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Salle des audiences publiques
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Ottawa (Ontario)

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Ottawa, Ontario / Ottawa (Ontario)

--- Upon commencing on Wednesday, December 14, 2016
at 8:34 a.m. / L'audience débute le mercredi
14 décembre 2016 à 8 h 34

Opening Remarks

MR. LEBLANC: Good morning. Bonjour à tous. Welcome to the public meeting of the Canadian Nuclear Safety Commission.

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

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

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

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 our website for a three-month period after the closure of the 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.

President Binder...?

THE PRESIDENT: Merci, Marc.

Good morning and welcome to the meeting of the Canadian Nuclear Safety Commission.

Welcome to all of you who are joining us via webcast and videoconference.

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

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

On my left are Dr. Sandy McEwan and Ms Rumina Velshi.

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

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

Please refer to the agenda published on

December 12, 2016, for the complete list of items to be presented today. Copies are available at reception.

CMD 16-M66.C

Approval of Agenda

THE PRESIDENT: With this information, I would now like to call for the adoption of the agenda. Do we have concurrence?

So the agenda CMD-M66.C is adopted.

CMD 16-M68

Status Report on Power Reactors

THE PRESIDENT: The first item on the agenda for today is the Status Report on Power Reactors, which is under CMD 16-M68.

We have some representatives from the power plants in the room, so welcome to all of you.

I will ask Mr. Frappier to proceed.

MR. FRAPPIER: Thank you, 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 Regulations.

I would point out that we also have

members of the licensees on the phone as well if there are any detailed questions.

With me today are our Power Reactor Program Division Directors, plus technical support, who are available to respond to questions on the status report that's presented in CMD 16-M68.

This document was finalized on December 9, 2016. The following are updates after the report was finalized.

First of all, Bruce Unit 1 is now at 8 percent full power, returning to service from a forced outage due to turbine trip.

Bruce Unit 2 is at 70 percent full power, returning to service after repairs to the injection valve and secondary seal of the primary heat transport pump were completed.

Update on Darlington Unit 2 refurbishment. This is the first time I think we are in front of you with the Darlington Unit 2 out for refurbishment. Forecast date for completion of the defuel campaign has been pulled ahead to January 9 from February 6, so they are a bit ahead of schedule there. And as of December 13, 354 of the 480 channels, that is 74 percent of the channels, have now been defuelled.

Also for Unit 2, CNSC received a report

about a critical injury December 1st. And ES Fox contractor employee suffered a broken leg while working in Unit 2. The Ministry of Labour and the CNSC were notified and the investigation is ongoing, but we could hear some more about that today if you want.

Pickering Unit 4. East fuelling machine repairs have now been completed and fuelling is now available. Unit 4 was at 92 percent of full power as of December 13 and we would expect that to continue climbing.

Pickering Unit 7. Unit 7 planned maintenance outage now has a projected completion date of late December 2016. I think in the status report we have it as mid-December 2016.

This concludes the Status Report on Power Reactors. CNSC staff and, as we mentioned, licensee employees are now available to answer any questions you may have.

THE PRESIDENT: Thank you. So let's start with Ms Velshi.

MEMBER VELSHI: Thank you, Mr. President.

I just wanted to let you know your status at the top says November, you want to change that to December.

About the Bruce A Unit 2 forced outage, tell me what the safety implications are of that SDS2

injection valve and the seal issues.

MR. LAFRENIÈRE: Ken Lafrenière for the record.

The injection valves are triplicated valves that basically inject the reactor poison during the shutdown, so an impairment to an injection valve has no safety implications. What it does is they are unable to perform their testing, so therefore they have to take the unit out of service to repair the valves and put it back in service. But there are no safety implications.

MEMBER VELSHI: So the SDS2 system is still available then or it's not?

MR. LAFRENIÈRE: The SDS2 system is completely available. Essentially to repair on a valve, they have to take a channel out of service and therefore --

MEMBER VELSHI: Thank you.

THE PRESIDENT: I'm sure that everybody knows what SDS is. Do you want to spell it out?

MR. LAFRENIÈRE: Yes, yes. The secondary shutdown system number 2.

THE PRESIDENT: Thank you.

MEMBER VELSHI: And I will ask one more question. For the critical injury at Darlington, can you just give us an update as to what happened, how, is the person back at work and are there any immediate corrective

actions that have been necessitated?

MR. MANLEY: This is Robin Manley from Ontario Power Generation, VP Nuclear Regulatory Affairs. I believe that we have Zar Khansaheb, Director of Ops and Maintenance, on the line.

MR. KHANSAHEB: It's Zar Khansaheb. I am the Director of Operations and Maintenance at Darlington.

Responding to the question regarding the ES Fox employee, the individual did suffer a broken leg as we were transporting an elevated work platform. The individual that was injured was a spotter and the driver of the elevated work platform did not see the spotter, lost contact, sight contact with him and ended up -- the individual ended up with an injury of a broken leg.

The Ministry of Labour did come to Darlington twice. They interviewed the ES Fox workers involved and they issued no orders to either OPG or ES Fox. And the individual is back at work with modified duties.

MEMBER VELSHI: And while your investigation or the Ministry of Labour's investigation is underway, have you had to implement any immediate corrective actions?

MR. KHANSAHEB: The corrective actions --

MEMBER VELSHI: Isn't it ironic that the spotter is the one that gets hit?

MR. KHANSAHEB: Yes, we understand that. This is around maintaining visual contact with everyone around him. Specifically, the driver should have made contact, sight contact with the individual that was spotting. So corrective actions are -- those individuals that were involved were fully qualified and corrective actions include stand-downs, rollouts, with the individuals across the site. And we took this at the fleet level as well, so this went across to Pickering Nuclear Station as well.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Dr. McEwan...?

MEMBER MCEWAN: Thank you, Mr. President.

So presumably for the Pickering, we will get a final -- for the Pickering accident, we will get a final report when all of the investigations are completed?

MR. FRAPPIER: Correct. We can update when it's all completed.

THE PRESIDENT: Ms Velshi...?

MEMBER VELSHI: I guess more for comment. On Pickering Unit 4, yet again, we are seeing fuelling machine problems resulting in a derating. So I just wanted to make that as a comment.

MR. FRAPPIER: Certainly, as I think your comment is implying, this is something that occurs

frequently and I'm not sure if OPG wants to have a comment on it from an operational perspective, but certainly from a safety perspective, they are taking appropriate actions with derating and the fuelling machine is available as needed from a safety perspective.

MR. MANLEY: Robin Manley for the record.

It's possible that Kamyar Dehdashtian will make a comment momentarily, but just to start off with, Mr. Frappier is correct, there is no safety issue here.

And, Commissioner, you are right that there are occasionally times when we have fuelling machine unavailability at the Pickering Station. We have had an extensive reliability improvement program for our fuelling machines across the site, which we have been working on. It doesn't meet our expectations fully and so work continues to improve the performance of the fuelling machine systems.

However, as I have spoken to the Commission previously, I believe it was probably last August, we have improved the overall reliability of the Pickering plant, and the overall impact of the fuelling machine reliability has decreased over the last few years. Like it has been less of a problem than it had been in the past and that's due to the focused attention of the leadership team on this particular issue.

Kamyar, I'm not sure if you have any additional specifics to add?

MR. DEHDASHTIAN: Good morning. This is Kamyar Dehdashtian, Manager of Regulatory Affairs at Pickering Nuclear, for the record. Thank you, Mr. Frappier and Mr. Manley.

All that was said is correct and the only thing I would add is that it was a minor fault with the fuelling machine that resulted in inconsistent clamping, and conservatively, reactor power was reduced per our operating procedures and our reactivity management plan. The fault was clear and the fuelling machine is back in service and we are raising power. And it was correctly stated that we are at 92 percent full power and raising power in the next couple of days.

MEMBER VELSHI: It was just a comment that Mr. Manley made that reliability of the fuelling machines has actually improved. Do you have numbers on that? I seem to recollect that at least in the last few months we have seen this at least once, if not more often, that it's because of unavailability of fuelling machines that there has been derating.

MR. MANLEY: Commissioner, I don't have the numbers of the reliability with me at this time and I don't have the trend over the last couple of months, but

what I was referring to was that at a previous Commission meeting we had reported that the overall trend up to that time had been an improving trend. So the specifics of the last couple of months I don't have with me.

MEMBER VELSHI: Yes, I think it would be interesting if you can send us the last six months, how that trend is, please.

MR. MANLEY: We will provide that information to the Regulatory Program Director. Thank you.

THE PRESIDENT: Dr. McEwan, any other...? Anything else, Ms Velshi?

So I have -- first of all, in Darlington, I noticed that you are forecasting the unit to defuel ahead of schedule. Every time there is something in the nuclear business ahead of schedule, I think it should be noted. But my question is: Is there any issue with the capacity in the pool for the used fuel?

MR. KHANSAHEB: This is Zar Khansaheb, Director of Ops and Maintenance, Darlington.

That has all been planned in terms of defuelling all 480 channels, all 6240 bundles. Our design allows for a full core defuel in terms of the use of the two irradiated fuel bays. So there is enough room for the fuel. We also have a dry used fuel storage capability which we are using to make additional room for that fuel as

well.

THE PRESIDENT: So that's my question. Do you have to take some of the old fuel out into the dry storage or do you have enough capacity right now in the pool to accommodate at least this particular unit?

MR. KHANSAHEB: Yes. Each year we have a set schedule for removing fuel from the irradiated fuel bays, that's part of our dry used fuel storage. We have sufficient room right now, even if we did not do that, to maintain a full core defuel.

THE PRESIDENT: Okay, thank you.

My last question is, remind us again, Mr. Frappier, what we decided, not to show any more Gentilly-2 in this report or at least remind us where it is.

MR. FRAPPIER: Gerry Frappier for the record.

Good point. The Power Reactor Status Report and the Annual Report on Power Reactors will no longer include the Gentilly-2 nuclear power plant since it has been closed down now for a long time, and that reporting, we obviously are still doing regulatory oversight on it and we have a licence with them, but that report will now be part of the waste annual report and the waste reporting.

THE PRESIDENT: You may want to note this

just to remind us of that, just a one-liner saying it's somewhere else.

MR. FRAPPIER: Okay, we will put that in here.

THE PRESIDENT: Thank you.

Anything else? Okay, thank you.

CMD 16-M64

Written submission from CNSC staff

THE PRESIDENT: The next item on the agenda is an information item to provide us with an update on the fitness for service safety and control area for the Chalk River Laboratories, as outlined in CMD 16-M64. This was a request from the Commission made during the April 6, 2016 public hearing.

I understand that we have a representative available for questions from the Canadian Nuclear Laboratories on the phone, CNL, Mr. Mantifel. You are here. Good surprise. Welcome. Thank you.

MR. COX: Mr. Mantifel is on the phone and for the record I'm David Cox for CNL.

THE PRESIDENT: Okay. So, Mr. Mantifel, can you hear us?

MR. MANTIFEL: Yes. Good morning. It's

Neil Mantifel for the record.

THE PRESIDENT: Mantifel, okay. Thank you.

Ms Tadros, the floor is yours.

MS TADROS: Thank you, sir, and good morning.

Mr. President, Members of the Commission, for the record, my name is Haidy Tadros, I am the Director General of the Directorate of Nuclear Cycle and Facilities Regulation.

With me today are Mr. Jean LeClair, Director of the Nuclear Laboratories Research Reactors Division, and Mr. Nhan Tran, Senior Project Officer in the same Division.

We are here to present the fifth status update on the fitness for service safety and control area of the National research universal reactor, NRU, and Canadian Nuclear Laboratories' progress towards a satisfactory rating.

Since the last update in November of 2016, CNSC staff have confirmed that CNL has achieved a satisfactory rating related to the following criteria: establishment of an equipment reliability program, implementation of a system health program, suitability of the condition of fluid boundary components and civil

structures, particularly the NRU reactor vessel, and reduce the overdue preventive maintenance job to negligible levels for safety-related systems.

The remaining activities, as per our update, are to be carried out by CNL, related to the installation of hardware and production of documentation for equipment fitness for service, equipment performance and maintenance.

We are available to take any questions you have at this time.

THE PRESIDENT: Thank you.

CNL, would you like to make any comment?

MR. COX: David Cox for the record, VP Operations, Chief Nuclear Officer for Canadian Nuclear Laboratories.

I'm pleased to be able to speak to this positive improvement in fitness for service of the NRU reactor. I concur with the observations shared by CNSC staff and note that of the remaining items, they are on track or in fact ahead of schedule. The completion of preventive maintenance technical basis documentation we expect to be completed this month, which is several months ahead of the schedule that is committed in the documentation that we hold here today.

THE PRESIDENT: Thank you.

So, Dr. McEwan, do you want to start the questions?

MEMBER MCEWAN: Thank you, Mr. President.

So I guess two congratulations: one for staff on the reports and the way the reports have evolved, they are really helpful, really well done, thank you; and CNL for catching up I guess.

A very simple question. Has the cessation of routine moly production made any changes to the schedule, has it made any complexities, made it simpler to work your way through it?

MR. COX: David Cox for the record.

I would say that yes, the cessation of moly isotope production at the end of October this year has afforded us some additional flexibility in maintenance completion and flexibility in terms of operating the reactor.

MEMBER MCEWAN: And I guess a follow-on. There are no concerns related to the vessel over the projected lifetime of operations of the reactor?

MR. COX: David Cox for the record.

I am very pleased to say that we have completed fully the sixth annual cycle of inspections and confirm fully the fitness for service adequacy of the vessel.

MR. LeCLAIR: Jean LeClair for the record.

Perhaps I could ask Mr. Blair Carroll, who is one of our technical specialists that we have here who has been involved in reviewing this over the last few years, if perhaps he can provide some further information for the Commission.

MR. CARROLL: For the record, my name is Blair Carroll, Specialist with Operational Engineering Assessment Division at the CNSC.

Yes, as has been mentioned, really this year was the completion of the final inspections that were left outstanding of certain regions of the NRU vessel, and it showed that in the regions that were inspected, there has been negligible corrosion since the time of restart of the vessel. So at this point, the conclusion of the fitness for service assessment is the same now as it was in 2010, there has been no change. In the meantime, the vessel inspection program will continue and the fitness for service report that was just received from NRU has shown that the vessel is fit to operate safely for the next year.

THE PRESIDENT: Ms Velshi...?

MEMBER VELSHI: Thank you.

I too echo Dr. McEwan's congratulations to both parties.

A very quick question. On the first page

at the bottom, the highlight where it says, "CNL has adjusted the target completion date for this action" -- this is c. Equipment Fitness for Service 1 -- it wasn't clear to me what was the date and what has it been changed to.

MR. LeCLAIR: Jean LeClair for the record.

That's a correction I guess we can say in our part. The target date had been changed in the last report. We should say that they are on target with the date that was previously reported in November. So it was revised in November and it's still that revised date.

MEMBER VELSHI: December date?

MR. LeCLAIR: Yes.

MEMBER VELSHI: Thank you.

MR. LeCLAIR: Thank you.

THE PRESIDENT: Any other questions?

Okay, thank you. Thank you very much.

CMD 16-M50/16-M50.A

Oral presentation by CNSC staff

THE PRESIDENT: The next item on the agenda is an information item on the 2015 Regulatory Oversight Report for Waste Management, Storage and Processing in Canada, as outlined in CMDs 16-M50 and

16-M50.A.

The public was invited to comment in writing. November 14, 2016, was the deadline set for filing by intervenors.

I understand we have a representative from licensees in attendance available for questioning -- available through teleconference. So let's check the teleconference.

Who is on? Anybody joining us via teleconference?

MR. GIERSZEWSKI: Yes, Paul Gierszewski from Nuclear Waste Management Organization.

THE PRESIDENT: Okay, thank you. Anybody else?

MR. ANDERSON: Kent Anderson from UniTech Services Group.

MR. RYDER: Good morning. Tim Ryder from EnergySolutions Canada.

THE PRESIDENT: Thank you.

MR. SHARPE: Hello. David Sharpe from Mississauga Metals & Alloys.

