEA is currently actively working at trying to develop that and we have been part of those sessions.

Conversely though, the framework that the CNSC uses was emerging -- actually emerged from the research that we have done, and all the work that we are doing and have been doing for decades is actually mapped to this framework. So again, licensees are completely free to

use the framework of their liking. The mapping that is sought is sort of a translation unit between whatever framework a licensee could use towards the framework that we use so that we could understand and read the report and get a good understanding of what is being assessed and verified and the actions that are taken in front of that.

**MEMBER DEMETER:** Just to understand the mapping, is it -- on the front page it describes their framework compared to your framework and they could describe their safety analysis based on their framework thereafter or is it a continuous mapping throughout the whole document? Is it a pro forma here is our framework, here is your framework, here is why they are equivalent and then we will use our framework for the rest?

**MR. BOUCHARD:** As you were saying -- André Bouchard for the record -- it's a front-end framework. Once we understand the language they use, if they don't change the framework that they use, then we are good for life as long as they don't change the framework. And that framework mapping has already been done for a version of the INPO framework which is also available through an NEI document, as well as we do have the OPG framework mapping as well which was provided unofficially to the CNSC through exchanges in understanding one of their previous assessments.

**THE PRESIDENT:** Ms Velshi...?

**MEMBER VELSHI:** Thank you.

So before we leave this framework, OPG, any comment on that? It looks like the mapping which you said would add little value has been done already for most -- it looks like for all intents and purposes. It's not as though there is a whole lot of incremental work. Do you want to comment on that before I ask my question on one of the other issues?

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

I'm actually not absolutely up to speed on the degree to which that is an official and complete mapping. You know, have we validated and verified it or was it preliminary, I'm not certain of that. I guess I would say that, as ever in the implementation of regulatory documents, we will have sort of a preliminary unofficial understanding of what the detailed requirements are and then when we come to actually have to do it officially we want to try and get it right, and then when CNSC does their inspections, you know, sometimes we have found that we didn't get it right or that they had expectations that were different than what we thought. So I would say to you that there is a certain degree of apprehension on our part as to whether or not we have a full understanding and how much the words like "should" and "may" and "recommend" turn out

to be "prove" that this is okay. It's an apprehension.

**MEMBER VELSHI:** And I think that's healthy to have that, but I mean what I have sensed in this entire presentation is that the CNSC is showing a whole lot of flexibility and accommodation. So even, you know, your first concern around implementation and having sufficient time, you know, maybe I will ask staff that question, that your expectation is once you -- if and when this REGDOC gets approved you will ask the licensees to submit an implementation plan and you would review that for reasonableness, right? I mean it's not they have to implement by a certain date or will it vary from licensee depending on how big the gap is and the resource commitments required?

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

So we will be asking them to submit an implementation plan. That implementation plan should certainly include dates and I think in this case our understanding is the security module, if you like, or security part might be a little bit behind the other things. We have had discussions and we are not opposed to that. The reasonableness of the timeframe is always something that needs to be looked at, but there is certainly nothing at this time that would indicate that's

going to be a problem.

**THE PRESIDENT:** So can we -- just on the security aspect, I'm just trying to understand really what the issue is. If you are not going to do a security culture, you are going to get CNSC security people telling you about your culture. I thought you would want to do this as a preemptive thing. Maybe I can get the security people of CNSC right now to tell me, do you have any difficulty in assessing security culture in an operator? I thought that's what you do.

**MR. ADAMS:** Patrick Adams, for the record.

CNSC Nuclear Security Division in the conduct of their activities to date have not done a formal assessment of security culture at the licensees' facilities. This has been encouraged and some of the assessment capacities or aspects such as observations during inspections, reviews of reports and events, those component aspects are occurring. We have a general sense of where the culture is, but it has not been undertaken as an assessment through a detailed, systematic, rigorous process which includes the survey elements.

We are aware that OPG has done work in this area to some degree, that Bruce Power has undertaken assessments on their own in this area, and that the former AECL, Chalk River Nuclear Laboratories undertook an

assessment, along with the World Institute for Nuclear Security. We clearly recognize that there are synergies that these two cultures, aspects if you will, have to work together, that they coexist. We recognize the concept of security culture issues are newer, but the IAEA documentation on nuclear security, their technical guidance has been issued for in excess of 10 years and the IAEA has now put out an assessment model, that's rather a new document just coming out in 2017.

It is our expectation or hope that the licensees build on the maturity that they have experienced undertaking safety culture assessments and that they leverage the operational experience and lessons learned to move security culture forward under an embracement singular culture and that they can move this beyond its immature stage to quickly bring it up to a stage that's comparable with what is currently known as the safety culture.

Certainly the CPPNM, the Convention on the Physical Protection of Nuclear Material as amended and ratified and is now in force since 2016 calls for assessments of and enhancement of security cultures, and the International Physical Protection Advisory Service Canada in 2015 recognized there are aspects that demonstrate security culture is evident but that needs to be formalized to document it and go through a rigorous

process.

**THE PRESIDENT:** Thank you.

Mr. Berube...?

**MEMBER BERUBE:** Well, it's interesting. My understanding of culture is that to look at it some people may not understand it, but really it's -- I use a model of a supertanker fully loaded running full throttle and an embedded culture is exactly like that, so moving it is incredibly difficult and I think the experts and our staff should know this up front. So if we are going to apply that pressure to change the direction of the culture in any organization, I really need to know why we are doing it, because the probability of success is not good.

**MR. LAMARRE:** Greg Lamarre, for the record.

I think what we have tried to do throughout the presentation is talk about safety culture as a specific area within our safety and control assessment framework that's a little bit different. There's no hard limits. There's no regulatory limits that are easily quantifiable and action limits hereunder. It is really about learning, understanding and improving on the journey of continuous improvement, what we require of the licensee in that area and the type of approach that the regulator is going to take on overseeing that journey.

So with that I would like to turn it over to Monsieur Bouchard who is going to provide a little bit more in terms of -- perhaps he can talk about the impact that oversight of culture has had on safety performance, because I think that gets to the root of what you are asking there.

--- Pause

**MR. BOUCHARD:** André Bouchard, for the record. I'm sorry, I wasn't paying attention to the bridging between Greg and I.

Just to discuss about examples. The whole point about culture is to know what you have in your organization. You have seen the five principles and that's the entire point, it's not towards changing anything. The first thing is to know what you have in your organization and the next step is figuring -- to understand it, so there is an assessment process. You need to connect with that culture so that from the ground up and the top down you clearly understand what is happening in the organization and to be able to determine where you as an organization want it to be and slowly get it there.

So it isn't necessarily about changing, because sometimes, interestingly enough, it's about discovering and simply adapting. Some of our licensees way back when, we have discussed with them some of their first

assessments that they have done. I'm going to tell you a little story, but it's a marking one that internationally resonates very well. These licensees had workers. However, the nature and the culture of these workers is that they were not necessarily understanding the signage, the safety signage in the facility. Simply that. But they discovered that through the first culture assessment that they ran and they just discovered what they had, understanding now as to why their safety message was not going through. There is nothing wrong with these individuals' culture, it's just that the organization needs to adapt so that the measures are effective. This is the kind of gains from a safety culture assessment that is expected, grounding it into what people need to be safe so that measures could be adapted in order to get that safety goal.

**MEMBER BERUBE:** Thank you for that. Just in that ilk, I understand having a background in change -- leadership change, leadership and cultural change -- that fundamentally what we are talking about is something very difficult to do, especially with an established culture and I just want to be very clear on this, that we are not trying to change the culture of the organizations that we are going to. I think more appropriately what we are trying to do is establish a

subculture of safety and security within those domains, because these organizations in mature form are very difficult to actually shift. However, adding something is not an impossible feat and I think that's a more practical way of posturing this, because when you say to somebody, "We are going to come in and we're going to regulate your culture to some extent, or advise you on how you are supposed to behave", you are going to get a lot of pushback, you know.

**MR. LAMARRE:** Greg Lamarre, for the record.

Thank you very much for those comments. If we have left you with the impression that we as the regulator are going to try to overly regulate safety culture of the licensees, then we have missed the mark. That was certainly not the intent of this REGDOC. The intent of the REGDOC is to highlight to licensees the importance of capturing safety culture at the very highest levels of their governance, which is one of the requirements, and to have mechanisms in place that are already supported by the language within the Class I Regs that talks about management systems supporting safety culture fundamentals and that, and in having some mechanisms within the organization supported by leadership at all levels and that's backed up by the managed system

approach to periodically go in and assess that, in addition to continual monitoring, and that we as the regulator should be ensuring that that system is in place, that the licensee is taking appropriate action with the outputs of that to try to continually improve safety. This is really what it's about. It's not about trying to take a hard regulatory stick to this area that would be akin to perhaps some of the other safety and control areas that we regulate more firmly quantitatively based upon very strict goals and regulatory targets.

**MEMBER BERUBE:** Just a last comment on this, if I may. Yes, I'm fine with that. I don't have an issue with that as a framework, making sure that we communicate this message to all interested parties, because otherwise, like I said, we're going to have difficulty trying to get this through.

And the last part of this of course is whenever we are doing culture change it requires a tremendous amount of leadership and pressure, because otherwise things don't change, and so this document will actually help us to increase the presence of leadership from this organization and actually help drive that implementation I would think.

**THE PRESIDENT:** Thank you.

Ms Penney...?

**MEMBER PENNEY:** Thanks. So it's a very detailed and thorough benchmarking and research effort from the material that we have been given and what I see is the challenges are around implementation of what can be perceived as an esoteric/academic thought bubble into something that's practical and helpful and adds value on the ground, and we are walking in halfway through a very long period of discussion.

So I'm going to ask about the maturity model, and I will ask CNSC first and then OPG, to try to get an understanding of where the differences are. So the maturity model that I'm looking at in the presentation has three stages, requirement-driven, goal-driven and continually improving. When you look at the document what I am familiar with is in your background research, which is around pathological, reactive, calculative, proactive and generative. These are very well understood in the oil and gas industry, it's what I'm familiar with, and self-assessments where you find many companies are somewhere between pathological and reactive and having that moment of truth where you go, oh, that's so not where we need to be. I'm wondering why your model is different than what I see used in many other industries. And then I guess the question to OPG is what's wrong with using a model like that? What am I missing? So over to CNSC staff.

**MR. BOUCHARD:** André Bouchard, for the record. Just to start an answer and then I will pass it on to Tanya.

When we decided to include the maturity model it was our conscious decision to try to use a simplistic model. One of the drivers for that was not necessarily the large licensees, NPPs, but it was the nuclear substance licensees and how the model could actually resonate with them, and instinctively we also wanted to use a three-tier model rather than have a five-tier model for that part. So Tanya will follow up with describing why we chose that model and where is it from.

**MS HEWITT:** Tanya Hewitt, for the record.

You are right to recognize that a lot of the literature searching that was done in support of this REGDOC looked at maturity models that are in use in a lot of other industries and most of them are not three stage, they are five, seven, you know, whatever stages they have. The maturity model in the REGDOC is based on IAEA guidance that was given in SRS 11 and IAEA TECDOC 1329, both of which had espoused a three-stage model. Given that this type of approach is fairly new to our licensees, we thought it best to probably go with a three-stage model rather than with a more complex five- or seven-stage model that some of

the other industries are more familiar with.

But I would like to just pass this question back to Mark Broeders, who would be able to give you some insight on how this model had been used in some of the facilities of Class II and nuclear substances.

**MR. BROEDERS:** Mark Broeders, for the record. I am the Director of Accelerators and Class II Facilities Division.

First and foremost, I think the Appendix C, the maturity model, is useful as kind of a lexicon, as a way of communicating between us and the licensees. So if we ask any licensee to define safety culture, you ask 10 and you get 10 different definitions. So the maturity model provides a nice picture, if you will, of what a healthy safety culture looks like rather than try and define it, pin it down into a single sentence.