MR. BOUDENS: Gerry Boudens, Director Of Nuclear Facilities with CANDU Energy Incorporated.

THE PRESIDENT: Okay, thank you. Thank you very much.

So the way we are going to do this is the presentation will be separated into three parts. Part 1 addresses Class I waste management and storage facilities, including OPG's Darlington, Pickering and Western Waste Management facilities and written interventions. After a break, we will resume with the two other parts of the report. We will keep you updated on this complicated process here.

So I will now turn to CNSC staff for the presentation as outlined in CMD 16-M50 and M50A.

Ms Tadros, the floor is yours.

MS TADORS: Thank you, sir. Haidy Tadros, for the record.

With me today for this item is Ms Karine Glenn, Director of the Waste and Decommissioning Division, and Ms Shona Thompson and Julie Mecke, Project Officers working in the same division.

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

We are here to present the Commission Member Document 16-M50A, the Regulatory Oversight Report for Waste Management, Storage and Processing Canada for 2015.

This slide summarizes, for 2015, the suite of annual regulatory oversight reports presented to the Commission. The next regulatory oversight report for waste management, storage and processing in Canada is planned for late 2017.

This regulatory oversight report is structured into three sections highlighting Class 1 waste management and storage facilities, waste processing installations and a general status update on the waste management initiatives currently ongoing.

In this report, certain waste facilities installation such as the waste management facility at the Point Lepreau nuclear generation station are not included. Nevertheless, there are still appropriate reporting mechanisms in place at the CNSC for these sites to be reported on the tables shown in this slide.

This is the first annual report on waste facilities and installations presented to the Commission, and it covers the 2015 calendar year. The public has been invited to comment on this report.

The report includes CNSC's regulatory activities, licensing activities, major developments and significant events, and the safety and control area performance rating for each waste facility and installation found in this report.

This report focuses on three safety and control areas of radiation protection, conventional health and safety and environmental protection which provide the key performance indicators for these facilities.

The focus of these three SCAs, we focus on these three SCAs because there are -- there was ever an issue that could affect the health and safety of the environment, it would most likely manifest itself in the evaluation of these three SCAs even if it was not linked directly with one of them.

So on this slide, before continuing, I'd like to just draw your attention to a few errors that was noted in the CMD after the submission deadline has passed.

So on pages 25, 34 and 42 of staff CMD 16-M50, the CMD states that if the action level of one millisievert is reached, they trigger OPG staff to establish the cause for reaching the action level.

The actual action level is one millisievert of above the planned dose per shift, not one millisievert. We'll answer any questions you have as we go forward on the particular action levels.

In Table 2-9, the licence limits at Darlington waste management facility and stormwater samples for gross gamma is 0.037 Becquerel per litre, and the licence limit for tritium is 1.85 kilo Becquerel per litre.

The CMD erroneously states that the licence limits are less than each of these respective values. The actual value is that actual value.

In Table 3-11, the correct value for cobalt-60 in 2013 for the liquid effluent monitoring results at CANDU Energy is 0.0314 giga Becquerels, not 0.0231 giga Becquerels.

And finally, in Table 3-3, the performance ratings for Mississauga Metals and Alloys Inc. in the emergency management and fire protection, waste management, security, safety analysis and packaging and transport Safety and Control Area are all rated satisfactory as opposed to the non-applicable, as is currently written in the CMD.

These changes do not impact CNSC staff's overall conclusions on the performance of these facilities discussed in the report. Any further errors identified before publication will be corrected, and we do apologize for any confusion this has occurred.

So on this slide, the CNSC offered participant funding to assist members of the public, indigenous groups and other stakeholders in reviewing this report and submitting written comments to the Commission.

The CNSC awarded \$4,300 to one funding applicant, Northwatch.

The CNSC received two interventions, one from the Canadian Nuclear Workers Council, and the other from Northwatch. The theme of these interventions include overall support of CNSC activities at the waste management facilities, gaps that were identified in fuel cycle regulatory reporting, and lack of CNSC information on the initiative for the long-term management of nuclear fuel waste.

This particular initiative will be discussed later on in our presentation, and we are available to take questions on these questions from the intervenors.

In 2015, all facilities had a satisfactory or better performance in all applicable Safety and Control Areas. All radiation doses to nuclear energy workers were below the regulatory limit of 50 millisieverts per year. All radiation doses to the public were below the regulatory limit of one millisievert per year, and licensees' environmental protection programs were effective at keeping environmental releases ALARA, and there were not lost time injuries that had occurred.

So this next section summarizes some general concepts around the CNSC's risk-informed regulatory oversight activities of the nuclear -- of this particular nuclear industry.

Broadly speaking, CNSC staff performed regulatory oversight activities through licensing, verification, enforcement and reporting. These activities enabled the CNSC to provide assurance to Canadians of the continuing compliance and safety performance of licensees.

CNSC staff verify compliance mainly through on-site inspections and desktop review. We also review licensees' operational activities and licensee documentation.

In some instances, CNSC may conduct independent monitoring and testing. In addition, licensees are required to report to the CNSC routine performance data and unusual occurrences.

CNSC staff assess the level of risk associated with each facility across all applicable Safety and Control Areas. The level of risk is reflected in CNSC staff's compliance plan for each facility, which includes the number and scope of inspections at the facility, the number of document reviews and any independent monitoring and testing activities that need to be conducted.

Areas more significant to safety such as worker radiation dose control and effluent and emission monitoring are the subject of more frequent and in-depth verification. Compliance plans are continuously reviewed to take into consideration unusual occurrences, licensees'

performance and lessons learned.

CNSC staff used a Safety and Control Area framework in evaluating each licensee's safety performance. Safety and Control Area framework, as we know, includes 14 Safety and Control Areas which are further sub-divided into specific areas that define key criteria and components.

CNSC staff used four ratings to assess a licensee's performance, which include fully satisfactory, satisfactory, below expectation and unacceptable.

A licensee's performance is measured by the ability to minimize all risk posed by the licensed activity and to comply with all regulatory requirements. Performance in each Safety and Control Area is continually assessed by CNSC staff using various inputs from regulatory oversight activities.

It is important to note that each Safety and Control Area is evaluated individually and that every facility has different inputs into the annual rating for a specific Safety and Control Area.

For example, a rating may not have an input from inspections if no inspections were conducted in that particular Safety and Control Area during the year. However, CNSC staff evaluate and rate other information that this licensee provides in their annual compliance reports.

The rating for a Safety and Control Area is not usually derived from just one indicator but, rather, from several specific areas and metrics that define key components. The SCA rating is assigned by CNSC staff after considering licensee compliance performance throughout the year.

Across the fuel cycle facilities, there are facility assessment and compliance teams, FAC teams. These are facility-specific groups of licensing, compliance and technical staff. The FAC teams use expert opinion to rate an SCA and represent a holistic summary of that specific Safety and Control Area.

CNSC staff rate the performance per SCA based on multiple inputs, as mentioned, including defined metrics such as lost time injury or dose to workers, program implementation at the site, events and licensee actions in response to events, occurrences and repeat occurrences of non-compliance, and the evaluation of a licensee's awareness and training around safety culture.

As outlined in CNSC staff's report, all waste facilities and installations have satisfactory or fully satisfactory ratings. These next two slides explain these two ratings and provide an example.

If a waste facility or installation receives a rating of fully satisfactory, this means

compliance within the SCA or specific area exceeds requirements and CNSC's expectations. Overall, compliance is stable or improving, and any problems or issues that arise are promptly addressed.

In contrast, a rating of satisfactory means that compliance within the SCA or the specific area meets requirements. Any deviations in overall compliance are minor, and pose a low risk to the overall achievement of regulatory objectives.

Should a program -- should a problem arise, appropriate improvements are planned.

This particular example, the Darlington waste management facility, obtained a satisfactory rating in the security SCA. The Pickering and Western Waste Management facilities both obtained fully satisfactory rating in the same SCA. All three of these facilities fall under a common corporate security program.

A security-related reportable event occurred at the Darlington waste management facility in 2015. OPG's initial response to the event was not adequate.

This led to the downgrade from fully satisfactory to satisfactory in the performance rating for this SCA at the Darlington waste management facility. Ultimately, corrective actions put in place by the

licensees were satisfactory to the CNSC staff.

The next two slides help explain regulatory limits and action levels.

Regulatory dose limits are established to limit the dose received to workers and members of the public. Controlled regulatory release limits are established to limit the quantity of nuclear and hazardous substances released into the environment and are based on the regulatory dose limit for the public.

Action levels are facility-specific limits and act as an early indication of potential loss of control or part of a licensee's environmental radiation protection program. Action levels are set by licensees based on operational performance and alert licensee before regulatory limits are reached.

An action level exceedance requires a licensee to notify the CNSC, perform an immediate investigation and carry out subsequent corrective actions and preventative maintenance to restore the effectiveness of the program.

This graph represents the relationship between the regulatory limit, licensee's action level and administrative level. The regulatory limit is a parameter that, if exceeded, warrants enforcement action. It is shown as a red line in the graph, and licensees must,

during normal operation, remain at all times -- remain below the regulatory limit.

Action levels and administrative levels are set by licensees. Exceedance of an action level shown in the yellow line is a parameter that may indicate a potential problem of part of a licensee's program. It is important to recognize that an exceedance of an action level does not imply a potential risk to the people or the environment, but identifies that the operating parameter may be outside of the norm based on the facility design.

The parameter within the range of normal operation is the administrative level. This is shown as the green region on the graph.

Exceedance of an administrative level indicates that an operating parameter is at the upper range of normal operations. Such as event -- such an event triggers an internal review by the licensee.

Licensees are responsible for identifying the parameters of their program that represent timely indicators of potential problems. For this reason, action levels are licensee specific and may change over time, depending on operational conditions.

In 2015, CNSC staff conducted independent environmental monitoring in the public areas around the Darlington nuclear generating station, the Pickering

nuclear generating station, and Bruce nuclear generating station to confirm that the public and the environment around these sites are safe.

These are the host sites for the three Class 1 waste management and storage facilities that you'll hear about.

The 2015 independent environmental monitoring program results indicate that the public and the environment in the vicinity of these facilities are protected and safe, and that there are no adverse environmental and health effects as a result of site operations.

These results are consistent with the results submitted by the licensees, demonstrating that the licensees' environmental protection programs protect the health and safety of people and the environment.

Independent environmental monitoring program results are provided on the CNSC web site.

So this slide shows a map indicating where the waste sites which will be discussed in this report are located. All sites are in Ontario, with the exception of University of Alberta, which is in Edmonton, Alberta.

I will now pass the presentation over to Ms. Shona Thompson to walk us through the Class 1 waste management facilities.

MS THOMPSON: Good morning. For the record, my name is Shona Thompson, and I'm the Project Officer responsible for the Darlington and Pickering waste management facilities.

I will now present CNSC staff's assessment of the performance of the Class 1 waste management and storage facilities.

There are three Class 1 waste management and storage facilities in Canada. All are located within the province of Ontario.

Ontario Power Generation, or OPG, is the owner and operator of all three facilities, which include the Darlington waste management facility, the Pickering waste management facility, and the Western Waste Management Facility.

This table presents the licensing and compliance effort from CNSC staff in 2015. In 2015, CNSC staff performed eight compliance inspections at the OPG waste management facilities. All findings resulting from these inspections were provided to the licensee in detailed inspection reports.

All enforcement actions arising from the findings were recorded in the CNSC regulatory information bank to ensure all actions were tracked to completion.

In 2015, 489 person-days were dedicated to

compliance activities. CNSC staff monitored these facilities through inspections and desktop reviews. This enables the CNSC to provide assurance to Canadians that the continuing compliance and safety performance of the licensee.

In 2015, 68 person-days were dedicated to licensing activities. There were no licence amendments for any of these facilities. However, considerable effort was spent on modernizing the Licence Condition Handbook for the Darlington waste management facility.

For 2015, CNSC staff rated each of the 14 Safety and Control Areas based on the results and observations from inspections and desktop reviews. For 2015, all of the waste management facilities received a satisfactory rating in all Safety and Control Areas except conventional health and safety, operating performance and safety analysis, where these facilities received a fully satisfactory rating.

The Pickering waste management facility and the Western Waste Management Facility also received a fully satisfactory rating for the security Safety and Control Area in 2015.

Overall, these ratings indicate consistent management of safety systems at these facilities.

The table and graph on this slide show the

average and maximum effective doses to nuclear energy workers in 2015. The red line on this graph displays the regulatory annual effective dose that a nuclear energy worker can receive. As shown, the average and maximum doses received by an individual worker at each of the facilities was well below the annual dose limit of 50 millisieverts.

This table shows the action level for nuclear energy workers at OPG's waste management facilities. For these facilities, an action level is reached when a person receives an external dose in a shift greater than or equal to one millisievert above the planned dose.

The planned dose is dependent on the worker's job function and duties for the day. For example, a person who wells a dry storage container will have a higher dose assigned to them than an office worker.

In 2015, there were no exceedances of the action level or regulatory limit.

The table on this slide shows the annual estimated dose to the public for 2015. Doses to the public are attributed to environmental releases. A separate action level applies to different contributing factors. These factors include releases such as airborne and liquid releases.

The regulatory annual effective dose limit for a member of the public is one millisievert. As shown, the average annual dose received by a member of the public at each of the waste management facilities was well below the annual limit of one millisievert.

The environmental protection SCA encompasses the environmental management systems, effluent and emissions control, and assessment and monitoring. As required by their licences, each waste management facility implemented and maintained an environmental protection program. This may include monitoring airborne releases, liquid effluent, radiation and/or groundwater, performing weekly samples and providing quarterly operational reports to the CNSC on various environmental activities which are reviewed by CNSC staff.

Overall, the performance ratings for the environmental protection Safety and Control Area indicate that all waste management facilities have met licensing requirements and are consistent with the performance ratings presented in CNSC staff's previous consolidated interim status reports on OPG's waste management facilities last presented to the Commission in June of 2015.

OPG has established and implemented a corporate-wide environmental management system that applies to all three waste management facilities. OPG's

corporate-wide environmental management system is registered under the International Standards Organization 14001 Standard. As an outcome of registration, the environmental management system is subject to periodic independent third-party audits and reviews in an effort to verify its sufficiency and also identify potential improvements.

Each waste management facility has derived release limits for airborne and liquid releases. The CNSC requires OPG to provide airborne and liquid release monitoring results and quarterly operational reports submitted to CNSC.

CNSC staff reviewed the information submitted for 2015 and conclude that OPG's effluent monitoring programs confirmed that airborne and waterborne releases of hazardous and radiological substances remained below the applicable regulatory limits.

The CNSC also requires OPG to report its radiological monitoring results on a quarterly basis to CNSC staff. Radiological monitoring activities include the placement of environmental dosimeters on perimeter fencing to ensure doses to non-nuclear energy workers do not exceed the dose limits for a member of the public. CNSC staff reviewed OPG's environmental monitoring programs for each of the waste management facilities and conclude that the

releases of both radiological and hazardous substances to the environment pose no risk to the public or the environment. There were no exceedances of licence limits for any waste management facility in 2015.

A lost-time injury is an injury that takes place at work and results in the worker being unable to return to work and carry out their duties for a period of time. The number of lost-time injuries that occur per year are a key performance measure. As shown in this slide, there were no lost-time injuries in 2015 at the OPG waste management facilities. CNSC staff conclude that waste management facilities have been implementing their conventional health and safety programs fully satisfactorily during 2015 and that their programs were effective in protecting the health and safety of persons working in the facilities.

The next sections will cover each of the waste management facilities in detail, starting with the Darlington Waste Management Facility.

The Darlington Waste Management Facility, or DWMF, is located at the site of the Darlington Nuclear Generating Station, or DNGS, on the north shore of Lake Ontario in the Municipality of Clarington, Ontario. The DWMF stores only high-level radioactive waste. Dry storage containers, or DSCs, containing used nuclear fuel from the

DNGS are processed and stored here.

The DWMF is contained within its own protected area with the site boundary of the DNGS. The DWMF consists of an amenities building, one DSC processing building, and two DSC storage buildings. The transfer of loaded DSCs from the DNGS to this waste management facility is conducted on OPG property with a security escort.

The DWMF has the capacity to store 983 DSCs in both storage buildings combined. The licence for the DWMF authorizes the construction of two additional storage buildings, which would allow for an additional storage capacity of 1,000 DSCs. The licence for the DWMF also authorizes the construction of one intermediate-level waste storage building, the Retube Waste Storage Building.

In November 2014, CNSC staff received advanced notification of OPG's intent to construct this building. Prior to the commencement of construction activities, OPG was required to submit an environmental management plan, a construction verification plan, and project design requirements. These documents were included in OPG's November 2014 submission. Following a review of OPG's submission in February 2015, CNSC staff, as delegated by the Commission, accepted these documents and construction of the Retube Waste Storage Building proceeded. CNSC staff verified that this activity poses no

added risk to the public or the environment.

The current licence is valid until April 2023.

The table on this slide shows the licence limit, action level, and actual emissions of particulate and air emissions at the DWMF. The DWMF falls under the derived release limits for the DNGS. The licence limits are based on the 1 millisievert regulatory dose that a member of the public can receive in a year. The actual emissions from DWMF are significantly lower than the licence limit and action level.

Next, I will discuss the Pickering Waste Management Facility. The Pickering Waste Management Facility, or PWMF, is located at the site of the Pickering Nuclear Generating Station, or PNGS, on the north shore of Lake Ontario in Pickering, Ontario.

The PWMF stores high-level radioactive waste, as well as intermediate-level radioactive waste from the refurbishment of the Pickering A Nuclear Generating Station and 34 above-ground dry storage modules located at the Retube Component Storage Area. The Retube Component Storage Area is close to the receipt of any new intermediate-level waste. DSCs containing used nuclear fuel solely from the PNGS are processed and stored at this facility. The transfer of loaded DSCs from the PNGS to the

PWMF is conducted on OPG property with a security escort.

The PWMF has the capacity to store 1,154 DSCs in three storage buildings, and also has the potential for a further storage capacity of an addition 500 DSCs by the construction of an additional storage building. This construction is authorized by the waste facility operating licence for the PWMF.

There have been no major changes to this facility or its operation in 2015. The current licence is valid until March 2018. OPG has applied for a licence renewal and has informed CNSC staff of their plans for additional construction, including a new processing building to replace the current processing building. This construction also encompasses two additional storage buildings. The Commission hearing is currently scheduled to take place in April 2017.

The table on this slide shows the licence limit, action level, and actual emissions of particulate in air emissions at the PWMF. The PWMF falls under the derived release limits for the Pickering B Nuclear Generating Station. The licence limits are based on the 1 millisievert regulatory dose that a member of the public can receive in a year. The actual emissions from this facility are significantly lower than the licence limit and action level.

Next I will discuss the Western Waste Management Facility. The Western Waste Management Facility, or WWMF, is located at the site of the Bruce Nuclear Generating Station, or BNGS, on the east shore of Lake Huron in the Municipality of Kincardine, Ontario.

The WWMF includes both a Low and Intermediate Level Waste Storage Facility and a Used Fuel Dry Storage Facility. The Low and Intermediate Level Waste Storage Facility receives low-level radioactive waste from the Darlington, Pickering, and Bruce Nuclear Generating Stations. The waste may be stored as-is or processed to reduce its volume through either incineration or compaction.

The Used Fuel Dry Storage Facility is contained within its own protected area, separate from the protected area of the BNGS, but within its site boundary, and consists of one DSC processing building and four DSC storage buildings. The Used Fuel Dry Storage Facility has the capacity to store 2,000 DSCs. The transfer of loaded DSCs from the BNGS to the WWMF is conducted on the Bruce Power site with a security escort.

The licence for the WWMF authorizes the construction of an additional nine storage buildings for low- and intermediate-level radioactive waste, 128 in-ground storage containers for intermediate-level

radioactive waste, and two DSC storage buildings.

There have been no major changes to this facility or its operation in 2015. The current licence is valid until May 2017. OPG has applied for a renewal, which includes a proposal for an expansion of the facility. The Commission hearing is scheduled to take place in April 2017.

The table on this slide shows the licence limits, action levels, and actual emissions as measured in various locations at the WWMF. This includes measuring tritium, carbon-14, particulate, and iodine-131 in air emissions, as well as tritium and gross beta in liquid effluent.

The WWMF has its own facility-specific derived release limits for airborne and liquid releases. The licence limits are based on the 1 millisievert regulatory dose that a member of the public can receive in a year. Liquid effluent discharged from the site include both subsurface drainage and stormwater. Waterborne effluent leaving the facility is collected at various sample stations located on site.

Weekly samples are taken from each sample station and analyzed for tritium and gross beta activity. Results of the individual sample stations are combined and reported to the CNSC as a total emission from the facility.

Results of the radiological effluent monitoring program are provided to the CNSC in quarterly operational reports. The actual releases from the facility are significantly lower than the licence limit and action level for every type of release. There were no exceedances of any of the action levels at this facility in 2015.

As part of OPG's environmental monitoring program, liquid releases are monitored at 18 wells which were consistently below the derived release limits. One well, water sampling hole 231, has indicated elevated tritium concentration since the late 1990s. In 2010, OPG investigated the issue and identified water vapour from the waste in the low-level storage buildings as the cause of the anomaly. After the implementation of corrective measures, results since 2011 have indicated a declining trend at this monitoring well. CNSC staff continue to review the results of this well in addition to the other monitoring results to ensure the safety of WWMF's operations.

The concentration of tritium levels in water sampling hole 231 peaked in 1990 at 80,000 becquerels per litre. OPG implemented corrective actions and results since 2011 have indicated a declining trend. In 2011, the tritium level at water sampling hole 231 dropped to 75,000 becquerels per litre. Since then, it has been decreasing

and in 2015 the tritium level was at 25,000 becquerels per litre. Groundwater at this site is not used for human consumption; therefore, the elevated levels of tritium at WWMF's water sampling hole 231 do not pose an unacceptable risk to humans.

Additionally, OPG submitted an environmental risk assessment and predictive effects assessment earlier in 2016 for this facility, taking into consideration all contaminant releases, including tritium from groundwater. CNSC staff have reviewed this assessment and concluded that tritium at water sampling hole 231 and elsewhere around the site are at acceptable levels.

To summarize, in 2015, at the Class 1 waste management and storage facilities, all facilities have satisfactory or better performance in all safety and control areas. All radiation doses to nuclear energy workers were below the regulatory limit. All radiation doses to members of the public were below the regulatory limit. The licensee's environmental protection programs were effective at keeping environmental releases ALARA, and no lost-time injuries occurred.

CNSC staff are satisfied that there are waste management and storage facilities in Canada.

This concludes the update on the Class 1 waste management and storage facilities. We will now break

in our presentation to address any questions the Commission may have on the Class 1 waste management and storage facilities.

THE PRESIDENT: Okay. Before we get into some of the questions, I'm sure that our licensee may want to share some information with us.

MS MORTON: Hello. For the record my name is Lise Morton, vice-president of Nuclear Waste Management with Ontario Power Generation, and I'm pleased to be here today.

OPG has worked hard to continuously improve performance of our nuclear waste management facilities. We're pleased to see that recognized in CNSC staff's report. OPG is especially proud of its safety record, and we focus on safety every day on every job.

The Pickering Waste Management Facility in particular has never had a lost-time accident since the beginning of its operation in 1996, and we're very proud of this. Doses to the public and to workers from the operation of these facilities remains well below legal limits. OPG continues to work to reduce the amount of radioactive waste being generated through various means, including improved segregation at source, resulting in lower volumes of low-level waste, and through our sorting and segregation at the Western Waste Management Facility to

reduce volumes of radioactive waste currently stored and reduce our environmental footprint.

Continuous improvement is an important facet of our overall program, and we strive to apply learning behaviours on a daily basis.

I thank you for the opportunity to speak today, and I welcome any questions the Commission may have.

THE PRESIDENT: Thank you.

So as per usual, we start with the interventions that we received. And I think the first one is -- the first submission is a written intervention by the Canadian Nuclear Workers' Council, as outlined in CMD 16-50.1.

CMD 16-M50.1

Written submission by

Canadian Nuclear Workers' Council

THE PRESIDENT: So any particular question? Ms Velshi, Dr. McEwan?

MEMBER VELSHI: No question. It's just good to get confirmation from the union that the staff's report reflects what their assessment is as well.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So this is a question

related to the third paragraph. "Unfortunately, due to a glitch, the union received the reports only a few days ago." Whose glitch? And could we have improved our communications with them?

MS GLENN: Karine Glenn for the record. I'm the director of the Wastes and Decommissioning Division.

The notice of hearing was posted well in advance of the meeting; a participant funding announcement was also done well in advance of the meeting. I'm not a hundred per cent certain as to what happened with the union not receiving the document, whether or not they -- we're not aware that they had requested it; however, as is the case, the CMDs are always available upon request, and that information is posted on the CNSC website.

MR. LEBLANC: And if I can add -- I have no idea either -- I'm Marc Leblanc from Secretariat -- what was the glitch that is referred. The Canadian Nuclear Workers' Council is one of our subscribers. They get all the information. They got the notice that stated when, where the document was, and they are frequent participants in Commission proceedings, so it may have been that the glitch was just that the document was not received or that they misplaced it. We have no idea. But it's not a normal occurrence with them.

MEMBER MCEWAN: So maybe you could just follow up and make sure that they're not too unhappy or that we didn't --

THE PRESIDENT: Okay, thank you. Anything else?

CMD 16-M50.2

Written submission from Northwatch

THE PRESIDENT: Okay, so I'd like to now to move to the next submission, which is a written intervention by Northwatch, as outlined in CMD 16-50.2. I'd like to remind -- I think you know, Commissioners, that they made comments on Part 1 or Part 3. So we're now talking only about Part 1.

So floor is open. Who wants to start?
Ms Velshi.

MEMBER VELSHI: Thank you. Well, why don't we go to the first recommendation from Northwatch on page 2. It's a question for staff. Recommendation about oversight reports being made available, and particularly the draft reports during the public comment period. And then the second one is around the website, but we'll get to that later. But if you can just talk about the availability of the regulatory oversight reports and your

thoughts about the draft report being available on the website as opposed to by request.

MS GLENN: Karine Glenn for the record. As is the practice for all of the proceedings with the Commission, CMDs are available from the Secretariat upon request once they are published. The regulatory oversight reports are draft at this point in time, and they're only available in English until we finalize the editing after the Commission proceedings, at which place [sic] they will translated, edited, and published on the CNSC website and will be available in both official languages at that time.

MEMBER VELSHI: So if you put yourself in Northwatch's shoes as they're trying to review this report and they need the nuclear power plant regulatory oversight report, because some of the waste facilities are covered in there, how would you help them access that more readily, since they're not available on the website as yet because they haven't been finalized -- or maybe it's been finalized, I don't know.

MS GLENN: Karine Glenn for the record. Northwatch is a frequent intervenor, and as is the procedure for all of our CMDs, they -- it's just a question of contacting the Secretariat and that CMD is provided to them either electronically or a paper copy may be sent to them as well. If they are a subscriber to the CNSC info

account, they would receive that information as well. The CMD is available through that venue.

MR. LEBLANC: And if I may just complete, Karine is totally right. The information is available immediately upon request. We cannot publish information that has not yet been translated, so in that context we have the English version. If someone was to ask for a version in French, we would accelerate the translation, but those are substantive documents and in that context that makes it a bit of a challenge for us. But we do provide the information, usually within a month prior to their intervention being requested. So that should provide enough time. For more substantive cases now we're trying to provide a 45-day window instead of 30 to allow them a bit more time to process the information, but certainly at the moment we're really endeavouring to provide information immediately upon request.

MEMBER VELSHI: Thank you. And so the nuclear power plant ROR, is that available on the website or has that not yet been finalized and translated?

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

There's a couple things I would like to mention in addition to what Mr. Leblanc has mentioned and Mme Glenn mentioned. The ROR, as they come before you,

they're not the final version. So we take your comments back, your direction with respect to any modifications, staff will make the amendments, and then we will modify them. With respect to the ROR of the nuclear power plants, the process is a little bit different from -- for historical reasons and allocation of resources to do it. But again, every ROR we go through before the Commission is in a draft form, and then it gets published based on the requirements, as it was mentioned, with respect to the availability of the information in French and in English.

MEMBER VELSHI: No, I understand that. I just wondered how much of a delay there was from the time the Commission saw that. So for the nuclear power plants, it was in August that we reviewed it. I just wanted to know when would it be finalized and translated and available on the website?

MR. JAMMAL: We'll get back to today with respect to this answer.

MEMBER VELSHI: Thank you. I think addresses the second part of Northwatch's recommendation around the website as well then. Thank you, Mr. President.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So can actually just go back, because if I look at the last paragraph on page 1 of the Northwatch intervention, it seems to me that they're

asking more for help in the future as more of these RORs are reported and there are more related publications for a common or some centralized listing of all of the reports with the RLs, which would make it much easier for an intervener or a member of the public who has an interest in this to flip backwards and forwards as they're trying to find information from current and past.

So I see this both as a current and a future request for linkages.

THE PRESIDENT: I see somebody want to help us here. Go ahead.

MS TADROS: So Haidy Tadros, for the record.

Yes, with regards -- so we're getting into a little bit of improvement opportunities for our website and how do we improve members of the public being able to access the information? So we have our colleague Lisa Donnelly from Communications, and we'll take sort of what we've done so far.

But in terms of what we currently have, again the draft reports are available and in the future with the improvements that we are seeing with our website specifically around the regulatory oversight reports, it would be opportune for members of the public to find what they're looking for relatively simply.

Just as a reminder, this is the first regulatory oversight report for waste management facilities as well, so we are constantly looking at ways to put the improvement measures that are brought forward in place for both the report content, but also for accessibility.

So I'll pass it over to Lisa Donnelly for the communications and improvements we've done.

MS DONNELLY Lisa Donnelly, Senior Communications Advisor, for the record.

CNSC staff do agree with many of the recommendations made in the intervention and, in fact, some of them have already been addressed, including updating the website to make it easier to find the regulatory oversight reports.

We've also included pre-licensing reviews, which was addressed, and information on the independent advisory groups, and we will certainly look towards making improvements to the web pages as we move forward.

THE PRESIDENT: Okay, thank you. Ms Velshi.

MEMBER VELSHI: My second question is the second part of Northwatch's comments, which is around the report, its scope, and how substantive it is in addressing some specific areas that Northwatch has identified.

So maybe I'll draw your attention to a few

things and get your reaction to that. So on page 4, the report is scoped too narrowly and the report is too superficial in its treatment. Then further down on page 5, identifies gaps, one of them being that you're not providing how much waste is generated, would be helpful. The next one is adequacy of used fuel and dry storage capacity.

So comment on -- I know this is the first report, and a great start, some helpful feedback here from Northwatch. What are your thoughts on that?

MS GLENN: Karine Glenn, for the record.

I'll start off by saying that we tried to layout in the presentation that there are other venues where other parts of the fuel cycle or the waste cycle are reported upon, and that may be through the NPP where the wet storage is covered under the operations of the nuclear power plants as opposed to the waste management facilities, which deal only with the dry storage.

However, a complete picture of waste management is produced every three years under the Joint Convention for the safety of used fuel management and the safe radioactive waste management. Canada produces a report every three years to this Joint Convention to fulfil its obligations as a contracting party.

That report covers that complete picture,

including the safety of the fuel in the pool, the dry storage containers, includes full inventories of the waste. That report was last produced in 2015, it will be drafted and submitted to the Joint Convention in 2017 in preparation for the next review meeting which is in 2018. So that is done on a tri-annual basis.

The effort that goes into producing that report is substantial, it is a large undertaking and the inventory that is produced in that report is assembled by Natural Resources Canada, they're the federal government body that's responsible for collecting that information. So they assemble the inventory information that is going to be used in the production of that report.

But Canada does produce this big picture of all waste in all different sectors of the nuclear industry used on a tri-annual basis.