The other benefit is we realized early on that it is unlikely that these licensees would perform a self-assessment, nor is there a regulatory requirement to do so. Nevertheless, we felt that there is good guidance in the document and we felt there is an opportunity for us as promoters of a healthy safety culture to give feedback to licensees, framed using the maturity model.

So what inspectors do is in the conduct of doing a Type I inspection, where they are interviewing a

vast majority of employees anyway, is to frame their observations in the maturity model. We're not drawing conclusions, we're not issuing grades, and we are making it very clear this is not part of a compliance exercise. This is simply a way for us to act as a catalyst to encourage licensees to start that self-reflection themselves. So we are giving simply the feedback that we are already collecting in the course of an inspection but framed in the context of the maturity model. So for those two reasons we felt that it's useful to use.

**THE PRESIDENT:** You know, on your page 153, 154, 155 and 156, you have a different way of depicting this maturity model. I have to tell you my problem with going up the steps of the line, it reads as if you will reach perfection, the top step, whereas the chart, that has an asymptotic kind of a thing to it -- this is on Fig. 1 -- this never ends, okay. So I don't like going up the stairs into maturity and I have seen it in other industries, I have seen it in security. I think we cannot give the impression that somehow you do three steps and you have arrived and then forget about it, you don't have to do anything else.

**MEMBER PENNEY:** You never make it to heaven.

**THE PRESIDENT:** Right.

--- Laughter / Rires

**THE PRESIDENT:** Am I right in this or do you have a different view?

**MS HEWITT:** Tanya Hewitt, for the record.

As you know, the last step in the three-stage maturity model is labelled "Continual Improvement", which is an evergreen aspirational type of understanding of where you would like to be as an organization. So you are right, it does go -- you know, it is this asymptotic going higher kind of thing that does capture the idea that these aren't finite steps, that okay, I'm at the top now and we're done. This is meant to be striving continually for better performance overall.

**THE PRESIDENT:** [Off microphone] It's only on page 155, the top chart that actually has continuous improvement at the top and it kind of indicates that it goes forever, whereas all the other ones, all the staircases don't have continuous improvement at the end. I'm just saying pictorially. Okay.

**MEMBER PENNEY:** Could we hear from OPG on this matter?

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

I'm trying to think what to say here, it's a very complex topic and I'm not a subject matter expert in it, okay.

So as I understand it, we don't have any concern at all with CNSC establishing a recommendation for someone who is new to the business of monitoring, assessing safety culture, especially for anyone who, as I believe some of the feedback was, found it to be a useful tool. Absolutely, anyone who thinks it's a useful tool, use it.

I think what we struggle with is we already have a validated safety culture assessment tool which we have used multiple times over more than a decade and we attempt to monitor the trend over time. Commissioner Berube, you know, you mentioned the supertanker and how slowly safety culture moves and I think we would say that that is true. We have terminology that we use when we report out to our staff and there are words that are used like healthy safety culture, strong safety culture, there are other adjectives. If we have this past practice of monitoring and assessing in a certain way and then there is an expectation established and now we would like you to score it against -- and I use the word "score", but measure it against this, that or the other, whether it's three steps, five steps or an infinite number of steps, to me this just seems like we are spending our effort on how we describe it. We are spending our effort on the words of the methodology rather than on the actual fostering and attempting to continually improve. So we

kind of wonder what would be the point of changing and so we simply would say we have no trouble with CNSC staff having Appendix B or Appendix C in the document, go ahead, just don't make us use yet another new tool. That's what we are asking.

**MEMBER PENNEY:** But it sounds like they will give you an opportunity to submit an implementation plan laying out how your current safety culture model, plan, self-assessment tools are being used and laying out the case in front of them as to why you should be allowed to continue using them. Is that not reasonable?

**MR. MANLEY:** It's reasonable that we not have to change the tool. The amount of effort that's required to document why existing methodologies are valid and acceptable is sometimes very little and a reasonable amount of limited effort. There are times, and I'm not saying that this will be the case in this REGDOC, but there are times in some other aspects of the 14 safety and control areas where it takes a considerable amount of time and effort to demonstrate to the regulator that we meet the regulatory requirements. So we are asking that it be, you know, minimal in this case.

**MEMBER PENNEY:** CNSC, have I mischaracterized what you said could be done?

**MR. BOUCHARD:** André Bouchard, for the

record.

We want to be very clear, when we go to the car dealer we do not have to buy all cars, we may not buy any cars, but the cars are in the window. The maturity model is in the REGDOC, it's up to the licensee to pick it up and use it or not. And that is simply because, as we were saying, the IAEA in its governance gives us information -- and it's also the community -- that it is a useful tool. It's a decision to use it or not use it and there is no intent by the CNSC staff to actually enforce its use at any point in time.

Mr. Broeders basically identified that some groups of licensees actually like it, it resonates with them, and we will work with the licensees that wish to do so and it's a good conversation tool. There could be other conversation tools as well that would be developed in the future. That's where it actually stops, it's a conversation tool.

**MR. ELDER:** Peter Elder, I am the Chief Science Officer. So just to add.

What this REGDOC tried to do in the presentation, maybe we weren't as clear as we liked. We could have been, are there really two audiences for this REGDOC? As OPG has pointed out, there has been a dialogue with the nuclear power plants around safety culture going

back close to 20 years and what we thought on that side, we are really trying to formalize the status quo, adding the security culture and integration in. We don't expect a significant change in how they have done it. We have seen their assessments for the last -- we have been reviewing their assessments. In terms of the other licensees, this is a newer conversation and there is more evidence just saying that it is useful for them to think about safety culture. We certainly are not on anybody trying to regulate it heavy-handed.

There is a lot of discussion. Part of the reason why it has taken 20 years to get here is there is a lot of discussion around regulators on can you regulate culture? It doesn't make sense. And we have come to the conclusion that well, it's a good -- what is makes sense and this is now an international consensus, is you have to go and measure it because -- and why this is important is that when you look at some of the events and some of the learnings that came, why the industry got into this, you can have the big accidents and say how did we get here. The other ones are the more telling ones on the importance of it, is you can have where all our other metrics said this is a good performer and the class reviews, it was Davis-Besse in the States, a very good performer, and then they had a near miss and they realized, oh, wait a minute.

But all their other indicators were saying this. Why we got into it is in '97 we actually had both in Canada. We had what had been a very good performer that had some events and said how did you go from very good performance to significant events, not accidents but very significant events. And we had another one where we didn't have significant events but we have a lot of small events and we're going, we need a way to start to assess something that is a little less tangible. And so we looked at what was the state-of-the-art at that time and we developed a model under our research program and essentially we gave it over to the licensees who then adopted it or adapted it. We are now at the position where we are saying now it's time to say let's make sure that we have the conversation and, as we noted before, with OPG we really don't expect them to have to rejig their model, we agree that using the same framework over time is useful, otherwise you are always changing your framework and you are not sure that your ship is going the same direction or where you want it to go. But we do need to have a common conversation. So whether they use the maturity model, we kind of agree that they are probably at the continuous improvement already. But we then said, okay, how are you going to assess that to make sure that it's assessed in a normal way, in a continuous way and that we get consistent reliable data to

help these assessments? And this is really to say it's another tool that has been proven that you can make changes when there are changes.

I would say the power reactors, those changes are largely already in place. I have been looking at this area for over 20 years and when you look back in there really is a different culture than there used to be and really this is about making sure that those changes are maintained for the big licensees.

**THE PRESIDENT:** Okay. Back to the top. Dr. Demeter...?

**MEMBER DEMETER:** Thank you.

So I'm sort of getting my head around this and I think everyone in the nuclear industry, whatever class of licensee, has a baseline safety culture and to some extent that's risk-informed based on what they do and I see this exercise part and parcel is to be a bit of a gap analysis, sort of here is your safety culture and here are some things you might not have known based on our, you know, more formalized or structured look at safety culture. So as an industry class, nuclear power plants, if you had five in front of you -- I'm trying to get a sense of how consistent, reliable and reproducible the assessment from CNSC will be with five different industries who present to you what they think is going to be good for them for their

safety culture. How can we have these -- are these five assessments going to be generalizable to each other? That's what I'm trying to get a sense of. This is such a quantitative-qualitative kind of -- it's not like doing derived release limits and dose limits. How can you consistently apply this tool across and say if I say this industry has a strong safety culture and this one has a strong safety culture that I'm comparing apples to apples? That's what I'm trying to get at.

**MR. BOUCHARD:** André Bouchard, for the record.

The method that was developed was to determine the presence of the characteristics in an organization concluding that there was a healthy safety culture present.

A safety culture assessment is much like a psychological profile. We all have ours, and it's not because it's bad or it's good. It's what we are; it's what we're made of.

Now, safety culture is at the organization level. So an organization like OPG is what they are. And often, even within OPG, Pickering is specific and Darlington is specific. It's their personality.

The CNSC through that REGDOC is not going to do the assessment itself. The licensee -- basically the

REGDOC set up a systematic analysis to do it, a little bit like a physician will have a way to make analysis of a patient in a systematic fashion, but the diagnose [sic] will be specific to the patient. So the assessment will lead to specific data of a given licensee.

What's important for the CNSC is to see the evidence of the characteristics of a healthy safety culture in those organization and to understand how they would like -- and how what they are proposing to improve to the next steps. So this is what we are going to do, and this is how we're looking at the performance of the five licensees within themselves.

What's important is to realize from our analysis that the licensee performs these assessment, that they see themselves thoroughly, and that we could cross-reference that with our inspection findings and what we know about the performance of the licensee. So we would see the same pictures as they see for themselves.

**MR. LAMARRE:** And Greg Lamarre, for the record.

If I can just add, so beyond the assessment that's done, the self-assessment that's done by the licensees, making sure by our oversight that they've got actions against those areas that have been identified and that there's commitment and follow-through on those.

Interestingly, we just went through some of the safety culture self-assessment here at the CNSC, and you know, there's got to be a management action type of commitment. You know, there's areas that have been identified through assessments, focus groups, interviews and that come up with thematic areas that identify certain traits of the culture of the organization. What's the organization doing about that? Where's the follow-through? Where's the commitment? Do we see changes as we carry out type IIs, as my colleague site inspectors do site walk-downs, participate as observers in the operational decision-making meetings? Are we seeing some tangible evidence that they've taken their findings from their self-assessment seriously and they're putting in place some actions to try to close any gaps?

**THE PRESIDENT:** Ms Velshi.

**MEMBER VELSHI:** Are you planning on any peer review down the road on the regulatory oversight of safety culture?

**THE PRESIDENT:** Actually, that's an interesting question. I don't know who the peers might be to actually do -- that have the expertise to do the peer review.

**MEMBER VELSHI:** Well, you've had missions for other things, like you said for security.

**THE PRESIDENT:** Yeah, but they will not be necessarily and actually in culture, which is now work under the IAEA.

So just embedded in this question, which country has the best safety culture regulatory process? I know you've done it -- by the way, we should have done it somewhere -- congratulate you on all the research. Enjoy the research, the benchmarking. So it was a good read about all the 20 years of research here.

But it also, to me, gives the impression this is a work in progress on all levels, domestic and international. So I wonder if there's any country that actually already got it. I know you took bits and pieces from Switzerland and Belgium, of all countries, and the US. So does anybody have a comprehensive safety and security culture?

**MR. BOUCHARD:** So I'll first start to answer Ms. Velshi's answer -- or question, and then I'll pass it on to Tanya and Victor, which will provide you with a more comprehensive international set-up.

We do know that the IAEA had a safety culture mission in the past, and they are currently working at developing or integrating these tools to these IRRS missions as well. They are not necessarily -- well, they are not necessarily looking at the regulators' approach

rather than some of the licensees' facilities assessments as well.

There are, however, there are other working groups which Canada is part of at the NEA level -- NEA is?

**MR. LAMARRE:** Nuclear Energy Agency.

**MR. BOUCHARD:** Nuclear Energy Agency, I'm sorry. And within that there's a working group on human and organizations factors. It's a gathering of about the 20 top-performing countries, regulators as well as operators. And its core function is to actually oversee HOF at the regulators and regulatory program as well. And one of the CNSC staff is actually the chair of that working group.