MEMBER VELSHI: So this is where it gets tricky, because this is Part 3. So maybe I'll just save my questions for then before I get the President's ire on this. So I get that, you know, we'll talk about that.

In the report itself, at least I didn't get it, I saw it in the slide presentation, you didn't refer to these other waste facilities that are not covered in the waste management facilities. So you didn't really give a full picture, and you're nodding, so I think that's

something I think you need to add to the report so that full report is there.

The other, we'll cover when we get to Part 3.

MS GLENN: Thank you. Karine Glenn. We will take your comments into consideration for next year's report and clarify -- maybe a clearer picture of what facilities are covered in the report and those facilities that are not, and where that information can be found going forward.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Thank you, Mr. President.

This is where we're going to run the risk of merging. I think the figure that they include on page 9, it really just comes to this cross-referencing and putting everything together. I found it very helpful as I tried to follow the cycle and go back. I think it might be helpful to look at this and to see if it can be incorporated into some of the way in which we present and consolidate and coordinate documentation.

THE PRESIDENT: This is an annual report, okay. So the question really is, do we annually report on your Joint Conventional thing moving forward? Well, I don't know. That's an option we can do, and continually to update. Because if it is covering the whole waste, then

annually describing what's changed in a year could be one way of doing it, or else you do the annual report and make reference to the convention.

I don't know what the right picture is, but it's always asked for what's missing from the annual report, and that's really what is being described here and what Northwatch quite rightly raised.

MEMBER MCEWAN: So just on the Joint Convention, when this report is submitted is it tabled with the Commission?

MS GLENN: Karine Glenn, for the record.

No, the report represents Canada's position as a collaboration between federal government partners that are responsible both for the regulation and the policy with respect to waste, as well as industry participates in the drafting of the report in order to provide factual and up-to-date information. That report represent's Canada's position, not the CNSC's position.

However, the CNSC is the lead organization to the Joint Convention, and we did report to the Commission following the last review meeting in August of 2015, we presented a summary of the joint review meeting and the presentation that was done to the review meeting to the Commission in a public meeting.

The report itself will be posted on the

CNSC website, all the previous ones can be found on the CNSC website. In addition, we also post, and are one of the very few countries that do this, all the questions that we receive as part of the peer review process and the responses that we provide. That can all be found on the CNSC website in addition to the presentation that the Canadian delegation makes at the joint review meeting.

MEMBER MCEWAN: So if we get a summary, why wouldn't we see the full report? It's on the website, but it's not formally presented to the Commission. I remember the presentation --

MS GLENN: That's correct.

MEMBER MCEWAN: -- it was a summary, it was --

MS GLENN: The report is posted, as I mentioned, on the CNSC website, and is available to all Canadians.

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

If I may, let's bench ourselves internationally. We have no issues at all presenting the report to the Commission for information. I just want to make sure that we're not going to get stuck into the procedural element where other member states are delayed in submission or posting pending approval of a commission.

As Ms Glenn has rightly and correctly mentioned the fact that it is Canada's report, we have no hesitation whatsoever to table the report to the Commission. But, again, it's available for the public. I'm not defending the process here, I just want to make sure that we have timelines, and it is a legal treaty by which we have to submit on time with respect to the report.

So we're working backwards, we'll see how we can manage that process so that it's -- because a lot of times the report is available to the public prior for us to come to Commission. So we can adjust accordingly if the Commission wishes to do so, we can provide a copy of the report in the form of a memo, because we would like to present to you the updated associated with the Joint Convention as we did previously.

THE PRESIDENT: What I hear you say, you don't want us to medal in your little report here. That's what you're really saying. It does not require Commission approval that's what you're saying to us, because the peer reviews done by the Convention itself is the final result of the report. That time, you can actually present what happened because it kind of takes commitment to the time you finally send correctly the report -- the process.

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

That is correct. So when we provide to the Commission is we're providing the challenges raised by the peer review. As Ms Glenn mentioned, the questions we even -- one of the very -- well, not the very few, we were the first member states or contracting parties to post the questions and our answers, so the transparency is we got good practices with respect to transparency as Canada's report.

In addition is the, as we mentioned, peer review results and challenges to Canada, and we have to respond formally in the report to the challenges addressed to Canada. The challenges to Canada are not just CNSC challenges, could be presented to the industry itself.

THE PRESIDENT: I do suggest when you have the report finally filed, you should send it to the Commission and bring in the process and what's the issues of the day, both for Canada and globally because, you know, we have some global concerns about some of those issues.

MEMBER VELSHI: Nothing for Northwatch.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Nothing for Northwatch.

THE PRESIDENT: If we miss something, we'll jump back.

Go ahead, Mr. Frappier.

MR. FRAPPIER: Gerry Frappier, for the

record.

Earlier there was a question about when the annual report of the nuclear power plants was going to be formally published in both official languages. That'll be December 15, so next week.

THE PRESIDENT: Okay, thank you.

So we are now into the full questions on Part 1 and starting with Ms Velshi.

MEMBER VELSHI: Thank you. So, again, the general comment, and recognizing this is your first report, I found that -- and I sat back and looked and said, so what exactly is this report telling me? It was reassuring that our waste facilities have negligible impact on worker safety, public safety, and the environment.

But I didn't get a sense of so what are the key issues, what is the area of regulatory concern, focus going forward, what are the challenges that are faced. I thought there were certain gaps in the report that, going forward, should be thought about.

Having had this discussion on the three-year Convention report that perhaps, and I'll just throw it out there, that maybe we don't need this as an annual report, but maybe a three-year report that allows more substantive discussion on what the state of the nation is.

I mean, we know it's going well, and maybe each year we just need a confirmation of that, but every three years we need to look at the bigger picture and see what is it from a regulatory focus are that needs further consideration? So any thoughts on that?

MS TADROS: Thank you. Haidy Tadros, for the record.

Thank you for the question. I think what this report has afforded us is an opportunity to look at the lessons that we've learned from what we've heard from the different public members who've intervened, but also the opportunity to put a strategy in place to better represent what it is we want to put out there, what it is we want to communicate in terms of our regulatory oversight, the safety of these facilities, and what we do on a continual basis.

As, Madam Velshi, you mentioned if it is a three-year report, then it will be a lot more information, a lot more data points that we can look at and give a perspective on.

As you already can tell, there are three sections of the report, so we are going to be getting into the other sections that you'll see have been, for the very first time, presented to the Commission, but will afford us an opportunity again to look at the systems that we

currently have in place where regulatory oversight is conducted from a CNSC staff perspective.

So I guess the short answer is I think there needs to be a strategy session where we look at the information presented and what we really want to make out of this report, not only for the waste management facilities and how they tie back into the NPP facilities themselves, but overall waste facilities and storage facilities across Canada.

So thank you for that, and we will definitely be looking at that.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Thank you. For the presentation, there was some very helpful pieces at the beginning of it, so thank you. But I thought I understood action levels, until we suddenly see it's not related to shift, not accumulative action level.

So if I read the slides, and I think there are three slides, 6, 15, and 24, where you actually discuss action levels. If I take this literally, is it possible for somebody to be 900 microcurries above the planned dose per shift from multiple shifts, and still not hit an action level?

MS TADROS: Haidy Tadros, for the record. I'll start, and maybe pass to colleagues

in radiation protection to better detail the answer with regards to action levels with regards to shifts.

Just for clarity, I believe you mentioned 900 microSieverts in terms of potential for getting -- perhaps you can repeat your question so we can get clarity on...?

MEMBER MCEWAN: So an action level is 1 milliSievert above the planned dose per shift, not 1 milliSievert, is what you say in slide 6, correct?

MS TADROS: That is correct. That is the action level that is currently set by the licensee.

MEMBER MCEWAN: So if a worker is .9 milliSieverts above the planned dose per shift, that worker would not hit an action level? Therefore, that worker could theoretically work 10 shifts at .9 milliSieverts and still not hit an action level as you've defined it in the first bullet of slide 6?

MR. MANLEY: Robin Manley, for the record. I'm the Vice-President of Nuclear Regulatory Affairs and Stakeholder Relations, and formerly Health Physics Manager and Radiation Protection Manager at OPG.

Your understanding is technically correct. If I may sort of outline the way the process works. For any particular day in any particular job, a planned estimated dose limit for that particular job or day is set using an

electronic record collar radiation exposure permit. That radiation exposure permit is based in either general terms on general work or if there's some very specific, highly specific work with higher dose, it would have a higher dose limit for that particular day.

So a number is generated that goes into the electronic dosimeter that alarms, if necessary, and that is a mechanism whereby we control the workers' exposure in any particular job. They can get an instantaneous read out at anytime, they can look and see what their dose is. They are expected to leave the work site before they hit the alarm level within their electronic dosimeter.

So that's a control level that exists below any action level that is set. So in addition to that, there is also an action level. The action level is if the planned dose on the dosimeter, if you go through that, you know, the alarm occurs, the worker keeps on working, gets a higher number than that, at that point where it's 1 milliSievert above the planned dose where the alarm would go off, at that point it triggers an action level.

So theoretically, if we didn't do our job as a management and leadership team and we allowed electronic dosimeter alarms to occur and did nothing, yes, you're right, you could hit the these action levels on

repeated basis.

But in practice, we act on any electronic dosimeter alarm, which is going to come in before the action level. So we have event reports that are filed, human performance event follow-ups that are done, supervisory and management investigations that would occur on electronic dosimeter alarms. The electronic dosimeter alarm itself is a very rare event, and so the action level is -- you know, in effect, we're not getting there because we have control levels lower down.

MEMBER MCEWAN: I really thought I understood action levels.

MR. MANLEY: I'm sorry to have confused you.

MEMBER MCEWAN: No, no. No, it's this first bullet I think which has really confused me. Because it seems to me there are two quite separate issues related to an action level for an individual worker.

The first would be related to the shift work. But how is the cumulative activity then checked? So, again, if I go back to the example you gave, a worker could theoretically be just below the alarm for multiple shifts and therefore cumulatively arrive at the action level over 10 shifts. How is that checked for and corrected for and monitored by staff?

MR. MANLEY: Well, I can tell you how it's monitored for by OPG. So in addition to what I described, which is the sort of shift process of ensuring that we stay at low doses, we also monitor the worker's cumulative dose over a period of time, and we have exposure control levels which are below our administrative dose limit, which is below the CNSC's regulatory limit. So before we would hit any kind of regulatory limit, we would have to go through first the exposure control level -- well, we act before we get there, but we would act at that point and then we would act again at the administrative dose limit and then there's further actions. So again, we have multiple control measures because we don't want to ever get to a legal limit, we don't want to ever get to an administrative dose limit. So we have controls below that.

MEMBER MCEWAN: So again, I think from the report's point of view, it will be helpful for the public reading this to actually understand just how complex and how thorough that process is for ensuring that not only an individual shift but the cumulative activities of a month or a week or whatever time period are monitored appropriately. As it's written, it doesn't give an understanding of that complexity, I think, and it certainly doesn't reflect just how carefully monitored cumulative doses are.

THE PRESIDENT: CNSC, do you want to add anything to that?

MS PURVIS: Good morning. Caroline Purvis, Director of the Radiation Protection Division, for the record.

I think, Dr. McEwan, you have hit the nail on the head. Each licensee does often have a complex system of early indicators or warnings that comprise administrative limits. So those are those fluctuations within normal operating levels, action levels which may be set on different frequencies depending on the parameter. In this case, what we were just discussing, these particular licensees have very robust work planning processes. So in this case, action levels actually set on the planned dose for the day or for the activity is appropriate because we know that there are measures in place to monitor that activity very precisely. Notwithstanding, these types of licensees also have measures in place to monitor the cumulative exposures that are received for workers.

If we talk about other types of licensed activities -- and we are going to get into those later on today -- the philosophy in their system of action levels and administrative levels is different, and it's incumbent a little bit on how their programs are developed. And

that's the reason why licensees will submit their approach for this in their radiation safety program. It's assessed by our specialist to ensure that they have the mechanisms in place to monitor and that these levels that they have chosen are appropriate indicators of that potential loss of control. Thank you.

MS THOMPSON: Shona Thompson for the record.

CNSC staff would like to add that OPG has not revised these action levels in several years and given the extent of the operational data that is now available to them, earlier this year in 2016, CNSC staff did request that OPG perform a review of their action levels to either confirm that they are still applicable or to revise them as necessary, and OPG has committed to completing this review prior to the relicensing of the Western and Pickering Waste Management Facilities that will be taking place in spring 2017.

THE PRESIDENT: Thank you.

Ms Velshi...?

MEMBER VELSHI: Some editing or clarity questions on the report.

So on page 1 of the report, second paragraph, fourth line, you talk about three SCAs, and SCAs have not been defined as yet in the report. I will give

you a minute to catch up.

And then on page 22, for the Darlington Waste Management Facility, the first paragraph says:

"Darlington Waste Management Facility stores only intermediate-level and high-level radioactive waste."

(As read)

There is no intermediate-level waste at Darlington; correct?

MS GLENN: Karine Glenn for the record.

That's correct. That is an error.

Following the refurbishment at the Darlington -- and yes, there will be storage of intermediate-level waste and that's why the retube storage building was constructed, but at the current time there is no intermediate-level waste at the Darlington Waste Management Facility and we will correct that mistake in the published version of the report.

MEMBER VELSHI: And then on page 28, Table 2.9, and I got the correction on the licence limit, but as I look at the actual results, it just says less than the licence limit. So is that what the minimum detectable activity is, 1.85 for tritium -- kilobecquerels per litre?

MS TADROS: We will get that answer.

Haidy Tadros. We will get that answer for you, Madam

Velshi.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Okay. Since we are on this particular table, let me use this table. I could have used any table here. I have lots of difficulties with the units, okay. I don't understand how something coming out through the stack is measured in gigabecquerel per year as a proxy for particulate. I thought particulate would be something like weight. For uranium, that kind of a thing, particularly in this, I don't understand how this is a good proxy for a licence limit. Somebody please explain to me. And then gigabecquerel per week. And I remember all the other places where it's either, you know, per metre cubed. I don't understand the limits, particularly when it comes to effluent for tritium, which we all look for liquid measurement. Like are there litres or weight? You are coming up with time, becquerel per time. I can't understand the philosophy here.

MR. RINKER: Mike Rinker for the record. I am the Director General for the Directorate of Environmental and Radiation Protection and Assessment.

So the limits that we are talking about are derived release limits and they are associated with the release of radionuclides and how we would limit facilities to make sure that the public would not be exposed to a dose

in exceedance of 1 mSv per annum, which is the regulatory limit that's provided in our regulations.

Calculations for these derived release limits are based on a CSA standard that is one of our most mature standards. It was first implemented in the 1980s. It's revised every five years and so we see incorporation of new science into this standard. So the end result of any release in this sort of calculation, whether it's a liquid release or an air release, is to make sure that the public is not going to receive a dose that would be greater than 1 mSv per annum. So there is a limit on that.

So if we are looking at emissions from the stack as an example, public exposure from emissions from the stack would include rainfall that would have tritium in it, it would be soil accumulation, soil ingestion, it would be the number of amount of activity that is in background garden produce and it's in drinking water. All of those are summed up in this calculation.

So the limit is in the number of becquerels that could be released in a year that would not result in a dose greater than 1 mSv per year and it includes various pathways, not only drinking water but also many other exposure pathways. That CSA standard that I talk about is the model for determining those many or multiple exposure pathways.

So we can't pick one of those pathways such as drinking water and put a limit as becquerels per litre because even if it was a liquid effluent that was going to the lake for example, certainly we think protecting water supplies is of primary importance and that is a major focus when we talk about protecting the public, thinking about tritium as 7000 Bq per litre. However, that tritium also is in the Lake, it can contact fish, people eat fish, so there are many other exposure pathways. And if we set the limit at the facility as becquerels per litre and compared it to drinking water, we would be omitting that other explanation of other potential pathways.

So the limit is based on that standard. It's in the total number of becquerels that could be released in a year that would not pose a risk to the public greater than 1 mSv per annum.