So there are a lot of discussions, peer exchanges. Some of our benchmark data actually comes from these countries, and we've used the same kind of countries as well for alcohol and drug testing and fatigue management, by the way.

So this is the kind of work that we do internationally. At the IAEA as well, there's a lot of collaboration in those kind of assessments. Victor, one of our staff, went to Pakistan twice to help the regulators do its own self-assessment as well and get them also through the analysis of that assessment too.

So without further delay, then, I'll pass it on to Tanya and Victor to provide you with more data.

**MR. GOEBEL:** Thanks, André.

My name is Victor Goebel, for the record. I'm a human and organizational performance specialist.

So, as André was saying, we have a lot of activities that we do, both on the side of learning from our peers from a regulatory perspective -- how they oversee or how they provide regulatory oversight of safety culture -- as well as being involved in, on the internal side, as Greg was talking about, the regulator and how they're assessing their own culture. We've been involved in a number of projects internationally on both fronts.

For the purposes of this REGDOC, we focused on best practices and current research in support of our approach and doing a survey of what kinds of approaches are being used in places like Belgium, Finland, Germany, and Switzerland in particular. The reason we focused on those four, in addition to the US NRC and a number of others, is because they have already implemented in some shape or form an oversight strategy involving their staff, involving the support of a legislative framework in all four of those cases, in order to provide their inspectors and their regulatory staff with a stream of information relating to culture.

And the way they do that varies across all of these licensees. You have in some cases licensees gathering information directly from observations that they'd already otherwise be doing. And in other cases, you have regulators who are gathering explicitly culture-related information and amalgamating it through working groups, through discussions, and sometimes independently, and going back to the licensees to have those kinds of conversations and enable reflection, enable learning, understanding, and so on regarding culture.

So we have included a lot of that information in CMD Appendix B. So for more detail you can refer to that. But I can say that we've been involved in a number of these projects, and there's a flurry of work going on internationally in these areas.

**THE PRESIDENT:** You guys are circling around and nobody's giving me a straight answer.

Who is the best country that got it all together?

**MR. GOEBEL:** So I'll try and answer that question, Dr. Binder.

Mr. Victor Goebel, for the record.

I don't think this is an area that we can put somebody at the top of the pyramid. What we're talking about here is culture. So an attempt to put somebody at

the top would mean that we would all look to them and try and copy them. And what we're really dealing with here is adapting an approach to suit an individual national context.

Every regulatory body is different. Every regulator regulates in a slightly different way. So what we need to do is adapt. And what we're doing is we're pulling on best practices from those four countries, Finland, Germany, Belgium, Switzerland, and we're also dealing with best practices from other regulators as well.

But I might pass this question off specifically to Kathleen Heppell-Masys, as I know she's been involved in a number of international efforts on safety and security culture in the past.

**MS HEPPELL-MASYS:** Good afternoon. My name is Kathleen Heppell-Masys. I used to be the former Director General of Safety Management at the CNSC for a number of years, and I'm currently the Director General of Security and Safeguards.

I think the team is being quite humble, if I might say. I've participated internationally in the IAEA effort on the Fukushima report, where I led a team of human and organizational factor specialists from around the world.

The team you have in front of you is

leading the way internationally in terms of their depth and their breadth and their competency and expertise. You have in front of you human factor specialist from engineering perspective and also from a social science perspective. And they're leading the way internationally not only on the safety culture oversight of utilities, NPPs, but also from all the breadth of licensees you've heard today.

Not only are we driving -- are they leading the way internationally but also domestically. Many other sectors of industries have come to the CNSC specialists to ask them for their advice, for their know-how, for their understanding of safety culture and the tools that have been deployed in that area for many, many years.

So that's my way of telling you that you have a very strong team in front of you.

**THE PRESIDENT:** Thank you. That's what I wanted to hear. I wanted to hear a summary.

--- Laughter / Rires

**THE PRESIDENT:** Okay, we are now to Mr. Berube.

**MEMBER BERUBE:** So I concur with everything the team is saying in terms of culture. It's very clear that this is said to -- you're trying to actually categorize and classify which culture is best.

That means that you have to get to a moral judgment. And that's not where we want to go, right. Very clearly that's not where we want to go.

So and just to basically reinforce this, culture really is about a shared belief system and a common behavioural system. And if this is what we're after, then I'm a hundred percent for that. To get to a point where we all agree on what safety culture looks like, what security culture looks like, and how we're going to implement that I think is a really good idea.

And it alarms me to hear that we haven't actually done a security audit in some of our facilities at this stage in the game. And that means to me that we have to do something about that to change that. And this is obviously what this document's really all about.

Thank you for that.

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

Just to be clear on that last statement, so we certainly undertake an awful lot of compliance activities around the security program. I think what was mentioned was specifically on something called security culture assessment. We have not reviewed those to the same extent. But as far as auditing that security practices are in place, that programs are in place, equipment's in place

and drills and all that, we're very strong on that.

**MEMBER BERUBE:** Thanks for that clarification.

**MR. BOUCHARD:** I would like to add -- André Bouchard.

You have heard yesterday the Bruce licence renewal and you read the CMD. Bruce in 2016 did a safety/security culture assessment, a combined assessment. And that was one of the first, obviously, to be done that way. So we started the learning. That's the key thing.

**THE PRESIDENT:** Ms Penney.

**MEMBER PENNEY:** A short question about I think I heard the self-assessments will be done every five years, so it's about implementation. But there's no requirement to submit to the CNSC. And so my question to staff is why. Why not ask them to submit it? If we're all in this together, what's the harm?

Oh, and then OPG, your opinion.

**MR. BOUCHARD:** André Bouchard, for the record.

As you saw from the comments and the exchange that we received during the consultation process and I referred to as a psychological profile earlier, a good safety culture needs to be thorough, clear, and fairly direct in its language. It's important that we protect

that both from the regulator as well as from the licensee so that there would be no innuendos into what were the issues so that it could actually be addressed and understood clearly.

And recognizing that, and this is why the CNSC has agreed -- and it's also a practice of the CNSC -- to go outside and review the reports at site, so that we could discuss as well at the same time with the licensee on their reflection process and thought process at the same time as seeing the facts and the entirety of the report itself.

So that's the reason. We do have access to the report. It's at site.

**MR. LAMARRE:** And Greg Lamarre, for the record.

If Mr. Ramzi Jammal was here, he would probably jump on this one as our chief regulatory operations officer.

Just to reiterate, perhaps, for the benefit of the new Commission members, CNSC staff has access to whatever documents we need in order to appropriately regulate the facilities that are licensed.

So this was a point that was in an earlier draft that they would submit a summary report to us. And through the consultation and back-and-forth, it was

realized that this was a point that perhaps they could keep that report and we would be able to look at not just a summary but the entirety of the report at site. And as you know, with the NPPs, we're at site all the time through the site office. So there is no inability to see the information that we need to properly oversee the licensees.

**MS HEWITT:** Just to add to -- Tanya Hewitt, for the record -- to add to Mr. Lamarre's comment, we've -- this document was extensively consulted upon, and we did receive feedback that the summary reports were not desired.

We also learned, though, that when we go to the site offices and read the report there, a lot of the safety culture people at the power plants will arrange meetings with their senior leadership so that we can talk with the senior leadership, which helps them in their fostering activities to be able to get along their journey in a more proactive fashion. So we were -- when we realized that us going to site gave them that benefit, we thought that if the summary report gives us -- if releasing the summary report gives them that opportunity, then that's probably a good gain on both sides.

**THE PRESIDENT:** Thank you.

Dr. Demeter? Ms Velshi? Mr. Berube?

Okay, so I have one -- two comments.

First of all, on figure 5 on page 97. This is for staff. You may want to look at this chart that can be the CNSC can adopt for internal purposes in CNSC. I actually found it interesting cut across many, many thing, between me, we, you, they. It's cute. It's kind of a layman language, but it conveys a pretty straight-forward language. Anyhow, for your consideration. And --

**MS HEWITT:** Dr. Binder, I just would like to highlight that that is from SRS 83, which is the IAEA document on performing self-assessments that was released in 2016, which was used extensively in the creation of this REGDOC.

**THE PRESIDENT:** But not internally in CNSC.

So the other thing is all the debate with industry. What I hear is this will evolve as you go through a couple of iteration. I cannot believe that CNSC, in reading a safety culture study by OPG, unless they have a particular interest to point out a clear deficiency, I cannot see how they going to be negatively disposed to say, well, you didn't apply our precise framework. You said it's not physics. You are going to have some kind of people who look at the qualitative and the quantitative together. And I just cannot see this difference of opinion. But over time, if there's disagreement, then you

should propose to amend the regulation. This ongoing continuous improvement.

So any final comments and thoughts?

So thank you. Well done.

We're going to take 15-minute break, and we'll get -- next is some EIRs, I believe. Right.

--- Upon recessing at 3:08 p.m. /
Suspension à 15 h 08
--- Upon resuming at 3:22 p.m. /
L'audience est reprise à 15 h 22

**THE PRESIDENT:** Okay, we are back. The next item is the event initial report rregarding a potential dose limit exceedance for a certified exposure device operator at 20/20 ND Technology Inc.

This is outlined in CMD 18-M15. I understand we have some people online. We have Mr. Pimm. Can you hear us?

**MR. PIMM:** Yeah, David Pimm here. I am an applicant authority for 20/20 NDT.

**THE PRESIDENT:** I also understand that we have Dr. Wilkins from Health Canada online.

**DR. WILKINS:** Yes, Ruth Wilkins, Health Canada here.

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

And Mr. Fundarek, the floor is yours or, I guess not. I just read what they tell me to read.

--- Laughter / Rires

**CMD 18-M15**

**Oral presentation by CNSC staff**

**MR. MOSES:** Thank you, Mr. President, and Members of the Commission. My name is Colin Moses, and I am the Director General of the Directorate of Nuclear Substance Regulation.

With me here today are Mr. Peter Fundarek, the director of Nuclear Substances and Radiation Devices Licensing Division; Mr. Henry Rabski, the director of the Operations Inspection Division; Ms Caroline Purvis, the director of the Radiation Protection Division, and Mr. Diego Estan, a specialist in the Radiation Protection Division.

We also have some staff on the line to field questions, as well as in the room.

CNSC staff are here today to provide you with an event initial report on a potential dose limit exceedance of a nuclear energy worker, as outlined in CMD 18-M15.

The potential dose stems from an event that occurred on December 18, 2017, which was reported to the CNSC on January 9, 2018.

Shortly after being notified of the event, CNSC staff visited the licensee to validate the information provided in the initial report.

Exposure devices generally involve the use of a guide tube that allows a source to be remotely extended from and retracted back into the shielded casing.

On December 18th, 2017 a certified exposure device operator was performing industrial radiography when the source became stuck and could not be retracted.

The licensee's radiation safety officer was contacted to perform the source retrieval. Although the RSO did not follow the licensee's emergency response procedures, they were able to return the source to the shielded position, using remote handling tools.

Persons handling exposure devices, including the radiation safety officer in this case, are required to wear more than one type of dosimeter to evaluate their exposure. One is a direct reading dosimeter for instantaneous readings, while another dosimeter is used by a dosimetry service provider licensed by the CNSC -- is issued by a dosimetry service provider licensed by the

CNSC. The results from this second dosimeter are recorded for the person in the National Dose Registry.

The direct reading dosimeter worn by the RSO, recorded a whole body dose of 0.45 mSv, which is at a similar level to the calculated dose included in the licensee's report. However, when the results of the official dosimeter worn by the RSO were received, it indicated a dose of 151.48 mSv, which is in excess of the annual dose limit for nuclear energy workers of 50 mSv, and the five year dosimetry limit of 100 mSv.

Pursuant to the *Radiation Protection Regulations*, the licensee has indicated this and this individual has been removed from work that could add to their dose, pending CNSC staff's review of this event.

Although not included in their initial reports, the licensee has submitted additional information to suggest that the dose committed to the dosimeter is non-personal. This is currently under review by CNSC staff.