THE PRESIDENT: So in the chart that you show about the progress of the whale, you do measure it in becquerel per litre, okay, and all of a sudden, you know, it's reducing and that's the thing you measure. Uranium, we all know uranium, it's not the radiological issues that we are worried about, so how can you put a licence thing that is devoid of the toxicity in there?

We have gone through this in Port Hope. We have developed this -- that we need to do something

about the units that relate not only to radiological concern but also to toxicity, and that's whether you have the ambient that you have to measure and you have to have the measure, not necessarily the effluent but where the effluent is going into the lake, right at that spot. You need to actually measure the lake. So I don't see this in any one of those things and I cannot compare these to any other facilities that we are using all the time, be it nuclear power plants or Port Hope, which is fresh in my mind.

MR. RINKER: Mike Rinker for the record.

So we are -- particularly with these facilities that we are talking about, I'm talking strictly about nuclear substances that are being released that would pose a dose, unlike uranium, which has chemical toxicity issue with kidney and for fish. So that's why we follow this particular standard for determining what the dose consequences are.

There are other things that we do and we wish to present, and some of those are there was an occurrence of tritium in groundwater at this same facility and so it is not related to the release limit at the end of the stack. There was an event that ended up relating to tritium in groundwater. Now, how do people get exposed to groundwater? They may put in a well and they could drink

it. And so in that case, you measure the concentration in the well and we compare it to the drinking water standard as an element of safety, but that's not the same thing as setting a release limit at the end of a stack, whether it's air emissions. It's another way of comparing that contaminated groundwater and explaining what it means in terms of safety.

So I think we have to be careful that we don't want to move away from a very well-established approach from setting release limits because the unit can be confusing. I think the 1 mSv per annum is a very well-understood unit and I think the number of becquerels that could be released at the end of a pipe that would achieve that, the number may differ, but it is in becquerels per year that would relate to a dose per annum, dose per year.

THE PRESIDENT: We will have a long conversation about that.

Go ahead, anybody else jump in.

MEMBER VELSHI: So one last one around clarity or confirming accuracy. So this is Slide number 38 on the Western Waste Management Facility highlights. The second bullet says that the facility receives lower-level waste from Darlington, Pickering and Bruce. It's kind of implying that it doesn't receive intermediate-level waste

from those facilities. So again, you need to complete that, unless there was a reason for just highlighting that.

MS TADROS: Thank you, Member Velshi.
Haidy Tadros for the record. Thank you for the question.

Actually, in our speakers' notes, we do mention that it's both low- and intermediate-level storage. So we will update the slide so as not to infer that intermediate has been left out.

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

THE PRESIDENT: Dr. McEwan...?

MEMBER MCEWAN: So again, just a couple of I think helpful slides. I think on -- you have a slide where you describe satisfactory and fully satisfactory. I would add "below expectations" to that because I think it gives the range of what we are looking at and it helps the public understand what we are doing for that.

The other element that I'm interested in is you have picked the three safety and control areas for, say, a more detailed review. Why didn't you include management systems in that? Because it's my understanding that is the fundamental SCA that will often predict problems in other areas.

MS TADROS: Thank you for the question.
Haidy Tadros for the record.

You are absolutely right. I think management system is what we typically refer to as the umbrella piece for all programs that are structured, programs that are implemented and from a safety culture perspective do provide a lens into how operations are being designed, implemented and corrected as needed.

With respect to use of management system as a key performance indicator, we believe that the three that are focused on in terms of key data indicators, such as dose and environment and conventional health and safety lost time injury, the three data indicators do give a lens into management system. And obviously, we could have included training as well because training is a major component of management system, ensuring that workers are trained and that there are sufficient and protective training programs in place.

So management system, while we choose to call it a safety and control area, is really an all-encompassing area that looks at all of the different safety and control areas that we have currently in place, and the reason why we choose the radiation protection, environmental protection and conventional health and safety is those are the ones that produce the metrics and really give a data point that we can look to and trace back to elements and programs of a management system, including

potentially training.

So I'm not sure if that suffices to answer with regards to key indicators, but those are the metrics that we currently have to show into a management system.

MS GLENN: Karine Glenn for the record.

If I may add. In the -- I know it's in this afternoon's regulatory oversight but we will see an instance where this was exactly the case. There was an event that manifested itself through environmental protection. The underlying cause was found to be management systems. However, the way that the event was found or that the problem was identified was through an environmental issue, and therefore the three SCAs that are highlighted in this report are not only common to all of the facilities and in installations that are covered in this report, but also provide that key indicator, if you would like, of problems that may have occurred in other safety control areas.

MEMBER MCEWAN: So what you're saying is -- that's a good example because I have lots of questions around that for the next part. Are you saying that if that environmental event had not happened, we would not, in the course of normal reviews, have identified issues with the management systems of that facility or that site?

MS TADROS: Haidy Tadros for the record.

No, I don't want to leave -- we don't want to leave you with the impression that that's the case. I think, as mentioned earlier in our slide deck as well, there are several inputs that allow CNSC staff to look at a safety and control area, and as management system is a key component for all programs, what we find is when occurrences or non-compliance happens and root causes are established and looked at, if they do go back to a systemic issue that has occurred, whether it be in training or in controlling doses, that systemic issue is typically associated with the management system in terms of establishment of the program, and the corrective action that needs to be taken is with the management system and not necessarily specifically in the training program per se.

So coming back to the example that was just presented, if that particular issue had not occurred from an environmental perspective, it would not have been the only trigger to identify if there was an issue with their management system. We use the licensee's responses to non-compliances as an indicator of their corrective action, of their safety culture for example, and when there is consistent non-compliances or repeat non-compliances that don't get corrected, then the systemic issues will go

back and we will address what is erroneous in the management system.

MEMBER MCEWAN: So can a careful review of a management system, independent of other SCAs, proactively identify a potential issue like this environmental issue that can be prevented before you have the feedback loop of an event leading back to the management system deficiency?

MS TADROS: Haidy Tadros for the record. Yes.

MEMBER MCEWAN: So why don't you include it proactively then as it is the fundamental management system?

MS TADROS: I think we will need to look at specifically the question in terms of including it as an overall umbrella and being able to look at the specific areas defined under management system to be able to proactively include it with every information piece that we gather.

I have a note here that Mr. Ramzi Jammal may want to take the microphone, so I will pass it on to him.

MR. JAMMAL: Okay, thank you.

Your question is very valid, but I want to make clarity between what is reporting to the Commission based on annual report and a systematic oversight and we

focus on three SCAs. That's the practice we have been doing for uranium mines and mills and that's the annual report that's being presented. I just do not want to leave the fact that we have a specific regulatory oversight for each and every SCA.

So your question is what indicators do we use with respect to reporting in this report? My colleagues presented typical indicators that will indirectly or directly demonstrate if there are issues associated with supporting programs. Our regulatory oversight for each SCA has, at times where it's needed, based on planned inspection and planned regulatory oversight, so we have our specialists that will go onsite to do a management system inspection, we have our specialist that will go onsite to do RP, radiation protection.

For the purpose of the regulatory oversight report, we felt at the time, from the practices we have been coming before the Commission, for UMMD processing facilities and Port Hope area, we have selected -- I do not want to call them dominant, we selected three SCAs that will give an overall comprehensive reflection of how the licensee performance is taking place during that period of the year.

We are open to any recommendation, but I

have to make it very clear that we have to be, from a resource perspective -- and that's my job at this point -- I will take the direction from the Commission if it wants us to do so, but I do not want the annual report to become a relicensing CMD for every element. I heard Ms Velshi and I heard you correctly. If there are any performance issues, we can provide you with a regulatory focus on the next cycle that we are going to go through, to provide you with an update. But that's what we selected, the three key SCAs, again, in conclusion, because they do give a comprehensive overview on the performance of the licensee, taking into consideration the other contributing factors from the other SCAs.

THE PRESIDENT: I took -- the reason you select -- though it is the most likely SCA to provide data and to change from year to year and you will report if any of the other SCAs has anything unusual about them. So I read them to be, yes, you do the inspection, we look at all of them, but these are the ones that we are focusing about reporting.

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

That's correct, sir. In addition to the annual report, we have the status report that we come almost on a monthly basis before the Commission. So if

there are major deviations or non-compliance, enforcement actions or events, we will come to the Commission.

THE PRESIDENT: Okay, thank you.

Anybody? Anything else? Ms Velshi...?

MEMBER VELSHI: A question for OPG. Two parts to it. One, on Slide 27 for the environmental management system, there is a statement here:

"Subject to periodic independent
third party audits and reviews"

Can you share with us some findings or recommendations from these audits and reviews?

MS MORTON: Lise Morton for the record.

I am having to go by memory now to think of some recent findings. So yes, we do periodic third-party audits of the environmental management system. I'm trying to go, I apologize, by memory here in terms of the last one that we have completed.

I know that there have been in the past -- and it may not be the most recent one -- there have been findings with respect to items such as storage of hazardous chemicals and how we are storing those, hazardous waste -- or materials, I apologize, you know, so whether they find a finding where something is in a chemical cabinet that perhaps shouldn't be. So we have had some findings on that in the past and certainly have worked hard to clean up

those kinds of things.

Sometimes the findings are again programmatic, going back to the discussion you had on the management system. So there have been some findings in some of the more recent ones, again programmatically across OPG in terms of the environment program, because quite often these third-party reviews are done, we are one element of a review for the whole company for example. So I believe it was the most recent one just had some fine-tuning, if you will, at the programmatic level in terms of how things were done across the company. There have been no significant environmental findings in these reviews from the waste facility specifically. We are quite often grouped in with the broader corporate review.

MEMBER VELSHI: Thank you. And do you get findings and recommendations that are not necessarily inconsistent but different from what the CNSC inspectors may have come up with?

MS MORTON: Lise Morton for the record.

I would say -- and I am going to speak across various program areas, if you will, not just environmental. I would say for the most part, no, we don't see an inconsistency between external audit findings or even our internal nuclear oversight audit findings that we conduct routinely and what we would see from routine

inspections. Again, sometimes the specific details or where they may have noticed a non-compliance in the facility might vary, but we are not finding a wide variation in terms of programmatic type deficiencies between the two sets of inspections or audits.

MEMBER VELSHI: Thank you.

And my second question was, on page 41 of the report, around performance of the Western Waste Management Facility there is a discussion of some non-compliances and one had to do with the tracking system and where the locations of the containers for lower-level waste were. Can you elaborate on that? What was the issue here and its significance, please?

MS MORTON: Lise Morton for the record.

Yes. So the issue that was found there during an inspection is that -- and this happens quite often during an inspection -- the Inspector, as they are walking through the low-level storage buildings for example, will pick a bin, and there are barcodes on every one of the bins, and will say, "Show me the records for that particular bin." The buildings are gridded with a specific location. So we will go back to the database and confirm was that bin in the grid and the location that the Inspector found it in. And we found -- excuse me, during one of the inspections, they found instances where the bin

was not exactly located at the same grid pattern as what our electronic system indicated, so there was some slight variation in terms of where the bin was located. We attributed that to some significant waste movements that we had been doing between buildings and a somewhat loss of control, if you will, but relatively minor because we went back and verified other -- we picked a statistically significant sample and went back and verified. So we believe that it was through the movement of waste to accommodate a project that we lost some control.

Going forward though, we are in the process right now of moving waste, significant volumes of waste, from one building to another as we empty buildings to install a new updated fire detection system. So that's our opportunity to verify that data again as we move all of this large volume of waste, but we are also in the process of updating that integrated waste tracking system. As you can imagine with any electronic system, it is now getting to be dated and so we are reaching the point and we have a project that we have just kicked off to update that electronic waste tracking system. So that's an ongoing effort for us to verify that the exact data in the database matches the physical location in the plant.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Okay. A last question.

On page 131 -- this is again unit issue -- Figure F1, this is airborne and nuclear substance release annually. Okay, so this is percentage of DRL. So I understand I'm looking here at percentage of -- so all those bars, so let's pick up tritium, it's 1.4×10^{-2} of 3 percent; right? What does becquerel per year have to do with this? Somebody explain, please.

MS SAUVÉ: Kiza Sauvé for the record. I am the Director of the Environmental Compliance and Laboratory Services Division.

So in this graph, it is based on percentage, so the 1.4×10^{-2} would be of course 0.0014 percent of the release limit. The release limit is found higher up in the report and so you can find with the actual release limit is. Where we have shown the becquerel per year, that's a little bit in response to you wanting to know what the actual units are that we are using to measure these different elements. So tritium is measured in becquerels per year, but the 1.4×10^{-2} is a percentage of the release limit, which is higher up in the report. So we are working and we will be doing a better job of showing things for you.

THE PRESIDENT: That's misleading, okay. You should remove that unless you are going to put in the DRL for the tritium and every other contaminant here. This

is very misleading, it pretends that you are actually reading it in becquerel per year, okay.

MS SAUVÉ: I would agree with you, yes. We are working on them.

THE PRESIDENT: Okay. It's the same thing for the next one F2.

MEMBER MCEWAN: Could I actually just ask a question on page 130?

THE PRESIDENT: Go ahead.

MEMBER MCEWAN: What is milligrams per R on Table F1 and micrograms per R and picograms per R? Page 130, Table F1.

DR. KWAMENA: Good morning. This is Nana Kwamena, Dr. Nana Kwamena, an Environmental Risk Assessment Officer here at the CNSC.

So at the waste management facility there is an incinerator and every year, according to their environmental compliance approval, they are required to do stack testing. So what you see in Table F1 is the result of their annual stack testing results. So they are required to test the emissions of particulate matter, mercury, dioxin, furans and total hydrocarbons coming out of the stack. So the units that you see in Table F1 are the units that are typically used when doing these stack testing results. So you are getting a mass in terms of a

volume coming out of the stack and the results, as you can see in Table F1, for the years 2013 to 2015 are compared to the environmental compliance approval allowed limit, which is also provided in that table.

MEMBER MCEWAN: But what does "R" stand for? I understand the volume, I understand the mass. I don't understand the "R."

THE PRESIDENT: OPG, I think, signalled that they understand it.

MS MORTON: Lise Morton for the record.

The "R", to my knowledge and recollection of our environmental compliance approval from the MOE is standard, so there's a conversion that has to go back to I believe ambient temperatures and also to I believe it's 20 percent oxygen. So it's to calibrate something back to a standard flow condition.

DR. KWAMENA: That is correct. The values are normalized to a reference temperature pressure and a percent oxygen.

THE PRESIDENT: Well, I'm glad that you all understand it. I have no idea what you are talking about.

--- Laughter / Rires

THE PRESIDENT: The "R" should be defined somewhere. It's not a normal unit that we use and it

should be absolutely clear what do you mean by "R" here.

Ms Velshi...?

MEMBER VELSHI: A very quick question for OPG. In the appendix as one looks at the different events, there were so many to do with emergency lighting units and it was over a period of time, and I just wondered at what point did you say, hey, is there a common cause here and do we need to address this more systematically?

MS MORTON: Lise Morton for the record.

Of course, your observation is absolutely correct. So part of it was ensuring that our testing of emergency lighting units was absolutely rigorous and we determined that our historical practices may not have been as rigorous as they needed to be. So as we got more rigorous with our testing, more deficiencies came out.

In particular, the one that I believe shows up quite a bit through the table is for our low-level storage buildings and our outbuildings, our retube waste component storage building for example up at the Western site. What we ended up finding out -- and yes, we did absolutely pause and say, okay, we have obviously got a trend here, what's going on. So what we did find is that the emergency lighting units in those buildings, those buildings are not heated, that they were not really designed for the types of environmental conditions that we

can see at the site. As everybody knows, the Western site can be quite cold in the winter, for example, so we did see some failures, for example, of batteries due to long exposure to low temperatures.

What we have therefore done is our design engineering group has gone back and reviewed these particular units, these emergency lighting units, and they have designed and specified a different emergency lighting unit that provides a heating capability for the battery compartment. We are currently in the process and we have installed these new emergency lighting units in 13 of our 14 low-level storage buildings. The one that is remaining is scheduled to be completed before the end of this year. So we did take that step back to say, okay, what's the common cause and the common trend here and to therefore address that.

THE PRESIDENT: Okay. I think this is done, Part 1. We will take a 15-minute break and we will resume at 11:05.