Given the uncertainty of the committed dose to the individual, CNSC staff have arranged for the dose to be assessed through bio-dosimetry in Health Canada Laboratories through blood sample analysis which will take approximately one month to complete.

The CNSC reported this event publicly on

the CNSC website and we remain available to answer any questions that you may have.

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

So let's start with Ms Velshi.

**MEMBER VELSHI:** Thank you. So a question for the licensee: When the incident was first reported, it was reported because -- I think it said the emergency response procedures were not followed by the RSO. Can you elaborate on that and what exactly was not followed and why not?

**MR. PIMM:** The exact details on what were not followed -- the proper equipment for doing the retrieval was not used and the notification to the CNSC was not done in accordance with the time outlined in our radiation safety procedures.

Just off the top of my head, I think that basically sums it up.

**MEMBER VELSHI:** Staff, do you have any further details?

**MR. MOSES:** Colin Moses, for the record.

First off, I'd just like to clarify, the regulations do require reporting of any such incident, so it wasn't necessarily the non-following of emergency procedures that required reporting, although that also requires reporting.

**MEMBER VELSHI:** No, I understand. But I think as I read the event report, that's what was reported, right, that --

**MR. MOSES:** That's correct. In the licensee's report they indicated that the licensee did not follow their emergency procedures referenced in the licence.

I'll ask Mr. Fundarek to provide details of that.

**MR. FUNDAREK:** Peter Fundarek for the record. I am the Director of the Nuclear Substances and Radiation Devices Licensing Division.

The licensees, as required by the regulations, are required to have certain equipment available for emergency operations, including the shielding material so that they can attenuate the source if it's outside of the normal shielding available, and have remote handling tools with which they can use to either sever the guide tubes to recover the material or long handling material so that they handle it a distance.

So these materials were not available for the recovery operations on the date when the incident happened in December 2017. So we're following up with that to find out what -- how the situation actually unfolded and get a better understanding of that, but we are of the

understanding the licensee has already taken action to ensure that every vehicle that they have available is suitably equipped with emergency equipment that's required by the Regulations, and that people have taken additional radiations -- sorry, additional source recovery training to enable them to respond to these incidents properly.

**MEMBER VELSHI:** So if one was the RSO and, you know, you have to go retrieve the source but you don't have the right equipment, what would the procedure call them to do? Not do the work or have the source sitting out there? Like what would the expectation be?

**MR. FUNDAREK:** Peter Fundarek, for the record.

We would expect that the licensee would be able to secure the site. In the location where it is, there weren't people around the area so they should have been able to secure the site and stabilize the situation and then obtain the necessary equipment to enable them to carry out the work safely.

We wouldn't expect somebody to undertake emergency operations in such a situation where there is no risk to other persons in the area. The situation was stable. They had the opportunity to go and collect the materials that they could have used safely and securely.

As it was, our understanding is that they

used equipment or used materials that happened to be available to do the work and that contributed or could have contributed to the radiation exposure.

**MEMBER VELSHI:** Thank you.

**THE PRESIDENT:** But let me understand. We are talking about a very -- if I understand correctly, we are talking about a remote area. So something happened and they don't have the right equipment. It would take hours maybe to go to a place to retrieve the right equipment. So what do you do in the interim? Do you enclose the site? What do you do?

**MR. FUNDAREK:** Peter Fundarek, for the record.

Whenever licensees are conducting radiography operations they are required to set up barriers and barricades to ensure that no person enters an area where radiation fields could be significant. This is a regulatory requirement. So at the boundary of those barriers and barricades then the radiation levels would be significantly reduced and would be okay for persons to come across or to come up to the boundary.

So the situation would have been stable if they had decided to go back or have someone go back. They had three persons onsite. They had the two workers who originally were part of the incident, plus the radiation

safety officer. It is conceivable that the radiation safety officer could have returned and gotten the equipment without compromising the safety and security of the site by leaving the other two workers there to ensure that no person did intrude upon the barriers?

**THE PRESIDENT:** Okay.

**MR. MOSES:** Colin Moses, for the record.

If I could just add to that, there has been recovery incidents in the past where a licensee has been required to do that and they have taken the time to ensure that they can perform that work safely even if it means waiting until, for example, it's daylight, as opposed to night-time. They have done that in the past.

**THE PRESIDENT:** Thank you.

Dr. Demeter...?

**MEMBER DEMETER:** Oh, thank you.

First of all, I reviewed the actions taken and I am very satisfied with the actions taken. The curiosity is most probably an electronic personal dosimeter which read .45 mSv and the body dosimeter that was sent in that read 151. It might have been -- you talk about it may not have been human exposure but -- and I suspect that by the time we started collecting blood, it was too late for a lymphocyte, looking at lymphocyte trends.

Dr. Wilkins is on the line. Is it

dicentrics that you're looking at to establish whether a significant dose was received or not?

**DR. WILKINS:** Yeah, Ruth Wilkins, for the record.

We are looking -- we are not looking at lymphocyte cell counts because you're right, it's too late at that point to look at cell counts. But we are looking at dicentrics.

**MEMBER DEMETER:** Is there any information available yet?

**DR. WILKINS:** No. No, we are still processing the sample. We don't have any results yet. But the dicentrics, although they are not completely stable in the blood there is -- it's the time between the exposure and the blood drawn was short enough that we should be able to see an excess in dicentrics if the individual did receive that dose.

**MEMBER DEMETER:** Okay, thank you.

And I guess the one other technical question is the dosimeter that was submitted was it an optical stimulator or TLD because I gather with an optical stimulator you have a better chance of looking at a static dose. If a device fell and it got a really high dose in a static, you can actually forensically determine a static dose versus a non-body dose.

**MR. ESTAN:** Diego Estan, Radiation Protection Division, for the record.

It was an OSLD dosimeter.

**MEMBER DEMETER:** So that might help as well.

If it happened to be a dose of -- let's say it is a dose of 150 mSv, who will follow up to ensure that the person that has adequate counselling based on the dose they received? Is it referral to their primary care physician or is there someone from Health Canada that will have -- act as a -- to give advice? I just was curious about follow-up if someone has a dose in this range.

**MR. MOSES:** Colin Moses, for the record.

I will let Ms Purvis provide information on that.

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

So the CNSC's role here, and my role actually, is to look at the return to work request from the licensee. So once the investigation is complete and we have a better understanding of the dose that was received, if it was in that range that the dosimeter registered, we would need to look at whether the individual could return. If they did return would we specify conditions with respect

to their return to work? That could be prorated dose limits. It could be, as you said, medical follow-up. It could be new training, et cetera.

So whenever we do an investigation -- when a licensee does an investigation and their report comes through, the return to work process, we'll look at their circumstances, look at their lifetime dose, and then identify the appropriate path forward.

With respect to medical follow-up, we would likely go to the -- although we have never done it, or I've certainly never done it, I think we would seek advice from experts, but likely a starting place would be with the physician of the individual in question.

**MEMBER DEMETER:** Thank you.

**THE PRESIDENT:** Just what is the symptom when you get such a dose? What is the expected reaction? Is it you immediately have an impact? Is there a burning sensation?

I'm trying to understand from the worker themselves would they feel -- is it localized? Is it whole body? They don't feel anything? What's the expectation?

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

Our expectation is that the worker would not observe any differences in their wellbeing. As you

know, the dose limits that we have currently for nuclear energy workers are 50 mSv in a single year, dosimetry period. So although this exposure is in excess of that it's still below any thresholds where we would expect to see any kind of acute health effects.

**THE PRESIDENT:** Thank you.

Ms Penney...?

**MEMBER PENNEY:** Was the RSO impacted?

**MR. MOSES:** Colin Moses, for the record.

So with respect to this event initial report, it was the RSO who performed the recovery, and so they were -- they were the individual who received that excessive dose.

**THE PRESIDENT:** Mr. Berube...?

**MEMBER BERUBE:** So looking at this it's obviously a case of human error. The question is, is this due to a training failure? What is the initial thoughts on, you know, why would somebody who is supposedly trained in this area not take the appropriate action to retrieve this material if they had been trained appropriate, and to understand you know the dangers of doing what they were doing?

**MR. MOSES:** Colin Moses, for the record.

So our regulations do have general training requirements and whenever there is a need for

source retrieval there is a requirement that the individual performing so has additional training requirements. But with respect to this particular individual, as well as some of those training experiences, I'll let the licensee respond to that.

**MR. PIMM:** David Pimm, for the record.

Through this event we did discover that the training that the RSO had was out of date. We had -- actually we were in line for the next available up-to-date course, which was not available until June. This was lined up previous to the incident.

This incident has obviously brought to light the training issues and so we have since then taken steps in order to ensure that anyone who is in this position has the up-to-date retrieval training.

There was a few other factors. Training was a big part of it. There was also the response time. This was late at night and the RSO was potentially not using best judgment -- well, obviously, was not using best judgment. We have changed some of our policies and are, in the meantime, changing policies to change how we react to these situations to ensure that one person isn't put in that position -- thinking more of the teamwork approach to future retrievals.

**THE PRESIDENT:** Thank you.

Ms Velshi...?

**MEMBER VELSHI:** So there seems to be a number of things that went wrong here. So I'll start off with when you say there is not going to be additional reporting to the Commission members. I think we do need additional reporting, one, to find out all the things that broke down; second, certainly around the dose and what the final verdict is. And I wasn't quite sure.

Maybe the person from Health Canada can help, help me with this. Will your assessment give a definitive dose or it will be an indication that, yes, it was more than .45 but we don't really quite know how high it is? Like what kind of -- with what confidence will you be able to give a dose level?

**DR. WILKINS:** There is some uncertainty in our dose assessment, so it will not be a definitive dose. We are working with biological systems here. But we will be able to tell if they got over a certain dose over 100 mSv, and we -- or we -- it's hard to say until we actually get the results. If there is no damage then he certainly did not get that dose. So we should be able to give a range.

**MEMBER VELSHI:** Thank you.

And staff, I think there was like a nine-day gap between the time you were notified and the

time you showed up onsite. I am just wondering. I mean we don't know if this was a real dose but did this RSO continue doing radioactive work? In the meantime were there any corrective actions taken? Should your response time have been shorter, like is this acceptable?

**MR. MOSES:** Colin Moses, for the record.

First of all, I would just like to note as well that we were informed of the event several weeks after the event actually occurred. And that is certainly one of the factors that we are reviewing and can report on when we report back to the Commission on additional details on that, because there is no doubt that this type of event requires an immediate report to the Commission, and that is same day reporting in our perspective.

So the delay between sort of being notified and deciding to go out and do that verification, I don't think has a substantive impact on sort of the licensee's follow-up.

I will note that the initial report, the immediate readings and the dose assessment did indicate that the dose was well below regulatory limits. It was not until that TLD results was received that we became aware that there was a possibility of over-exposure. We --

**MEMBER VELSHI:** Sorry, Colin, before you go further, but it was only when the CNSC staff got there.

They hadn't even sent the dosimeter to be read out. All of those things got delayed because the regulator hadn't responded more promptly.

I'm not saying the licensee shouldn't have done all those things, but I'm just saying that that was probably another barrier that could have been strengthened, maybe.

**MR. MOSES:** Colin Moses, for the record.

The accountability is clear in this regard and there is no doubt that the licensee should have immediately sent that TLD as soon as that event happened for a reading. There is no question there. I do agree when CNSC staff visited they noted that that TLD had not been sent, and from our perspective that's unacceptable.

But I could ask Mr. Peter Larkin, who did visit that site. I believe he is online. He can speak to his observations when he did that site visit.

**MR. LARKIN:** Peter Larkin, for the record. I am the Regional Office Coordinator in Calgary.

I did visit the 20/20 office on January 18, accompanied by a licensing specialist, Michael Davey(ph). We did discover on January 18th, that date -- we were asked specifically about the TLDs that were worn that day and were told by the then radiation safety officer had, in fact, been submitted to Health Canada that they

couldn't understand why they hadn't gotten results yet, et cetera.