Thank you.

--- Upon recessing 10:49 a.m. /

Suspension à 10 h 49

--- Upon resuming at 11:08 a.m. /

Reprise à 11 h 08

THE PRESIDENT: Okay. I don't think you need further introduction. We are going to the next part. So over to you, Ms Tadros.

MS GLENN: Good morning. My name is Karine Glenn and I will present the CNSC staff assessment of the performance of waste processing installations.

There are eight waste processing installations covered by this report. All are located in Ontario except for the University of Alberta, which is located in Edmonton, Alberta. Due to the nature of their licensed operational activities, UniTech does not have a physical location for storage or processing in Canada.

This table presents the licensing and compliance effort from CNSC staff for 2015. CNSC staff performed nine compliance inspections at the waste processing installations. All the findings resulting from these inspections were provided to the licensees in detailed inspection reports and all enforcements arising from the inspections were recorded in CNSC Regulatory Information Bank to ensure that all these enforcement actions were tracked to completion.

Two hundred and seven person-days were dedicated to compliance activities in 2015. Through inspections as well as through the review of licensee

reports, CNSC staff monitor waste processing installations to enable the CNSC to provide assurance to Canadians of the continuing compliance and safety performance of the licensees. In 2015, CNSC staff spend 108 person-days on licensing activities for waste processing installations. There were no licence amendments for any of the installations. However, considerable effort was spent on modernizing the associated Licence Condition Handbooks. Two licences were revoked in 2015. Given the low-risk nature of these installations, all licences were issued by CNSC designated officer.

CNSC staff have rated each applicable safety and control area based on the results and observations from inspections and desktop reviews. For 2015, all the waste processing installations received a satisfactory rating in all of the applicable safety and control areas. Some SCAs do not apply to all installations. For example, UniTech's operation involves a truck that travels from a Canadian licensed facility to the United States. There are no environmental releases resulting from this activity, therefore this SCA does not apply. Overall, these ratings indicate consistent management of safety for all installations.

The graph and table on this slide show the average and maximum effective dose to nuclear energy

workers in 2015. The red line on this chart displays the regulatory annual effective dose limit that a nuclear energy worker can receive. As shown, the average and maximum dose received by an individual worker at each of these installations was well below the annual dose limit of 50 mSv. Please note that there are now nuclear energy workers at some of the facilities.

This table shows the action levels for nuclear energy workers at waste processing installations. For these installations, there are action levels set at various time frequencies depending on the installation. Additionally, some installations have multiple action levels. For example, the University of Alberta has quarterly action levels, as shown in the table, in addition to annual action levels to ensure the protection of their nuclear energy workers. Some installations are not included on this slide as they do not have nuclear energy workers. In 2015, there were no exceedances of the action level or regulatory limit at any waste processing installation.

The table on this slide shows the annual estimated dose to the public for 2015. The regulatory annual effective dose limit that a member of the public can receive is 1 mSv per year. As shown, the average annual dose received by members of the public at each of the

installations covered by this report was well below the annual limit of one. Doses to the public are attributed to environmental releases. A separate action level applies to different contributing factors. These factors include airborne and liquid releases.

As shown on this slide, there were no lost time injuries in 2015 at the waste installations. CNSC staff conclude that waste installation licensees have been implementing their conventional health and safety programs satisfactorily during 2015 and their programs were effective in protecting the health and safety of persons working in their installations.

The first installation I will discuss in detail is EnergySolutions Canada.

EnergySolutions Canada Corporation, or ESC, formerly known as Monserco Limited, is a low-risk licensee that has been in operation since 1978 and manages the handling and processing of low-level radioactive material. EnergySolutions collects low-level radioactive waste from licensed nuclear facilities such as nuclear power plants, hospitals, universities and research institutes on a contractual basis. Radioactive material is either sorted and/or repackaged at its Brampton location or directly shipped to the United States for processing via incineration or recycling. The resultant ash from

incineration is returned to EnergySolutions and then routed to a licensed nuclear facility such as Chalk River Laboratory for disposal.

There have been no major changes to the installation or its operations in 2015 and its current licence is valid until 2022.

The next installation I will discuss is Candu Energy.

Candu Energy Incorporated was a low-risk installation that refurbished contaminated tools and equipment used to service nuclear generating stations. A CNSC designated officer issued Candu Energy a licence in September of 2011. During 2015, the licensee informed the CNSC that operations at this location would cease and requested to revoke their licence as the lease on their existing building was expiring. Candu Energy planned to request a new licence to conduct the same activities at a different location, at a building owned by Candu Energy.

Candu Energy ceased operations at this location in July of 2015 and began the process of decommissioning the installation. Candu energy provided staff with a detailed decommissioning plan and an end state decommissioning report which described the activities performed to return the building to unrestricted use. CNSC staff reviewed the documents submitted by Candu Energy and

conducted an inspection in November of 2015 which focused on the verification of the decommissioning activities. No issues were identified during this inspection and CNSC staff confirmed that the decommissioning of the installation had been completed in accordance with CNSC requirements and the site was released for unrestricted public use. As a result, in December of 2015, a CNSC designated officer revoked this licence.

A new licence was issued in August of 2016 for Candu Energy for their new location in Mississauga. This licence is valid until 2026.

The next installation is the Central Maintenance and Laundry Facility.

The Central Maintenance and Laundry Facility is a low-risk installation located at the site of the Bruce Nuclear Generating Station. The Central Maintenance and Laundry Facility is designed, operated and used to support the operation of Bruce A and B Nuclear Generating Stations. The radiological work programs at this location are conducted under this designated officer issued licence. The work programs include maintenance and calibration of radiation instruments, station equipment maintenance and processing of active laundry.

There have been no major changes to the installation or its operations in 2015 and its current

licence is valid until August 2017.

I will next discuss UniTech Services Canada Limited.

This is a low-risk licensee that provides the decontamination services for Canadian licensees. UniTech takes possession of the nuclear substances at a licensee's location after UniTech's trucks have been loaded and locked by the licensees. They then export these items to their facilities in the United States and, once decontaminated, the items are returned to the owners. Due to its licensed activities, UniTech does not have a physical facility for storage or processing in Canada. Their licence is required to possess and export the items they collect.

There have been no major changes to this licence or its operations in 2015 and their current licence is valid until 2020.

The next installation covered under this report is the waste installation at the University of Alberta.

The University of Alberta Clover Bar Hazardous Waste Management Facility is a low-risk installation owned and operated by the University of Alberta. This installation manages a variety of radioactive wastes that are solely generated by the

university itself. Waste management techniques used here include collection, characterization, volume reduction and disposal.

There have been no major changes to this installation or its operations in 2015. Its current licence is valid until March of 2017 and the licensee has applied for a renewal of their licence.

Another similar installation is the University of Toronto.

The University of Toronto Radioactive Waste Management Facility is a low-risk installation owned and operated by the University. This installation manages a variety of chemical and radioactive waste streams that are solely generated by the University facility itself. The University of Toronto's waste management facility ships compacted drums of lab waste, drums of liquid scintillation vials and sealed sources to another waste management licensee.

There have been no major changes to this installation or operations in 2015 and their licence is valid until 2024.

The next waste installation is Mississauga Metals & Alloys.

Mississauga Metals & Alloys Inc. is a metal recycling installation. Prior to 2007, Mississauga

Metals imported zirconium metals, tubes and alloys that were slightly contaminated with uranium for decontamination. This led to an unacceptable volume of accumulated radioactive wastes at this facility in both solid and liquid form. Although being safely stored, no systems were in place to reduce the volumes of accumulating wastes. In 2007, a CNSC designated officer issued a licence allowing Mississauga Metals to safely manage the existing waste inventory and reduce this inventory by processing and shipping to an authorized disposal facility. No further decontamination of nuclear contaminated metals was permitted under this licence.

Under Mississauga Metals' current licence, CNSC requires monthly reporting on the reduction of contaminated waste onsite and does not authorize Mississauga Metals to accept any new radioactive material. In 2015, the volume of liquid waste onsite has decreased from 184,000 litres to 148,000 litres, with a total reduction of 36,000 litres.

There have been no major changes to this installation or its operations in 2015 and their licence is valid until 2019.

Another similar installation to Mississauga Metals is Richmond Metals Recycling.

Richmond Metals Recycling Inc. was a metal

recycling company specializing in zirconium tube recycling. CNSC staff issued an order to Richmond Metals Recycling in June 2015 for failing to adequately respond to CNSC's repeated requests for information. The order issued by CNSC staff required Richmond Metals to immediately cease all operations authorized under their licence and to place all drums containing contaminated zirconium tubes into safe storage until a sufficient number of qualified workers were able to safely carry out the licensed activity. CNSC staff also required the licensee to provide a satisfactory response to CNSC staff's November 2014 inspection and to submit reports periodically, as required by their licence.

In July 2015 Richmond Metals submitted a request to the CNSC to revoke their licence. Following this request, Richmond Metals initiated the cleanup of their installation with the assistance of a qualified third party.

CNSC staff issued a second order in September 2015 after it was discovered -- pardon me -- after it -- staff discovered a small amount of radioactive contamination in the facility while on inspection. The second order required Richmond Metals to check all items before they were removed from the facility, to submit a facility decommissioning plan to CNSC for approval, and to conduct decommissioning of the installation and to submit a

report on the decommissioning.

CNSC staff verified through inspection and direct measurements that the installation was successfully decontaminated. The results demonstrated that there was no risk to the health and safety of the public or the environment and demonstrated compliance with CNSC requirements.

In November 2015, a CNSC-designated officer revoked the licence issued to Richmond Metals and the site was released for unrestricted public use. The resultant cleanup report is posted on the CNSC website.

To summarize this section, in 2015 at waste processing installations, all installations have or had satisfactory performance in all the applicable safety and control areas. All radiation doses to nuclear energy workers were below the regulatory limits, and all radiation doses to the public were well below the regulatory limit. Licensees' environmental protection programs were effective at keeping environmental releases as low as reasonably achievable, and no lost-time injuries occurred. CNSC staff are satisfied that waste processing installations in Canada operated safely in 2015.

We will now break in our presentation to address any questions the Commission may have on waste processing installations.

THE PRESIDENT: Thank you. So now I'm going to ask any of the licensees whether they want to make any comments. And let me go in order here. Let me hear first from EnergySolutions. Any comments?

MR. RYDER: Good morning Mr. President and members of the Commission. For the record, my name is Tim Ryder, the radiation safety officer for EnergySolutions Canada.

I've no further comments on the report that was issued. We've had plenty of time to review this, so I'd just like to thank the CNSC for their work.

THE PRESIDENT: Thank you. CANDU Energy.

MR. BOUDENS: Gerry Boudens for the record.

We have no further comments at this time. I would like to thank the Commission for the opportunity to participate today. Thank you.

THE PRESIDENT: Thank you. UniTech?

MR. ANDERSON: For the record, Kent Anderson, radiation safety officer for UniTech Services Canada.

We have no comments.

THE PRESIDENT: Thank you.
Mississauga Metals.

MR. SHARPE: Good morning, it's

David Sharpe, president of Mississauga Metals.

At this time we have no further comments.

THE PRESIDENT: And Central Maintenance, I guess it's Bruce.

MR. SAUNDERS: Yeah, it's Frank Saunders for the record.

Now, we have no direct comments. We have a few sort of typos and errors that need to be fixed that we'll communicate to staff, but otherwise -- in the report itself, not in the presentation. So we will do that. Other than that, we're satisfied with the outcome.

THE PRESIDENT: Anybody else that I've missed?

Okay, so let's start with the question period. And I understand that Dr. McEwan . . .

MEMBER MCEWAN: Thank you, Mr. President.

So I think for EnergySolutions and staff, page 62, how do you end up with a TLD in an airport X-ray machine? And how do you do the back calculation?

MS THOMPSON: Shona Thompson for the record, project officer responsible for EnergySolutions Canada.

This particular staff member I believe was travelling on business with EnergySolutions, and in their luggage or on their person had their TLD with them, and

when they walked through the X-ray machine, they didn't take the TLD off.

Typically when we travel with the CNSC and we go to the airport, we pass our TLDs around the X-ray machine to the workers at the airport and they scan them independently of going through the X-ray machines. So this worker wouldn't have done that.

If the worker in EnergySolutions Canada would like to correct the dose, they can contact the National Dose Registry. EnergySolutions Canada is on the line if they would like to comment on if that was done or anything additional from what I've said.

MR. RYDER: Good morning again. For the record Tim Ryder.

On this occasion, the actual employee had left his TLD inside his checked-in baggage. When we looked at his travel plans and his arrangements at any airports he'd actually travelled through on this occasion, based on the information supplied by the airports on the types of X-ray machines that are used in these airport handling areas -- baggage handling areas, the dose was pretty accurately estimated for the amount of time it would have been exposed to.

We also at the time evaluated that -- the type of work and work that he'd been known to take, and he

does wear an electronic dosimeter as well, and the doses that were suggested by the electronic dosimeter and the type of work that he conducted was not conducive to him receiving the 1.4 millisieverts. We did look at again his APD records and his working records from what he'd been doing from the devices he was with, and we concluded that he had -- that 1.34 millisieverts was the unexplained dose.

We haven't made an application to Health Canada at the moment. The operations manager here will be making the submission to have the TLD records, but I can check on that to make sure.

MEMBER MCEWAN: Thank you.

THE PRESIDENT: Ms Velshi.

MEMBER VELSHI: If I move to my question, is it up to the licensee to change the record? Would the CNSC not require them to make sure that what's in the National Dose Registry is an accurate dose?

MS TADROS: Ms. Caroline Purvis from -- Haidy Tadros for the record. Ms. Caroline Purvis will take that question.

MS PURVIS: Caroline Purvis for the record.

So the CNSC has a regulatory document or regulatory standard, pardon me, S-260, which describes the process for initiating changes to our records in the

National Dose Registry. Typically what happens in a case such as this where the licensee has undertaken an investigation and their belief is that the majority of the dose is non-personal in nature, so the dosimeter received an exposure but the individual did not, they'd submit an investigation report with the official dose change request form signed by the radiation safety officer as well as the worker themselves. It's submitted and it's reviewed by experts at the CNSC, who will essentially approve the request and then initiate the change in the dose registry.

MEMBER VELSHI: So it's a requirement that they change what's in the dose registry to what the accurate one is, as opposed to it's optional if they choose to?

MS PURVIS: Ideally, we would like all the records in the National Dose Registry to reflect the occupational exposures received. In a case such as this, the recommendation will go back to the licensee to initiate that request. I will acknowledge that there are likely occasions where low-level exposures are received such as this where the licensee hasn't undertaken to change the dose in the registry.

MS THOMPSON: Shona Thompson for the record.

I just wanted to add that this dose was

not an exceedance of the action level that's in place at EnergySolutions Canada, and if that dose was received by a nuclear energy worker, it's still well below their regulatory limit of 50 millisieverts; however, EnergySolutions Canada did conduct an internal investigation because that dose was higher than what's normally seen by the nuclear energy workers at the facility, but it was not in exceedance of an action level.

MEMBER VELSHI: Thank you.

THE PRESIDENT: So just for clarity, I just want to make sure, just because it was a low dosage, it's not a mandatory requirement to update the registry. Is that correct? I just want to make sure whether it's mandatory or optional.

MS PURVIS: Caroline Purvis for the record.

CNSC staff's expectation is that when the licensee conducts an investigation and they determine part of the dose is non-personal, that they'll initiate the process to correct the dose in the registry.

THE PRESIDENT: Is high expectation -- what does that mean? Is it a requirement or guidelines?

MS PURVIS: If we know about it and if we have the opportunity to intervene and to provide guidance, then we will definitely be providing strong guidance that

they initiate that request and we'll conduct follow-up. If we are not aware that there has been an anomalous reading, we obviously cannot intervene in that way.

THE PRESIDENT: Well, you're now aware; right?

--- Laughter / Rires

MS PURVIS: In this case, yes.

THE PRESIDENT: Okay, thank you.

Ms Velshi.

MEMBER VELSHI: Thank you.

Question for staff. So I found this section very actually quite enlightening because I wasn't aware of most of these facilities.

So if I look at Mississauga Metals and Alloys and Richmond Metals Recycling Inc. So if I read this correctly, is the CNSC position now that they should not be accepting any more radioactive material? And so one of them has revoked their licence. But the other one, Mississauga Metals and Alloys, so until their licence expires -- and I can't remember what date it is, 2017 or '19 -- is the expectation that they get rid of all the radioactive material they have in inventory by then?

MR. DWYER: Robert Dwyer, project officer in the Nuclear Processing Facilities division for the record.

That's correct. MMA is not authorized to receive any additional nuclear material than what they already have. As per condition 6 of their current licence, it specifically states that they're not authorized to recover or process any remaining material. They're only allowed to continue to neutralize the existing asset inventory that they have. When they neutralize that asset, it forms a precipitate which does contain some small quantities of nuclear material, and they dispose of that appropriately.

MEMBER VELSHI: And so what's driven this change on why they can't accept any more radioactive material?

MR. DWYER: Robert Dwyer for the record.

Back in 2007, so a number of years ago, even prior to that, MMA imported a number -- or a large quantity of -- I guess they started getting into the business of decontaminating scrap metal. Over time, the waste associated with the decontamination began to -- the volumes began to increase to the point where I guess in 2007 we intervened and said, you know, enough is enough. We need to see this volume of waste decrease. So hence, in '07, I believe we put in that licensing condition that said no more material is going to come in. You need to start processing that waste inventory.

MEMBER VELSHI: Thank you.

Do the two licensees want to comment on that?

MR. SHARPE: Yes, hi, David Sharpe from Mississauga Metals.

We are on a work-down of our inventory and we expect to have it completed by end of 2018, to have all the materials off of our site.

MEMBER VELSHI: Thank you. And for Richmond Metals Recycling, was it this -- I guess you wanted your licence revoked because you couldn't carry on with this business? Is that correct?

MS MURTHY: (Off microphone) ... director of Nuclear Processing Facilities division.

So Richmond Metals Recycling is a separate -- it was a separate licence with a separate applicant authority. And they decided that they did not want to be in the business anymore.

MEMBER VELSHI: But there is no business for them to be in, right, if you don't allow them to accept any more radioactive material to decontaminate.

MS MURTHY: Kavita Murthy for the record.

So the incidents that led to us issuing an order did result in them not being allowed to accept any more until they had satisfied CNSC staff that they could

operate safely. And subsequent to that order, they made a business decision that they did not want to be in the business. So that is not to say that we would have given them -- we wouldn't have then subsequently changed that and allowed them to receive more inventory. They just needed to do certain things before we were going to allow them to do it, and they chose that they'd -- to get out of the business.

MEMBER VELSHI: So am I wrong in comparing these two businesses? So one decided to get out. They were not in compliance, and they said, Okay, we don't want to be in this after doing what -- but other one's actually been told you cannot receive any more, not because they weren't in compliance, they just -- the inventory was just going bigger and getting bigger and bigger.

MS MURTHY: Kavita Murthy for the record. So the reason Richmond Metals was allowed to revoke their licence is because they were successfully able to take care of their inventory and so there was no reason -- once they had got rid of their inventory, there was no reason for them to continue having a licence.

With respect to Mississauga Metals, the situation is different. They have an inventory of material that they have been told that they need to get -- to decrease the quantities of. And at the end of the day,

when all of the amount of material that they have right now is gone, they could choose to stay in the business, provided they give us information to allow us -- to give us confidence that they can continue operations. And I think -- Ramzi, do you have something?

MR. JAMMAL: Ramzi Jammal for the record.

Every licensee has a safety case by which -- that we are -- approve the operations. So the -- in the case of this licensee, they were approaching the limits of the safety case with respect to their operations; hence, their compliance was not -- again, we had to expand quite a bit of resources for regulatory oversight, and that's why you see the limitation. So that whatever they will have in their possession will not exceed the safety case associated with the licensee. And that's the point Ms Murthy is trying to say, that changes did take place, but as long as they are within the safety case, they can operate accordingly.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So staying with Richmond Metals for a while. My sense in this fairly brief report is that there were compliance issues -- significant compliance issues developing as the business wound down. So are there lessons learned there in how we monitor companies and how we look at companies who are dealing with

these low-level waste issues, and are there problems in ensuring compliance if a company is winding down?

MS GLENN: Karine Glenn for the record.

All of these licensees are evaluated based on a risk-informed basis, and we develop a risk-informed inspection plan based on the activities associated at each of the facilities. And this was done by a team that was across the CNSC and encompassed representatives from the various safety control areas and members of the fact team.

On an ongoing basis, that plan is revisited based on licensee activities and licensee performance. And so we can revisit the compliance requirements or the compliance recommendations that are planned for a specific licensee at any point in time as a result of an event or as a result of a poor performance. We can increase that plan. There is a baseline that is determined based on the risk associated with that facility and the activities. And then after that, it can be adjusted based on its performance.

MEMBER MCEWAN: So can I just -- if I quote what you say on page 97: "for failing to adequately respond to repeated requests for information." So at what stage does the tipping point come, where you go from concern to action?

MR. RINKER: Mike Rinker. I'd like to

respond to this. I was the licensing director at the time of this enforcement action.

So Richmond Metals had received a licence. They received their material for processing, though, in batches. So they had a licence for several months with no activity, and then they received their first shipment of material. So they had begun processing, and we immediately did an inspection because this is their first time conducting their activities. We issued an inspection report with some enforcement actions. There were some minor non-compliances. But there's a proposed time for them to respond, and they did not respond in a reasonable time frame.

So we did another reactive inspection several months later, found additional non-compliances, you know, provided an additional inspection report. So in the order of about six months, there was two inspection reports with outstanding non-compliances.

It was then we arrived and issued orders to get them into compliance and to require that action. And we were not satisfied in our -- in the responses we were getting, so there was an additional order to cease operations.

So all of that occurred within a 12-month period, where they'd just started operations and for which

they were asked to cease operations, and then an additional six months for them to decommission and to have their licence revoked.

So I think the regulatory oversight was quite strong and on top of this facility as they initiated their operations. And when we realized that they were not doing so safely and not responding adequately, they no longer had a licence. So I think the regulatory oversight was appropriate, and action was taken in a reasonably short amount of time.

THE PRESIDENT: So a quick question on this. So why didn't you AMP them? And second, did they have enough financial guarantees to make sure that they can actually clean it up properly?

MR. RINKER: Mike Rinker for the record.

So yes, they did have a preliminary decommissioning plan and a financial guarantee. And it was more than sufficient to require the complete cleanup and the release of this facility.

We did take a number of considerations on what we should do from an enforcement perspective, and an administrative monetary penalty, an AMP, is a tool to encourage compliance. And we thought with the type of actions we were taking, we were not seeing any evidence that this licensee was responding to enforcement actions.

And we thought the best course of action was that they should no longer be licensed for this activity. And in fact in July they wrote to the CNSC requesting their licence to be revoked.

THE PRESIDENT: Thank you. Ms Velshi.

MEMBER VELSHI: Thank you.

I was puzzled by UniTech's licence for a waste installation facility, when it really is a shipping company, at least in Canada. So help me understand the rationale for why and what's more onerous as a result of being classified as a waste processing installation from a regulatory perspective.

MS MURTHY: Kavita Murthy for the record.

You're right. They don't have a building. They shouldn't technically be called an installation. And in fact the activity they're involved in is essentially shipping waste across the border.

Regarding the licence, this has become a requirement because UniTech actually takes possession of the materials once it's in their container. And in order for them to take possession, they need to have a licence in particular because this material goes outside of Canada. So this is a requirement under our current regulatory framework.

THE PRESIDENT: But then why is it not --

we have another shop that there is all kind of, you know, transportation. Why is it in the waste shop rather than in transportation shop?

MS TADROS: So Haidy Tadros, for the record.

That's a very good question, sir. I think what, again, this exercise of putting these facilities before you and going through them ourselves have afforded us is an opportunity to look at the consistency within the CNSC of how the licences are generated and the way that we can put standardization across nuclear substances licences.

There is a requirement if the levels become a certain amount that they become a waste nuclear substance licence according to the class of licences we currently have, but it does give us an opportunity to look at the different licences they have and where they -- where they can go with regards to a nuclear substance licence or a waste nuclear substance licence.

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

Just to complement what my colleagues are saying, the reason they need a licence is, as Ms Murray said, they take possession, but in order to ensure -- because it's going cross border, so that licence authorize UniTech to import and export that substance so they don't

have to come and ask for an approval every time. So the licence has multiple verbs.

One of them is the possession. Second is the import and export. So when they export the substance, it's a very, very low level substance, so the licence authorize them to -- for exportation because the U.S. on the other side ensures that the exporters is licensed by the national authority and then they have the regulatory oversight from Canadian perspective.

THE PRESIDENT: We understand that you need import or export, but we have uranium export -- we have our own shop that deals with all kind of transportation. I just don't understand why this particular trucking company ended up with -- with waste.

This --

MR. JAMMAL: It's not -- sorry. It's Ramzi Jammal, for the record.

It's not a trucking company we're talking about. This is the -- our taking a possession of the substance. It's not just the -- it's not the trans-shipments.

THE PRESIDENT: In Canada, it's a trucking company. What it does in the States, I don't care about.

MR. JAMMAL: But the -- it's a low level, so we have multiple licensees that allows the exportation

of the substance as part of their licence, the possession licence. So they are taking possession of the -- of the material and then they are exporting it to the U.S., so that's what the licence is providing them the authority to do two things.

It's not just a trans-shipment of the substance.

THE PRESIDENT: Mr. Collins(sic), I see you sitting over there trying to hide.

Why don't you come over here and tell us about all the other companies? Does it belong in your shop, or not?

MR. MOSES: Colin Moses, for the record.

First of all, just to clarify, while our shop does handle the transport of nuclear substances, we also handle the possession of nuclear substances. And so in this case, it's not a shipment that would require a transport licence, but it would require a possession licence because, as was mentioned previously, they do take ownership.

In terms of which shop handles it, for all intents and purposes, our regulatory approach for this level and this risk of facilities is consistent across the directorates.

I think I understand a few years ago, we

looked at what was the appropriate threshold managing a facility as a waste -- waste nuclear substance facility versus a nuclear substance facility, and there was criteria that was developed to determine whether -- which shop should appropriately manage this. And because of that criteria, this is where this activity landed.

But as I mentioned, for all intents and purposes, the impact of where you sit within each of the buckets is very minimal.

MEMBER VELSHI: So what, exactly, is it that they pick up and ship to get decontaminated?

MR. DWYER: So Robert Dwyer, for the record.

Primarily, they -- their business currently revolves around contaminated clothing and PPE at licensees' sites. They also do some quantities of like small tooling and equipment, but primarily it's decontamination of coveralls and such.

THE PRESIDENT: So I think, Mr. Moses, you're being very diplomatic.

This is so uniquely different than everything else in the facility here that I -- you may want to take and rethink this allocation of responsibilities.

MR. MOSES: I can take that back. And just to mention that there are a number of other licensees

who are in a similar situation that they possess material but don't have the physical location in Canada under our regime as well.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So slide 50.

And this is really going back to my previous question to OPG. We've got two different ways of designating an action level. One is a cumulative activity and one is a single shift level.

When I saw it put like this, I still struggle to understand how they are comparable and how that the shift level provides a regulatory perspective on where an organization would take an action in response to a dose.

MS PURVIS: Caroline Purvis, for the record.

So we want to talk about the shift related action level again.

I think it's fair to say -- and I just want to understand correctly what you're getting at, is are you concerned that we cannot bring that back to a dose limit? Is that where you're coming from?

MEMBER MCEWAN: Yeah, and I think this slide really makes the question clear because you're basically saying there were no exceedances in 2015 for the five facilities, which is fine. But you're using quite

different parameters to say whether or not there was an exceedance.

One is clearly related to a cumulative dose over a fixed period, a year or a month or three months, whereas the other is related to a single shift, which gives no sense of what the cumulative risk could be.

MS PURVIS: Thank you for clarifying.

So in the case of the central maintenance and laundry facility, you're correct, and the one that's presented is a quarter of a millisievert over the planned dose in a shift. However, this licence also has other action levels which are not presented in the slide, and they are cumulative ones as well, so there is an action level for a year as well for this facility.

So I think the absence of a complete picture as we discussed earlier can be misleading, and so we're taking a stab at trying to present action levels to give some context and I see that perhaps we have some work to do yet.

MEMBER MCEWAN: Yeah, I just think like all of the other discussions on units, it's helpful to have comparable units when they're presented in a summary fashion as they are in these reports. Otherwise, this is a very helpful table.

THE PRESIDENT: I think we want to hear

from Bruce explanation on this.

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

Yeah, I think maybe the way it's presented is a bit problematic, but shift or job, right, it can be either. Action levels are not intended to be regulatory. They're part of our internal process. They are there simply for the purpose of telling us that something in our planning didn't go correctly if somebody hit that action level, so they're all set well below anything that would be a significant dose of any kind, right, and they may be set on a shift basis for people who do a particular kind of work in a shift.

More frequently, they're set on a job basis, so if you're a mechanic working on a radioactive piece of equipment, you'll have an actual dose assignment for that job and a limit that's set for that particular job.

Those all track back into our system both electronically and through the TLD eventually, and we have different action levels within that system on individuals should their dose start to, you know, reach levels that we don't expect it to be reaching and we ask why. But the ones on the shift and the job basis are really there just to key us that something about that job didn't go the way

we thought it would, so we go look at the job.

Maybe our estimates were wrong. Maybe there was human performance error. Maybe there was something in the system that wasn't as it expected.

At any rate, we can then adjust our system to make sure it's appropriate for the next time around.

So it's kind of a little misleading to suggest those are regulatory limits. They're not regulatory limits; they're defence in depth, in essence. It's about catching the little things before they become big things.

THE PRESIDENT: While I got you, both the staff and Bruce, why is this facility not part of Bruce?

I know that, in fact, for regulatory thing you include all the employees as part of Bruce. Why does it deserve a different licence?

MR. BUHR: Hi. My name's Rob Buhr. I'm the Project Officer for the central maintenance laundry facility.

It's a good question and, in fact, we're currently looking into doing that exact thing, so the licence expires in August of 2017 and the hope is that we'll be able to roll the waste nuclear substance licence into the power reactor operating licence. So those discussions are currently under way.

THE PRESIDENT: There must have been a historical rationale. Did Bruce ask for it as a separate licence?

MR. BUHR: The original facility was licensed, I believe, in like 1983, so I think the history of that has probably been lost and now we're starting to maybe re-evaluate some of -- how some of these licences are issued.

MR. SAUNDERS: Yeah, from Bruce Power perspective, we have several different licences on the site which cause us an administrative nightmare, and we've been slowly bringing them into the -- into the overall site licence because they all operate under the same programs and the same systems. It doesn't make sense to be separate.

You'll see in this one a number of those kind of issues when they try to report the number of nuclear energy workers that work at the CMF. Well, it could be anybody on site, depending on the job assignment, so essentially you get the site number because, you know, it's not a -- it's not a defined facility. It works within our process and it's there to support the plant, so if we have an overhaul going on, we will assign people from other parts of the site to go work there.

So having it as a separate licence creates

a kind of administrative problem which is artificial, so it's our intention in the -- in the next licence to actually bring that in along with some of the other, you know, small irradiators and stuff we have on site so that they're all part of one licence because, in effect, they work under the same management program. They don't have separate programs.

THE PRESIDENT: Thank you.

Ms Velshi?

MEMBER VELSHI: Question for CANDU Energy, page 144 of the report. This is the event around inaccurate reporting of worker dose.

Can you give us more details as to what happened and even what the doses -- what the dose was and the -- any safety implications of that?

MR. BOUDENS: Gerry Boudens, CANDU Energy Incorporated, for the record.

So with respect to the report that's referenced on page 144, there were a total of 16 inaccuracies that we had discovered with respect to dose history of our workers. The majority of those were related to doses our workers had received while deployed internationally conducting service work at some of the CANDU reactors around the globe.