I suggested, well, we contact Health Canada right away to determine what the delay might have been, and well about seven minutes later I guess they came back in with a box full of OSLDs and say that none of the OSLDs from December had actually been submitted yet to Health Canada. So we instructed them to submit them immediately. And I understand those results came back on January 30th with the one particular OSLD result being high.

**MEMBER VELSHI:** Thank you.

**THE PRESIDENT:** So given all of this, how did you reach your conclusion that you don't have to report back to us again?

**MR. MOSES:** Colin Moses, for the record.

So we do report on all our regulatory activities through the nuclear substances annual regulatory oversight report, and we did intend, and will absolutely include information on this.

I take your point. I think there is still an uncertainty with the dose received by the individual and there is merit in reporting back to the Commission on that.

**THE PRESIDENT:** Dr. Demeter...?

**MEMBER DEMETER:** Thank you.

Is the CNSC aware of any issues with this particular device? Is this a one-off or is this a trend, because these devices do plug. Occasionally, you have failed retrieval of the source. So is this -- I'm trying to think of other similar models that have had the same problem, or this is a one-off?

**MR. MOSES:** Colin Moses, for the record.

I'll refer the question to Mr. Peter Larkin who has much more broader experience with these devices, but I will say too that there is a requirement that licensees, when they experience these kind of events, to report that to the manufacturer in case it is a systemic issue.

**MR. LARKIN:** If you are talking about the specific exposure device and use, that particular model is in widespread use across Canada. It's probably used by -- I would suspect, 95 percent of the radiography devices are this particular model. There's -- it certainly has -- it's an approved certified radiation device in Canada. It's also a certified Type B package, again in Canada.

There's nothing at all inherently wrong or at fault at all with the equipment itself. It has to be properly maintained. It has to be used safely. It has to be used in accordance with our very specific and rigorous regulations. And if it is, then it's -- it can be operated

very safely.

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

**THE PRESIDENT:** Thank you.

Ms Penney? Mr. Berube? Ms Velshi?

Okay. Thank you. Thank you very much.

We will move now to the next Event Initial Report, which is regarding a fire in an industrial radiography vehicle at 20/20 ND Technology Inc. This is outlined in CMD 18-M16 and, again, one of you are going to tell us what it is about. Go ahead please.

**CMD 18-M16**

**Oral presentation by CNSC staff**

**MR. MOSES:** Thank you. For the record, I am Colin Moses, Director General of the Directorate of Nuclear Substances Regulation.

So CNSC Staff are here to provide an update on an Event Initial Report on a vehicle fire that occurred on March 1st, 2018 as outlined in CMD 18-M16.

The vehicle contained an exposure device with a Category 2 sealed source of iridium-192. These devices are used for non-destructive examination generally to verify the adequacy of welds and metal works.

While the cause of the fire is yet to be

confirmed, the local fire department believes it to have originated in a heater used to prevent freezing of photography chemicals that are stored in the back of the truck. The licensee recovered the device following the fire and verified the device was undamaged.

A CNSC inspector was on site on March 2nd and was able to confirm that the device appeared undamaged and that the dose rates on the surface was at a level that is to be expected for such devices.

This is to be expected, as these devices are certified as Type B packages for the purposes of transport and are subject to thermal tests that simulate accident conditions during transport.

We've heard from the fire department that the temperatures that would be expected to be experienced in this type of fire are well below the temperatures that are used for the thermal test of this package.

The CNSC reported this event publicly through its Twitter account and provided additional details on the event on the CNSC website.

CNSC Staff remain available to answer any questions you may have.

**THE PRESIDENT:** Okay, thank you. Starting with Dr. Demeter.

**MEMBER DEMETER:** Thank you. Nice pictures

as well.

At the initial attendance by the fire department, was there any guidance or monitoring -- obviously it was placarded, but they might not have been able to see that because of the fire -- were they aware that there was a device and was there any monitoring to make sure that it was safe for them to proceed with extinguishing the fire?

**MR. MOSES:** Colin Moses, for the record. I'll let the licensee respond to that.

**MR. PIMM:** Dave Pimm, for the record. Yes, the fire was discovered by a CEDO and monitoring equipment was available and was used through the entire event. The firefighters that were dealing with the blaze were actually given a RAYDOS and instructed that if there was a peep or an alarm that they were to evacuate immediately.

Then the CEDO did stay at a safe distance from the fire with the RAYDOS in hand and monitored, but there was no change in the activity.

**MEMBER DEMETER:** Okay, thank you.

**MEMBER VELSHI:** No question. Just good prompt action by all concerned. Thank you.

**MEMBER BERUBE:** Just a point of clarity. First of all, I want to point out that the response on this

was extremely good. I think it was initiated by CNSC Staff without prompting, is that correct?

**MR. MOSES:** Colin Moses, for the record. Yes. I'll let Mr. Larkin answer that, but he did discover this event through social media monitoring before it was even reported to the CNSC Staff.

**MEMBER BERUBE:** So I really appreciate that kind of initiative, that somebody would actually see to it that they'd go and take a look at this event if they were close enough to do so. So thank you for that.

The other thing that I want to check on is while he was there did he have the opportunity to actually inspect the vehicle to make sure that it had the proper licensing, markings and everything else so that the fire and safety crews should have been well aware of what was in the back of the vehicle?

**MR. MOSES:** Yes. I'll let Mr. Larkin answer that.

**MR. LARKIN:** Yes, the incident occurred on March 1st, and I showed up on the morning of March 2nd. I did attend at 20-20's office location in Grand Prairie. I did take a look at the one exposure device that they had in their storage vault which happened to be one exposure device that was involved in the fire the previous night.

The exposure device, other than the fact

that it had a very strong smell of smoke, it looked pretty well -- I shouldn't call it pristine, but certainly there was no indication of any compromise on the shield or anything like that. The dose rate that I measured was 360 microsieverts per hour, which was certainly consistent with the source activity in the exposure device.

Even the plastic contact details, labels on the device were still intact. So the fire didn't -- obviously hadn't reached the exposure device, and the exposure device suffered no consequence, if you like, in any regard with respect to the fire.

I did go out to the darkroom truck, I was at the CEDO's residence, and that was quite a different story. The darkroom truck had suffered significant damage. I have forwarded documents -- or all the photographs that I took are certainly available on file. I don't think the eDOC number really at hand -- but they are available on file.

I went to look at the darkroom truck specifically to see -- perhaps get an indication as to maybe how hot the fire might have been. I was looking to see what the lead tunnel, which is the shielding material that they're required to have in the darkroom truck, to see whether maybe it had melted. Lead melts around 327 degrees. It was still pretty well intact, so it obviously

hadn’t reached that type of temperature.

I also looked at the lead inside the photographic film cassettes to see if maybe that had been, if you like, compromised but, no, it had not.

I have spoken since to the Deputy Fire Chief in Grand Prairie County, he confirmed that the fire appears to have originated in the heater which was used to keep the chemicals warm or keep them unfrozen overnight. The fire was very much restricted to the darkroom truck itself. That appears to be just the nature of that -- it’s a relatively airtight container and that seems to have slowed down the progress of the fire.

**MEMBER BERUBE:** Thank you for that.

**THE PRESIDENT:** Ms Penny.

**MEMBER PENNEY:** Just the question that Mr. Berube asked, was the truck properly placarded for the materials it was carrying?

**MR. MOSES:** I'll let Mr. Larkin answer that one.

**MR. LARKIN:** Yes, it was. I’m just referring to my photographs here. I think the placards have since been flipped up, if you like, because the camera’s no longer on board.

But there also was a radiation area warning sign on the left rear compartment of the darkroom

truck which is where the exposure device had been stored. It was still intact. Again, that part of the darkroom truck had been untouched by the fire.

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

I'd like to move now to the next item which is an Event Initial Report regarding the exceedance of regulatory dose limit by a nuclear energy worker at the Windsor Regional Hospital as described in CMD 18-M18.

I understand that Mr. Pullo, Representing Windsor Regional Hospital, is joining us via teleconference. Mr. Pullo, can you hear us?

**MR. PULLO:** Yes. I'm here, thank you. Good afternoon.

**THE PRESIDENT:** Thank you. Mr. Moses, over to you still.

**CMD 18-M18**

**Oral presentation by CNSC staff**

**MR. MOSES:** Thank you. For the record, I am Colin Moses, Director General of the Directorate of Nuclear Substance Regulation.

CNSC Staff is here today to provide you with an Event Initial Report on a exceedance of a

regulatory dose limit by a nuclear energy worker during diagnostic nuclear medicine procedures, as outlined in CMD 18-M18.

Before going any further, I would just like to clarify that there was a typo in the dates provided in the Event Initial Report that was included in the CMD. The event and all subsequent actions occurred in 2018, not 2017. So my apologies for any confusion that might have caused.

So on February 13th, 2018 a nuclear medicine technician who was a nuclear energy worker, was preparing a Technetium-99m MAA, which is used in lung scans. The syringe shield slipped and the technician was contaminated with Technetium-99m on their right wrist. The worker immediately proceeded with decontamination to the extent possible, and some remaining fixed contamination remained following that decontamination.

The total dose received by the worker to their extremity was estimated to be 3.6 sieverts or 3,600 millisieverts, which is in excess of the annual dose limit to an extremity of 500 millisieverts. The technologist remains employed by the hospital, but has been removed from work that could contribute to further radiation exposure.

The licensee has implemented additional procedure and worker protection measures to mitigate

potential reoccurrence of this event.

The CNSC reported the event publicly on our website, and we remain available to answer any questions that you may have.

**THE PRESIDENT:** Thank you.

Ms Velshi.

**MEMBER VELSHI:** So at a dose of 3.6 sieverts to the extremity, are there any visible symptoms?

**MR. MOSES:** I'll let Ms Purvis answer that.

**MS PRUVIS:** Caroline Purvis, Director of Radiation Protection Division, for the record. This technologist, as we understand, has no visible effects from this localized exposure to the wrist.

What you may see, usually in exposures in excess of what was observed here or what's estimated here, you may foresee skin reddening. Usually you'll see that coming and going quickly within the sort of 2 to 6 grey range, 2 to 6 sievert range essentially. Then above that, you may see other loss of hair, et cetera, but those are in much elevated doses.

So no health effects were observed in this case and we wouldn't really expect it.

**MEMBER VELSHI:** Thank you. So a question to the licensee. As I looked at your planned corrective

actions, is there kind of like an engineering solution to this syringe shield so that you can't operate the syringe unless the shield is properly in place? I mean, what one can see, you know, problems like this could happen otherwise.

**MR. PULLO:** The syringe used has a pretty standard shield used in this type of work. Essentially, it covers a syringe, it's made of lead, and it does require a turning of the bottom to lock it into place. So it's pretty much a standard instrument or protective device that's used in this type of work.

**MEMBER VELSHI:** So what you're saying is that to make it more forgiving for errors like this, I mean, because it's just used so frequently it's pretty standard?

**MR. PULLO:** Yes --

**MEMBER VELSHI:** It's just that the consequence is pretty high, right, and it's prone to errors, dropping the syringe, I don't know.

**MR. PULLO:** One thing we did institute is a longer glove sleeve so that the -- so as opposed to a standard glove, the cuffs are extended on the rubber gloves. So the cuffs are extended so that we can pull it and extend it over the wrists of the lab coat to mitigate, you know, any exposure to the wrist. We've already put

that in place.

**MEMBER VELSHI:** But the person could have spilled this on a patient instead. I'm just wondering if your syringe is not properly protected, how do you avoid that?

**MR. PULLO:** This work was in the hot lab where the radioactive material is prepared for patient use. But similar syringe shields are used in nuclear medicine for injection of patients to protect, you know, the workers, to minimize their exposure.

So you are correct, a similar syringe shield would be used when injecting patients. But, again, it's a standard piece of equipment that's used, you know, across the industry.

Essentially, you're injecting a radioisotope intravenously into a patient. So it involves, you know, manual -- it's a manual dexterity process in doing so.

**MEMBER VELSHI:** Thank you.

**THE PRESIDENT:** Dr. Demeter.

**MEMBER DEMETER:** Thank you. Given the doses used for this procedure, I was a bit surprised at the skin dose at 3.6 sieverts.

Then I was a bit surprised with 2 sieverts usually being a threshold before you start getting

reddening, and 3 sieverts at the bottom end of the threshold before you start get peeling like a bad sunburn, so I was surprised that there was no effect. So it hearkens[sic] the confidence intervals in the skin dose, because at 3.6 sieverts I'd expect a little bit of reddening.

But that being said, for the person on the line, what is the usual sequence? When do you put on the dose shield in the sequence of events in the hot lab? Is it put on before it gets to the patient or when it gets to the patient? In this case, it seemed to be before it got to the patient.

**MR. PULLO:** Yeah, in this case the shield was used while drawing up the dose from -- basically it's a glass vial within a what we call a lead pig, and the dose is -- so you have a needle and a syringe to draw the dose from the shielded vial and you shield the syringe itself with a lead shield.

So basically, you would put the syringe in the shield, tighten the shield, and then draw your dose from there. Then you would untighten or loosen the shield, put it into your dose calibrate to assay your dose, and you may do that once or twice or until you get your correct dose for the patient. Then that gets put into a separate shielded container until it's ready to be administered to

the patient.

So this work that was done here was in the hot lab.

**MEMBER DEMETER:** Yeah, I understand. So it sounds like you might be taking it in and out of the shield a number of times until your dose is appropriate?

**MR. PULLO:** That is correct.

**MEMBER DEMETER:** Okay. Is there a way of drawing up the dose once and then putting it in the lead shield when the dose is correct, so you're only doing that once?

**MR. PULLO:** Well, the point of the lead shield is to have some -- as the material is drawn from the vial into the syringe you have your shield around the syringe, and actually that's done behind lead glass as well. So you have sort of like what we call a drawing station.

Cindy's with me here. What do you call the -- it's a lead partition.

**MEMBER DEMETER:** Yeah, I understand.

**MR. PULLO:** So, essentially, you have your arms around this lead partition with lead glass, so you are working behind lead glass and you're drawing that radioactive material from the vial into your syringe. So you want your lead shield on that syringe at that time as

an additional protective barrier.

**MEMBER DEMETER:** Okay. I guess an alternate technique is that the vial with the radioactive material is in a leaded container itself, so that when you're drawing it -- anyway, that's another --

**MR. PULLO:** Yes, it is.

**MEMBER DEMETER:** -- that's technical.

**MR. PULLO:** Yes.

**MEMBER DEMETER:** But I guess from CNSC Staff's point of view, what are your confidence intervals around that skin dose? Is it a modelled -- it's probably a standard program that you use based on readings at a certain distance from the skin and the isotope that's present?

**MR. MOSES:** I'll let Mr. Estan answer that question, who performed the review of that dose assessment.

**MR. ESTAN:** Diego Estan, Radiation Protection Division. There are significant degrees of uncertainty when we do this skin dose calculation due to contamination. The most significant of which would be the affected skin surface area.

So we have to be conservative in our assumptions, and we assume that 1 square centimetre of skin is contaminated. However, it's easier to imagine that perhaps 10 square centimetres of skin was contaminated. If

it was, then the dose would be 10 times lower, 360 millisieverts.

So it's because of the conservative assumption of 1 square centimetre that we get the result that we get.

**MEMBER DEMETER:** So that helps me understand the results. Thank you.

**THE PRESIDENT:** Mr. Berube.

**MEMBER BERUBE:** So help me out here, I'm a little bit confused. When I'm looking at the causes, clearly the cause here is an explanation of what happened, but it doesn't tell me why it happened. Getting to root cause is really about understanding why, not what.

So I'm trying to understand, do we have a design issue here, do we have a manufacturing defect here, do we have an operating error here, do we have a procedural error here? I'm not comfortable I know what the answer to that is. Can you explain to me what you think it is?

**MR. MOSES:** Colin Moses, for the record. I'll let the licensee speak to the review of this event.

**MR. PULLO:** I mean, essentially, you have a manual procedure which involves, you know, the dexterity of the worker. You have a protective device and, you know, it's -- you know, perhaps there's... I don't know if there's better designs for the syringe shields, there are

different types, but essentially with this type it does require a tightening of the syringe shield on the syringe and, you know...

I, myself too, you know, and the worker, when reviewing, you know, what we could do better, you know, aside from ensuring that that syringe shield is adequately fastened to the syringe before beginning the work and making sure that, you know, you have protective -- you know, that the gloves are covering, you know, your skin, your hands, your wrists.

Everything in my review was done properly, it just boiled down to an unforeseen circumstance. Unforeseen but we've, you know, been able to put an additional protective measure in place, and that's to, you know, get extended cuff gloves to help mitigate that in the future. But overall, when reviewing her practice and her work, you know, everything appears good.

**THE PRESIDENT:** So how many hospitals are using such syringes? There must be hundreds of them being used not only in Canada, but the U.S., internationally. That's a pretty standard model, is it not?

So what I'm trying to understand, you know, do people share occurrences of accidents so people can learn from this? What's the data on the frequency of such events?

**MR. PULLO:** I, myself, wouldn't have that data. You know, in practice I don't think it's unusual to get, you know, drops on the gloves and, you know, when working with this material. So most of the times it ends up on the gloves and the gloves are changed out and there's no contamination to the skin.

In this instance there was a bit of skin exposed on the wrist and, unfortunately, it ended up there. But, again, I don't have the data, but I don't think it's unusual to get some contamination on the hands or, you know, on the gloves or maybe even the equipment that you're working with, having some contamination on that equipment that ends up having to be put aside and decayed for a period of time before it can be used again.

Perhaps I can defer to some of the CNSC Staff to see what they've seen out there in the field.

**THE PRESIDENT:** Go ahead.

**MR. MOSES:** Colin Moses, for the record. So, as the licensee indicated, it does happen when you are manually manipulating liquids to prepare doses or to prepare that. Those events can happen from time to time.

In fact, when reviewing our reporting expectations, if I looked over the last five years, there have been a high number of reported contamination events that had negligible dose consequence. As a result, the

CNSC clarified our reporting expectations to not only give guidance on how to respond when this type of contamination happens but also when you need to tell us about it to ensure that we are being informed of the significant events, that we can share those lessons learned more broadly.

I also wanted to speak just briefly to the root causes. I do appreciate your point. You need to look whenever you look at any event, why did it happen. In this case I would argue it's unlikely to be training. The technician responded very appropriately immediately after becoming aware of the contamination. They began decontamination practices, which significantly mitigated the eventual dose that they received. But there could be human factor considerations. You are manipulating a relatively heavy device. In this case it was a fairly large syringe for the amount of liquid that they were drawing down, so perhaps there could be some human factor considerations. But this is an activity that's done on a daily basis across many, many hospitals in Canada.

**THE PRESIDENT:** The surprising learning outcome is use longer gloves. So why is that not being conveyed? I assume that somebody is now saying to all hospitals in Canada, "Make sure you use long gloves"? Who does that?

**MR. MOSES:** Colin Moses, for the record.

First of all, we do. Whenever events like this happen we share those as broadly as possible. We share them both through our outreach groups -- we meet with the Canadian Radiation Protection Association for example on a regular basis and speak to these events. We also disseminate them on our website and include them in our newsletter which is developed specifically for these licensees and in some cases, where warranted, we communicate directly with the licensees performing these kinds of activities to highlight these lessons learned. Because it is important that other licensees out there might be using too short gloves for example and so just that simple awareness to think about that additional layer of protection can mitigate this occurring again. So we share that broadly.

I will also note that the Canadian Radiation Protection Association also has an event sharing website that they encourage their members to participate and this licensee can speak to whether they intend to contribute to that, but that is also within their own network tool that's available to share these kind of events and lessons learned.

**THE PRESIDENT:** Okay, thanks.

Any other burning questions?

Okay. Thank you very much.

**MR. PULLO:** Thank you.

**THE PRESIDENT:** The next item, which I understand is the last item, on the agenda is an information item to provide us with the status of the Designated Officer Program for 2016 as outlined in CMD 18-M10 and 18-M10.A. I will turn the floor over to Mr. Leblanc. Go ahead, please.

**CMD 18-M10/18-M10.A**

**Oral presentation by CNSC Staff**

**M. LEBLANC :** Merci et bonjour, Monsieur le Président et les Membres de Commission. Comme on vient d'énoncer, mon nom est Marc Leblanc. Je suis le Secrétaire de la Commission.

I am very fortunate to have here with me today Monica Hornof, who is the Lead Commission Technical Officer in the Commission Secretariat as she is very versed, a lot more than I am, on this topic. We are here today to present the report on the status of the Designated Officer Program for 2016.

In this presentation we will provide you with a brief background on the DO Program, DO being designated officers -- I think the new Members now are

getting some of those acronyms better understood -- information about the authorities carried out by DOs in 2016; information on notices of violation and related administrative monetary penalties, also known as AMPs, that are issued by DOs; information on decisions that were reportable to the Commission, and this is a key feature of this report because there is a statutory requirement to report to the Commission on some of those decisions; and DO Program updates and initiatives that have been undertaken since the last update to the Commission in 2016.

I will now pass the presentation to Ms Hornof.

**MS HORNOF:** Good afternoon, Members of the Commission.

So first I will start off with during the presentation of the 2015 DO report the Commission requested that the data presented include more detailed information and be grouped by specific actions. To address this action, this 2016 report includes more information about licensing and certification authorities carried out, including licence issuance, renewal, amendment, revocations and transfers, as well as certifications and decertifications of persons and equipment.

Additionally, more details are provided regarding the DO positions at the CNSC as well as about the

continuous improvement initiatives and other DO Program updates.

Now, a little background on the CNSC's DO Program.

The DO Program is a key component of the CNSC's licensing and compliance framework. DOs have been carrying out their authorities since 2000 when the *Nuclear Safety and Control Act* came into force and the DO Program was established. In 2014 the Commission accepted a revised DO Program and designated 31 DO positions which better reflected the CNSC's operational needs. Currently, the CNSC has DOs in seven directorates of the Regulatory Operations and the Technical Support Branches. The implementation of the DO Program is a collaborative undertaking between many CNSC divisions and directorates.

DOs have statutory powers and carry out authorities under the *Nuclear Safety and Control Act*. These include licensing, certification and compliance authorities, making up a significant part of the CNSC's regulatory framework. DO authorities include making lower-risk licensing decisions, making decisions in respect of inspector orders, making orders and issuing administrative monetary penalties, or AMPs.

Now, on this slide a little bit of clarification or precision is needed on the first point.

A DO decision is as effective as a Commission decision since it is authorized by the NSCA and the Commission has authorized the DO to make the decision. There are, however, two levels of authority between DOs and the Commission. DO decisions are subject to Commission review or appeal, which in of itself is reflective of these two levels of authority. As such, an applicant or a licensee may appeal a DO decision to the Commission. This is provided for in the NSCA.

Further of note is that DOs providing an opportunity to be heard to an applicant or licensee is a statutory requirement for certain decisions such as licence refusals and revocations.

Before providing information about the DO positions that exist at the CNSC, an overview of the CNSC organizational chart as it relates to DO staffing provides insight into how DO staffing is structured.

At the top we have the President and CEO, as well as yourselves, the Commission. The Commission designates certain positions within the CNSC to have DO authorities.

The highest level positions at the CNSC with DO authorities are the Vice-President positions in the Regulatory Operations and Technical Support Branches. This is followed by Directors General in seven directorates,

Directors in six divisions and then senior officers in those divisions.

The next slide will provide more information on how these authorities are distributed within the organization to ensure continuity of operations.

CNSC DOs carry out authorities in accordance with their position and operational responsibilities at the CNSC. DOs in more senior positions, such as Directors General, have a broader scope of authorities than DOs in less senior positions, such as Directors. The Vice-Presidents of the Regulatory Operations Branch and the Technical Support Branch have all of the authorities of the DOs in their respective branches.

This 'pyramid style' allocation of DO power ensures continuity of operations. Should a DO be unable to carry out their authorities, a DO at the same or higher level in the same directorate, or a Vice-President, could carry out the authority. This continuity is especially important because DO powers are not transferable between CNSC staff and DOs have been designated by the Commission by name.

This chart provides a breakdown of DO authorities by CNSC directorate. The Commission has established 31 positions in both the Regulatory Operations and the Technical Support Branches to carry out lower-risk

authorities provided for by subsection 37(2) and section 65.05 of the NSCA.

You will see that there are 13 DOs in the Directorate of Nuclear Substance Regulation. This is due to the volume of lower-risk licensing and certification authorities carried out in that directorate, making up a large part of this key program.

Based on the authorities given to a DO by the Commission, DOs can carry out:

- the licensing of lower-risk facilities and nuclear activities;

- the certification and decertification of prescribed equipment or of persons for the purposes of the NSCA;

- the designation of CNSC inspectors;

- confirming, amending, revoking or replacing orders made by CNSC inspectors as well as making orders;

- issuance of return-to-work authorizations of persons whose dose exceeded the prescribed dose limits; and

- issuance of notices of violation and AMPs.

In 2016, DOs carried out a total of 4,268 authorities. Additional information on these authorities

is provided in the following slides.

So of the authorities carried out in 2016, the majority were licensing and certification authorities. These included 2,347 nuclear substance, radiation device and transport licences issued, renewed, amended, transferred or revoked by the Directorate of Nuclear Substance Regulation; it also included 1,309 import and export licences issued, amended, revoked or transferred by the Directorate of Security and Safeguards; and the certification of 455 exposure device operators and 98 persons in specific Class IA positions by the Directorate of Safety Management.

Not shown on the slide are also six licensing authorities carried out by the Directorate of Nuclear Cycle and Facilities Regulation and the Directorate of Environmental and Radiation Protection and Assessment.

DOs also carried out 47 non-licensing authorities, including 15 inspector designations and six return-to-work authorizations.

As can be seen from the figure shown on this slide, out of both licensing and compliance authorities carried out in 2016, over half, 2,380, were carried out by the Directorate of Nuclear Substance Regulation. This was followed by authorities carried out by the Directorate of Security and Safeguards and the

Directorate of Safety Management.

As discussed in the previous slides, DOs are designated in multiple CNSC divisions and directorates based on operational responsibilities. The fact that three directorates carried out the majority of authorities should not be taken as an indication that DOs are not required in the other directorates. The DOs in those directorates are authorized to carry out specific authorities that are unique to the expertise of the staff found in those directorates.

Now we will move on to Administrative Monetary Penalties, or AMPs.

In 2016, nine AMPs were issued by DOs, including one AMP by the Director General of the Directorate of Power Reactor Regulation and eight AMPs by the Director General of the Directorate of Nuclear Substance Regulation.

All persons issued with a notice of violation and AMP were advised of the opportunity to request a review by the Commission of the amount of the penalty, the facts of the violation, or both.

Although one request for review was initially filed, it was later withdrawn. As such, all AMPs issued in 2016 were all paid in full and the matters are now all closed.

As Mr. Leblanc mentioned, the reporting of decisions pursuant to subsection 37(5) of the NSCA is the only statutory reporting requirement for DOs.

This DO Report, when presented to the Commission, will fulfill this reporting requirement for 2016.

But I would like to take a minute here to differentiate between decisions reported to the Commission under subsection 37(5) and decisions made by DOs that have to be referred to the Commission under subsection 37(6).

Decisions that would be referred to the Commission are those that DOs make in respect of making DO orders. The NSCA requires that when a DO uses her or his authority to issue an order, the order be referred to the Commission. The Commission then has to decide to confirm, amend, revoke or replace the order.

In 2016, DOs did not make any orders and, as such, no DO orders were referred to the Commission for review.

Now, back to the decisions that are reportable to the Commission. These include licence refusals; the issuance of licences with a financial guarantee; the renewal of a licence with a change in conditions or the suspension, amendment, revocation or replacement of a licence without the consent of the

licensee; and the confirmation, amendment, revocation or replacement of an inspector order.

In 2016, DOs made 1,170 decisions that were reportable to the Commission. The majority of these decisions were issued by the Directorate of Nuclear Substance Regulation DOs -- sorry, were licences issued by the Directorate of Nuclear Substance Regulation DOs that included a financial guarantee requirement.

DOs also confirmed or revoked 17 inspector orders. Of note is that although DOs revoked orders, this was not because the orders were found to not be warranted, rather it was a procedural error, the orders should have been confirmed. However, corrective actions have been put in place in this regard.

Now, I would like to talk a little about some DO Program updates and improvement initiatives.

The DO Program is constantly evolving as part of the CNSC's commitment to continuous improvement. In 2016 there were 15 DO position staffing changes. With these staffing changes, CNSC staff ensured that all new DOs and DOs changing positions participated in the DO Training and Assistance Program. This included briefings with the Commission Secretary and Senior General Counsel, self-directed learning of DO documentation and on-the-job learning.

In the last year it was clarified, or rather DOs were reminded that they have access to CNSC legal counsel for advice respecting the exercise of DO authorities at any time. It is important to note that this has always been the case and does not reflect a change in procedure.

Finally, a DO community page and DO bulletin board were created on the CNSC Intranet. The community page has resources for DOs and informs CNSC staff about the DO Program. The bulletin board provides DOs with updates, changes and improvements to the Program.

Further, during 2016, work instructions, templates, guidance documents and additional training materials were developed for DOs with the authority to make orders. All of the DOs with this authority and their administrative assistants have participated in this training.

During the presentation of the 2015 DO Report, the suggestion for the establishment of a DO Community Forum was raised by the Commission. This was further recommended during a CNSC self-assessment on DO licensing processes. CNSC staff are organizing this DO Forum which will bring DOs together to share knowledge, experience and expertise.

This Forum -- which is planned for April

2018 -- will also feature information on tools and resources available to DOs; case studies from experienced DOs; and briefings from the Secretariat and Legal Services to provide DOs with some refresher training.

Also in 2016, CNSC staff carried out a DO licensing process self-assessment which highlighted good practices and also made recommendations for improvements to the DO Program. The intent of the self-assessment was to assess the availability of tools and other resources to facilitate the DO's statutory decision-making in a consistent and transparent manner, not the decisions themselves. Overall, the self-assessment showed that a well-established DO licensing process was in place.

The self-assessment identified seven key recommendations, accepted by CNSC management, and a Management Action Plan to address them was established. In addition to the recommendation for a DO Community Forum, these recommendations included:

- that all DOs, new and existing, undergo the DO Training and Assistance program. As of December 2017, all DOs had undergone this program, most within the last year and a half;

- reminding DOs that they have access, and always have had access, to CNSC legal counsel;

- carrying out self-assessments of DO

decision processes every five years.

The self-assessment also recommended that the DO Program Maintenance Plan be updated. Through this update, CNSC staff identified a benefit of a briefing for new DOs that includes information about the tools, training and learning opportunities available to them. All future DOs will attend this briefing and updated information about these resources will be provided to current DOs during the Community Forum in April 2018.

I will now pass the presentation back to Monsieur Leblanc.

**M. LEBLANC :** Merci, Monica.

So in conclusion, during 2016 DOs carried out 4,268 authorities. Of these, 1,170 were reportable to the Commission, being the main purpose of our presentation today.

Another purpose of our presentation today was to introduce in a more fulsome manner the concept of DOs to our new Commission Members, but this is just the start. We will have much more detailed opportunities to discuss training. I am certain that Lisa, when she will provide you with some training on the NSCA, will spend a lot of time on the various actors within the CNSC, the inspectors, designated officers, and your role when compared to these.

So in this report, the Commission's recommendations for DO reporting and program improvements, including the DO forum, were addressed. Those were issues that were raised the last time we presented before this Commission. As Monica has mentioned, a lot of improvements were made since last year.

Looking ahead to the next report, detailed reporting for DO authorities carried out in 2017 will be compiled. We are intending to provide the 2017 report this year in 2018 so there will not be that lapse of time between the information presented today and that was for the year 2016.

The report may also be modified because of internal discussions pertaining to whether we need to be as fulsome in this report, given that a lot of the designated officer information in terms of numbers is already provided in some of the Regulatory Oversight Reports. So in that context we will be looking for some direction from the Commission as to whether the usefulness of this report, whether you want it to be done on an annual basis and whether you want it to concentrate more on the DO program itself and not on the numbers of DO activities or authorities given that these will be reflected in various RORs, except from some areas.

Another update on the DO Program

improvement initiative will also be provided in the next iteration of this report. This will include an update on the DO Community Forum that is taking place next month, with lessons learned and improvements for the subsequent forums.

Finally, DO documentation and supporting tools will continue to be updated throughout 2018.

This concludes our presentation today. I would be remiss if I was not to thank, on behalf of Monica and myself, all the DOs that have contributed information to this report and many of the key DOs that are here in the room today and to whom we will very likely direct some of your substantive questions. Thank you.

**THE PRESIDENT:** Thank you.

So let's go to the question period with Dr. Demeter.

**MEMBER DEMETER:** Thank you very much for the presentation. I think the high-level review is very informative and I think one suggestion that would help put this in some context is some trend data, so from year to year to year how does this look, is it stable?

I think one of the comforting point estimates for me, because I don't know what the trend is, is that the number of AMPs issued in 2016 was nine. I remember when the Administrative Monetary Penalty Program

was being rolled out there was a lot of anxiety in the field about this particular tool relative to compliance. I don't know the number for the previous year or for 2017, but nine as one point estimate looks pretty reasonable, it's not excessive. So the trend data would be really interesting at a high level as well. That's my only comment. But thank you, I found it very informative.

**THE PRESIDENT:** Thank you.

Ms Velshi...?

**MEMBER VELSHI:** Thank you.

What I also found reassuring is that none of the decisions were sent forward to the Commission for review. So that in itself is great news.

I did have a quick question on slide number 16 because I didn't understand what something meant in there. So if you can pull it up, please. The fourth bullet that says:

> "17 inspector order confirmations or revocations orders that were revoked should have been confirmed"

What does that mean?

**MS HORNOF:** Monica Hornof, for the record.

So in that situation what had happened was that when the DO reviewed the inspector order, all the conditions of the order had been satisfied and at that

point since the conditions had been satisfied the order was revoked. However, that isn't the correct approach. It still should have been confirmed and then the licensee would be informed that they had satisfied the conditions of the order and the matter would be closed. So we have put corrective actions in regard to that.

**MEMBER VELSHI:** Right, because you still want to know that there was an order that was issued.

**MS HORNOF:** Correct.

**MEMBER VELSHI:** Thank you.

And my last question. So if we were to ask the DOs, what would they see as their biggest challenges or the most contentious decisions that they have had to struggle with?

**MS HORNOF:** Monica Hornof, for the record. I'm going to pass this to my colleagues who are DOs to provide you an answer. Perhaps the Director of Nuclear Substance Regulation would like to chime in.

**MR. MOSES:** Colin Moses, for the record, Director General of Nuclear Substance Regulation.

I think the answer is really in that same slide 16, which are the ones that are required to be reported to the Commission, and generally those ones are required to be reported because there is a potential for them to be contested by the people receiving that.

I know certainly from my experience as a Designated Officer, most of my decisions are related to order reviews and deciding whether to confirm, amend, revoke or replace an order, and in that case the ones that are most challenging for me are the ones where the licensee seeks an opportunity to be heard because then they present arguments and I am asked to weigh on those different arguments. And I think that the procedural aspects in sort of ensuring that I follow due process is generally the most challenging, but in that regard I have been adequately supported with appropriate legal advice from the legal team that we have at the CNSC to ensure that we do meet all our legal obligations while still providing an expeditious and appropriate process.

And I'm not sure if Mr. Fundarek, who is actually our Lead DO in terms of decision-making, might want to add any experience.

**MR. FUNDAREK:** Peter Fundarek, for the record.

Most of the DO decisions that I undertake are fairly routine amendments, revocations, renewals of licence, all of those being asked for by the licensee. The contentious ones are understanding some of the business materials that are provided to us in the context of transfers and understanding the changes in corporate

structure that the licensee is proposing, buyouts, and this happens at 11:59 and at 12:01 then this company forms and then you end up with the same company name but a different corporate number and you're trying to understand, okay, where is the link between the old company and the new company. So understanding those business transactions is a challenge. We are capably supported by legal services on that regard and that does help us in coming to a decision on that.

The other one that's difficult is when the licensee has not met our expectations, hasn't provided sufficient information, and so then the recommendation comes from the licensing team to not issue a licence or issue a licence with an amended term, and so then that kicks in the Designated Officer opportunity to be heard process. So then I will go to the licensee with an opportunity to be heard and provide them with the information as to why a recommendation has been made and then give them an opportunity to respond to that lack of information or to provide additional information that they may feel is relevant to their application and then consider that information. So those can be kind of difficult because they are time-sensitive, particularly for renewals when we are coming close to the end of the month in which the licence is going to expire, and if the licensee hasn't

been communicating with us on a regular basis, then that can pose an additional challenge to make sure that we get the information from them in a timely manner. So that does form a bit of a difficulty, but I have to make sure that the process is followed, provide them with an opportunity to be heard and then provide them with my reasons for decision.

**THE PRESIDENT:** So how many took -- you know, through all of CNSC, how many actually took on the opportunity to be heard? For the year, for 2016, how many were there?

**MR. MOSES:** Colin Moses, for the record. I will let Mr. Fundarek add for his example, but in my experience I have reviewed of the order of 100 orders since I took on the role of a DO, perhaps a bit less than that, and I have had two instances where a licensee has asked for an opportunity to be heard. Generally they are not actually contesting the facts of the order, they just want to present additional information or arguments to present their position. So that has happened to me twice in all the orders that I have reviewed. Generally inspectors are well trained, they have a good knowledge of regulatory requirements, and the facts that inform their decision to issue an order are quite clear and make it very difficult for a licensee to challenge any of

those aspects, which is why probably I see a very low number of licensees leveraging that opportunity.

I will let Mr. Fundarek add some details as well.

**MR. FUNDAREK:** Peter Fundarek, for the record.

So in 2016 there were five licences that I refused to issue. Four of those did not provide any additional information during the period of the opportunity to be heard. One did, but the information provided was still not satisfactory.

**THE PRESIDENT:** I was wondering, you know, we have some other DOs also, if they had requests to be heard, whether that's a good indication that things are pretty good and you don't get challenged much. Is that a good indication that by and large your decisions are being accepted by the industry?

**MS HORNOF:** Monica Hornof, for the record. I'm going to pass this back to Director of Nuclear Substance Regulation again.

**MR. MOSES:** Colin Moses. And anybody behind me please feel free to add your own experiences. But I know from mine, I think when you follow due process, when you have facts, when you are clear and transparent in that process, those are really the key elements to ensure

that you have a robust process. I know certainly in decisions to issue administrative monetary penalties for example we issue a notice of violation and certainly a big part of my focus is to ensure that the facts are solid and that they appropriately describe the rationale that I arrived at in determining the amount of the administrative monetary penalty. And I do think the fact that those aren't challenged is that we have presented clear and robust arguments to support that decision or reasons for decision.

**THE PRESIDENT:** Ms Penney...?

**MEMBER PENNEY:** A couple of things. Are there timelines around the licensing processes?

**MS HORNOF:** Monica Hornof, for the record. I am going to pass this back to one of our more experienced DOs again.

**MR. MOSES:** So certain Designated Officer decisions do have embedded timelines. For example -- I'm trying to think of one off the top of my head, but there is a requirement on inspectors to refer a matter to DO for example within 10 days of making an order and an obligation on the Designated Officer that within 10 days of arriving at their decision that they communicate that decision to the affected individuals.

With respect to licence requirements,

there are some, although not prescribed in legislation, some very practical timelines. For example, if Mr. Fundarek is dealing with a renewal request, that licence has an expiry date and we don't want to find ourselves in a situation of having a licensee who is not authorized to possess the material that they do possess. So those timelines apply as well.

**MEMBER PENNEY:** Lots of organizations actually look at and benchmark their responsiveness in timelines in being able to -- and, you know, so you might want to consider that.

**MR. MOSES:** Sorry.

**MEMBER PENNEY:** I'm sorry.

**MR. MOSES:** I was remiss, I should have added too that we also apply internal service standards and report publicly on our service standards for high-volume regulatory decisions. So for most of the decisions -- or all of the decisions made by Mr. Fundarek for example, those have publicly reported service standards.

**MEMBER PENNEY:** In terms of the AMPs, I'm very interested in compliance, so I don't know if there is additional information that could be available to us around the AMPs. I would just leave that with you.

But when you say what else would we like with respect to this information, I think you need to look

at how labour-intensive it is. I'm not sure the fact we are only getting 2016 review data in 2018 means that it's really manual in terms of pulling it together and a lot of work and/or some other reason. But, you know, because we could ask for all kinds of things that could take -- that could distract you from important things, if you know what I mean, so be mindful of effectiveness.

**MS HORNOF:** If I can just provide -- so for the AMPs we do report everything on our external website, so there is more information. You can get the notice of violation and if there is a Commission review of the AMP, you can get all that information there. And there is some information in the report as well that was provided to you.

In regard to the report, it's not labour-intensive so much as there was -- we were trying to decide what to do with the report and it took a while to make that decision and that's why it's coming before you now. However, for the next iteration, as Monsieur Leblanc alluded, we will try to get that out to you much quicker than the last one.

But anything -- I do want to clarify to our new Commission Members as well that if there is anything of importance or something that we think is significant to report, it is reported to the Commission

immediately, as you saw with our EIRs today. If there's any such orders, that kind of thing, and any AMPs that are issued, Monsieur Leblanc sends you the information. So you do get that information.

**THE PRESIDENT:** Mr. Berube...?

**MEMBER BERUBE:** Well, I want to thank you for that. It was very informative to me. Based on the information presented it looks like things are working rather well and so congratulations on that basis. You all seem to be doing well at your job, which is wonderful to see.

One of the things I wanted to add to on the trend on DOs is, you know, when I'm looking at this I have no idea how many people are actually licensed, how many facilities are actually licensed. So if you could add that kind of information so we have a sense of, you know, how much action is being taken against what is our licence base, because it gives me a good idea, you know, of what is really going on out there, much more so than just this is the number of actions we have taken.

**MS HORNOF:** Monica Hornof, for the record. So that is a great suggestion and we will definitely implement that into future iterations.

Regarding trending of the decisions themselves, because I know those came up previously as

well, DO decisions is really dependent on the licence renewals and on how many licensees, which I take your point it's good to know who's licensed and how many licensees there are, so trending in that regard isn't necessarily a good show of how effectively the program is working. It can definitely be provided, but I'm not sure if it's of value to show how effective the program itself is. But I will ask one of my DOs, probably the Directorate of Nuclear Substance Regulation, if he has anything else to add to that.

**MR. MOSES:** Colin Moses, for the record.

We do actually look at trending and report on trending through our Regulatory Oversight Report. So just for your information that is a report that we compile on an annual basis. We have been doing it for the last eight years now. That report speaks to our overall regulatory oversight activities for the sector that we regulate in our directorate. It provides numbers of licensees and also provides our DO decision-making, the development. We also include information on the enforcement actions that were taken by staff in that reporting period. So we provide information on orders that were issued by inspectors, orders that were issued by designated officers as well as administrative monetary penalties that were issued, and we provide information on

significant events that occurred throughout the year of the reporting period. But the bulk of the report is actually on performance trending of the licensees that we regulate. So it provides normalized percentages for each sector that's regulated by a directorate, speaks to their performance, speaks to significant trends from previous years, and so that is a wealth of information.

If you are interested, we did just recently publish the 2016 report on our website and it was presented to the Commission last September and we do have a presentation scheduled in October. In the meantime, I'm sure we will have an opportunity to brief you on the activities that we regulate ahead of that meeting.

**MEMBER BERUBE:** Yes. I'm not concerned about whether the program is actually working or not, it's pretty clear it is. So the issue is I'm just looking at general behavioural trends within the actual licensees themselves and just the differential in that ratio tells me a lot about how people are actually receiving the program, how they are responding to the program, whether or not, you know, things are going to shift over time. That's all it's telling me, right?

**THE PRESIDENT:** Back to Dr. Demeter.

Ms Velshi...?

**MEMBER VELSHI:** No, thank you.

**THE PRESIDENT:** So the last exchange, particularly for the new Commissioners who have not yet seen some of the annual reports, I was surprised that you don't formally ask for -- not to come to us again in the future. So the question is given that a lot of the statistics are found annually in the RORs, what additional information is here that could be useful that you don't find anywhere else?

**MR. LEBLANC:** Well, there is information on some DO activities and those DOs don't have to file any RORs. For example, Security and Safeguards Directorate would not be covered by any of the reports. Also, this allows us to report back on DO activities and the programs generally and also allows us in a very aggregated manner to meet the reporting requirements of the Commission. Instead of my sending individually each of those DO activities that are covered by section 37 to the members, we saw more than 1,000 of them, it allows me to aggregate them into -- right. So that's why I suggested earlier that if we were to continue the program we put the emphasis on the program improvements and those areas that are not covered in RORs. So we would simply include by reference information that you would already find in the RORs, the Regulatory Oversight Reports, and then also report on improvements that have been made and feedback on the DO Forum, the

Community Forum that will take place.

So there are some gaps that are not covered in the RORs in terms of reporting on DO activities, and because the DOs work kind of in a parallel manner to the Commission, I think it's one good opportunity to provide information to the Members as to the huge amount of work that is being done by our very large DO community. The amount of work, when you see that we have more than 4,000 authorities, it shows that it's not only those 12 hearings that we are having in a particular period and those 10 meetings, it reflects back to all the activities that the DO activities are doing in terms of licensing and compliance. So it's a question of Members determining. We could do it secretarially, we could provide that report without having to present it in this forum. You would lose the ability to ask questions from the actual doers, the DOs that are doing the work and for them to be able to reflect on the year that just passed.

**THE PRESIDENT:** But what do you mean DSS doesn't have an ROR? I thought everybody was going to have an ROR, moving forward. So import and export and all that stuff. Because I thought that the ROR, every DO shop or every branch would have at least its own ROR where all the substance of the activities is described.

**MR. LEBLANC:** Yes.

**THE PRESIDENT:** So I am trying to understand. If there is a gap, it better be something useful that we don't see anywhere else. No?

**MR. LEBLANC:** I don't have an answer on this. I don't know if Kathleen or Peter are available in the room today, but certainly it's something that I think has already been brought to their attention before and we will be able to follow up with them.

**MS PIKE:** Hello. Claire Pike, for the record. I am the Director of the Regulatory Operations Coordination Division.

We are presently doing a review of all Regulatory Oversight Reports and one of the things that that review will encompass is making sure that we get those activities that are not yet captured in our regular ROR reporting schedule, that that will be addressed.

**THE PRESIDENT:** So that's good. So you should also consider whether such a report captures something new that we don't see anywhere else. So, you know, I found the report very useful, even though I have seen most of the stuff in there in every ROR. So the question is particularly we don't want to burden you, as Ms Penney said, with additional work if it's not going to be useful really. So I am looking forward to the report on the future of RORs.

Does anybody else want to raise any particular question?

Okay, thank you. Thank you very much.

So I guess I have to say something like this concludes the public meeting of the Commission. Thank you for your participation. Bonne fin de journée.

**MS McGEE:** If you have borrowed interpretation devices, please remember to return them at the reception and claim your identification card. Thank you.

--- Whereupon the meeting concluded at 4:56 p.m. /
La réunion s'est terminée à 16 h 56