There were issues related to getting

timely reporting from those clients, and a couple of issues related to internal processes that we have with respect to the management of dose in that we do an assessment prior to deploying our workers to the sites, do a dose assessment and then the expectation is that they remain within those limits, but it is an estimate.

But nonetheless, we've got a good reporting culture and we report those as inaccuracies, although they're related to our internal processes.

To answer your question regarding the level of dose, I have that here. Just one moment.

Sorry. I just had to find the details in my notes here.

So the minimal adjustment was .8 millsieverts; the maximum was 1.2.

THE PRESIDENT: Okay, thank you.

Do you want to add something to that?

MS. PURVIS: Caroline Purvis, for the record.

I think it's important to clarify that the dose history issues that were reported were not for the licensed activity that we're discussing today. So just to be clear, this is -- it's outside the scope of the activities that are being reported today.

MEMBER VELSHI: Yeah, thank you.

Yeah. I think it was more on -- again, tied in with what Dr. McEwan's asking about, action levels and cumulative dose, and even if it's dose elsewhere, are you aware of it and are you taking that in as you plan work, so.

THE PRESIDENT: Dr. McEwan.

I have one -- first of all, where are we -- I know University of Alberta. I wasn't aware University of Alberta had waste facilities. But maybe they will need one because I understand -- did they apply now for decommissioning?

MS GLENN: Karine Glenn, for the record.

You're referring to the Slowpoke facility at the University of Alberta. We have -- they are in the process of putting together their application for the decommissioning of that facility.

THE PRESIDENT: It hasn't been received. No application has been received.

Okay. Thank you.

On page -- let me see if I can find it.

I'm totally lost. Okay, found it.

Page 63. So for ESC, I'm trying to understand this internal dosimetry programs of theirs, that there's -- they're doing bio assays. So the action level -- so they have here an ALARA level of 6,000

Becquerel per litre, investigation level of 12,000, and then action level is set at 23.

So what I'm trying to understand is, are these action level and those parameters are being measured against what they are actually measuring in the bio assay?

MS PURVIS: Caroline Purvis, for the record.

So the concentrations that are being expressed here in Becquerels per litre is for the measurement of the tritium concentration of the bio assay, yes, the urine bio assay. So they're looking for tritium concentrations in urine and then determining at what level it is against the ALARA level, the investigation level or the action level. And that would correspond to doses.

THE PRESIDENT: But I was impressed that they were using these as an operational kind of limit. So it will be useful to see what kind of result did they get from the bio assay in Becquerel per litres.

MS PURVIS: So if you -- so results in terms of the dose received by an individual at those levels? Is that your question, or your comment?

THE PRESIDENT: Yeah. Not in -- against millisievert that are on the graph upstairs. I'm talking about the bio assay when you measure the Becquerel per litre. In the bio assay, when you do the results.

Anybody has those numbers, or they get translated into --

MS PURVIS: So I don't have the raw numbers in Becquerels per litre. What I can say if you refer to the first paragraph on the next page, there were a number of exposures that exceeded their ALARA level, which is a very low level. And when you look at the dose consequence of the one sample that exceeded the investigation level, the dose consequence was approximately 10 microsieverts to the worker, so very, very low. But if the licensee would like to add anything, perhaps they can.

THE PRESIDENT: Well, just so everybody's focused on what my concern is, if there were those exceedance of 6,000 Becquerel per litre, they're not very, very low. I mean, the limit is 7,000 Becquerel per litre for drinking water, and I understand this is an internal measure. That's why I think I'm not understanding something.

MS PURVIS: So this is the concentration of tritium that is voided out or that is found in urine if an individual worker was exposed to an atmosphere in which they had an intake of tritium. So you can't make a comparison with the drinking water standard. This would equate to a dose to a worker.

THE PRESIDENT: So if we were at -- if one

of those bio assay result were into the, I don't know, 10,000 Becquerel per litre, we would not be concerned?

MS PURVIS: So the 12,000 Becquerel per litre, which is their investigation level currently, is equivalent to approximately 10 to 15 microsieverts of dose, so very low. Not a regulatory concern or health concern.

THE PRESIDENT: Okay. Thank you for that.

And again, on slide 66, just two comments on that particular slide.

First of all, the table, again, you know, you know my preoccupation with units. So it says -- this Table 3-8, it says annual, even though it's 000, so it's irrelevant in substance, but just for format, it says annual averages, then the tritium is measured in giga Becquerel per week and the title of the licence limit is giga Becquerel. Is that annual or per week also?

MS TADROS: I think -- Haidy Tadros, for the record.

I think Kiza Sauv   is there to answer the details.

MS SAUV  : Kiza Sauv  , for the record.

So this table, the licence limit is a total, so it is an annual amount. What the table will, in the future, be showing once Energy Solutions do have emissions -- because at this point, Energy Solutions do not

have air emissions.

If we were to keep it the same, it would show what the annual average of their weekly monitoring was. So we'll have to work at, obviously, making sure that we can compare that to the licence limit as well as including an action level for you so that comparison will be there.

If their monitoring is in gigaBecquerels per week, their action level will also be set at a weekly or a monthly average. But again, we'll work at ensuring that the tables are easily read and easily -- you can do the comparisons that you need to do.

THE PRESIDENT: Thank you.

Any final?

Okay. I think we are done with Part 2.

Any of the licensees want to make final comments?

I hear silence. That means no.

Okay. We will break for lunch.

We should do Part 3? Okay. Part 3 it is.

Ms Tadros, it's still you.

MS TADROS: Thank you, sir.

Haidy Tadros, for the record.

I'm going to pass this final section to Ms Julie Mecke, who will walk us through a status update on the waste management initiatives currently ongoing.

MS MECKE: Good afternoon, my name is Julie Mecke, I will discuss the status update on waste management initiatives.

There are three waste management initiatives, that the CNSC will discuss; the first, Ontario Power Generation's Deep Geologic Repository Project; the second, the Nuclear Waste Management Organization's Adaptive Phase Management Initiative; and third, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

The first initiative I will speak to is Ontario Power Generation's, or OPG's, Deep Geologic Repository, or DGR.

OPG's DGR is for the long-term management of its low, or LLW, and intermediate-level waste, or ILW, waste produced from OPG's owned and operated facilities.

The intended purpose of the DGR would be to provide an emplaced volume of approximately 200,000 cubic metres of package radioactive waste which would consist of about 90 per cent low-level waste and 10 per cent intermediate-level waste. It is important to note that this facility would not be for the long-term management of used nuclear fuel.

The low and intermediate-level waste is currently stored at Western Waste Management Facility. As

seen in this drawing, the proposed DGR would be located on the Bruce Nuclear site immediately adjacent to the Western Waste Management Facility. The radioactive waste would be emplaced within rooms excavated in limestone at a depth of approximately 680 metres below ground surface.

In 2011 OPG submitted an environment impact statement and application for a licence to prepare site and construct the DGR. The CNSC and the Canadian Minister of Environment then appointed a three-member Joint Review Panel, or JRP, to conduct an examination of potential environmental effects of the project and to consider OPG's application for a CNSC licence to prepare site and construct the facility.

The panel held public hearings in local communities in 2013 and 2014, for a total of 33 days. The public hearing process provided an opportunity for participants to provide input and ask questions on the project. The proceedings, with over 200 public interventions, were webcast on the CNSC website and the CNSC delivered a total of 18 presentations.

The panel issued its report on May 6th, 2015. Overall, the panel concluded that the project is not likely to result in significant adverse environmental effects, taking into account the implementation of the mitigation measures committed by OPG together with the

mitigation measures recommended by the panel, and it is not likely to cause significant adverse effects on Aboriginal interests. The report included 9

In February of this year the Minister of Environment and Climate Change requested that OPG conduct additional studies and provide additional information prior to making a decision on the environmental assessment. Specifically, the Minister requested additional information on alternative sites for the project, cumulative environmental effects of other projects in the vicinity of the proposed location and mitigation commitments.

In April 2016 OPG responded to the Minister's request, indicating that additional information would be submitted by the end of December 2016. On December 12th, 2016 the Governor in Council announced its decision to extend the time limit for the issuance of a decision statement on OPG's DGR by 243 days.

If an environmental assessment is approved, the panel will then make a licensing decision. No regulatory decisions have been made to date.

Now I will discuss the second initiative, which is the NWMO's, or Nuclear Waste Management Organization's Adaptive Phase Management Initiative for a Deep Geological Repository for Canada's used nuclear fuel.

CNSC Staff provided an update on CNSC's

role and outreach activity at the Commission meeting on February 4th, 2015. The NWMO was established in 2002 by Canada's Nuclear Energy Corporations: Ontario Power Generation; Hydro Quebec; and, New Brunswick Power Corporation, and they did this in accordance with the *Nuclear Fuel Waste Act*.

Under the *Nuclear Fuel Waste Act* the NWMO is responsible for long-term management of Canada's used fuel bundles, removed from commercial or research reactors. The selected approach for the long-term management of used nuclear fuel is the Adaptive Phased Management or APM. No application has been submitted by the NWMO.

It is international best practice for the regulator to get involved early in these initiatives that may involve the long-term management of radioactive waste, such as a deep geological repository for used nuclear fuel.

CNSC is involved early in the process to ensure that the future licence applicant, the NWMO, and potentially affected communities, have a comprehensive understanding of the CNSC's role in regulating Canada's nuclear sector and, if a licence were submitted to CNSC in the future, the public hearing process.

CNSC operates in an open and transparent manner. As such, CNSC staff posts information on our early involvement on the CNSC website. The following are examples

of activities that CNSC have conducted. We conduct outreach activities to explain our role, we highlight the science that CNSC is conducting internationally on deep geological repositories and how this could be used in future regulatory decision making.

We identify regulatory requirements to the future applicant. One way the CNSC has done this is to conduct a pre-licensing review of conceptual design and an illustrative safety assessment associated with two hypothetical but realistic sites; one that has crystalline rock formation and one that has sedimentary rock formation. Also to provide feedback early in the process CNSC Staff have conducted an assessment of the NWMO's management system for contractor procurement process for citing.

CNSC involvement will continue to expand as the AMP initiative moves forward.

Now I will focus on CNSC's pre-licensing outreach activities. At this early stage, before a licence application has been submitted, staff outreach activities serve to explain CNSC's regulatory role as the independent watchdog and also to build relationships with these communities.

CNSC meets with communities, First Nations, Métis citizens who have expressed interest in learning more about CNSC's regulatory role. The format and

sequencing can be as follows: a day-long meeting with CNSC specialists in Ottawa; CNSC presenting at meetings in the community; and also, CNSC conducting open houses in the community. All of these activities are performed at the request of communities.

This map shows two things: first, the blue circles are the communities who are still in the NWMO's Learn More Process, there are currently nine; second, it also shows CNSC's outreach activities that were conducted in 2015, as shown by the purple squares. So the green-coloured triangle represents CNSC Staff being invited to the community to present, and the purple-coloured squares represent where CNSC Staff have been requested by the community to conduct a CNSC open house.

In addition, in 2015 CNSC Staff met with Spanish Neighbouring Liaison Committee and the Métis Nation of Ontario in Ottawa.

These are CNSC key messages when we're conducting outreach activities. First, CNSC is the independent regulator and we conduct our own independent research. Next, there has been no licence application and it is early in the process. CNSC does not promote the APM initiative and nuclear energy, nor does it create energy policy. CNSC's role is to ensure safety.

Last, I will discuss the joint convention

on the safety of spent fuel management and on the safety of radioactive waste management, or Joint Convention.

Canada was one of the first countries, known as contracting parties, to ratify the Joint Convention which came into force in June of 2001. The CNSC coordinates and submits the national report on behalf of Canada. These reports represent collective work and involve cooperation from various federal departments as well as input from licensees and industry organizations.

Canada's national reports are published together with responses to questions received from other contracting parties. All Canadian national reports can be found on CNSC's website.

The fifth review meeting of the Joint Convention was held in May 2015 in Vienna. Canada presented its fifth national report. On August 20th, 2015 the CNSC presented an overview of the fifth review meeting at a Commission hearing.

Regarding the next steps, this sixth national report will be submitted in October of 2017, and the sixth review meeting will take place in May of 2018.

Now I will hand the presentation back to Ms Tadros.

MS TADROS: So these are our final sort of concluding slides of the regulatory oversight report that

you've had before you today. I'll skip through the next slide, because I think you've heard CNSC Staff's overall conclusions with regards to licensees' programs, you've seen this slide before, and basically welcome any comments or questions you may have on what we've presented today with regards to this third section and how to move forward.

THE PRESIDENT: Thank you. Before we do that, I'd like to give the floor to OPG and NWMO if they want to add any comment. I know that we have some representative from NWMO on the line. Can you hear us?

MR. GIERSZEWSKI: I can hear you fine, yes.

THE PRESIDENT: Thank you. So OPG?

MS MORTON: Lise Morton, for the record. We have no further comment.

THE PRESIDENT: NWMO?

MR. GIERSZEWSKI: Thank you, Mr. President, Members of the Commission. So, for the record, my name is Paul Gierszewski, I am Director of Safety and Licensing at NWMO. I'd also like to introduce the other NWMO participants that are with me on the phone today, in particular Derek Wilson, Vice-President, Design and Construction; and Lisa Lang, Senior Advisor, Regulatory Affairs.

Consistent with our mandate, the NWMO is

safely implementing Canada's approach for long-term management of used nuclear fuel. The NWMO is presently in a site selection process and this is a multi-year process.

We understand the Commission will be interested and will have questions on our program, so we are therefore in the process of arranging a full briefing of the Commission in 2017, probably at its June 2017 meeting. At that time, we will be able to provide a complete history and status of our program.

We have no comments on this CNSC annual report. Thank you.

THE PRESIDENT: Thank you. Ms Velshi.

MEMBER VELSHI: So is this where we do the interventions?

THE PRESIDENT: I guess you didn't figure it out yet? We are in interventions, Ms Velshi, go ahead.

MEMBER VELSHI: Thank you.

So there are a few from Northwatch that I wanted to start off with, one was the easy one on the typos on the association versus agency. But a confirmation that both the IAEA and the NEA where you discuss collaboration on regulatory stuff there is no industry participation, is that correct?

MS TADROS: Haidy Tadros, for the record. The NEA will have industry participation,

whereas the IAEA will not.

MEMBER VELSHI: Thank you. So Northwatch, a couple of issues that they raised and I'd like to get your comments on that. One was around transparency, CNSC transparency, especially around technical reviews that you have done and how much public disclosure there is, so if you can comment on that?

The second one was around your outreach activities and the effectiveness of that, and they've done some kind of a survey. Again, I'd love to get your thoughts on that please.

MS GLENN: Karine Glenn, for the record.

With respect to the transparency, specifically the issue raised by Northwatch, was related to the CNSC review of the two cases that had been submitted. We have just completed those cases, and I will pass it on to the specialist to provide further information of where the status of the summary and posting of the summary is.

But with respect to the survey that was undertaken by Northwatch, the role of the CNSC at this point in time, we are in pre-licensing. No application has been submitted by the licensee. So when the CNSC does go out and do outreach in the communities, as Ms Mecke mentioned in her presentation, we do so at the request of the communities, and we have not refused any requests that

have come before us.

When the communities are ready, whether it be an Indigenous community or a municipal government or community liaison committee that contacts us, it's when they're ready and when they're ready to engage. Then we will go into the community in the format that they prefer. If they ask for us to have an open house, we will go and have an open house. If they want us to just give them a briefing, that's what we will do.

In all cases, we do not specifically discuss the APM project. We are there to explain the role of the CNSC, the role of the Commission the processes that projects have to go through in order to get licensing, the environmental assessment process that they have to undergo before they move through.

Sometimes we'll be in communities where there's already nuclear facilities, we'll bring project officers from those areas, such as when we go up to Elliott Lake, we'll bring project officers from the Blind River Conversion Facilities and people that are familiar with the decommissioned mine sites. We are there to represent the CNSC and speak about the regulator's role in regulating the nuclear industry, not to speak to the APM project specifically.

When we do go and do these outreach

activities, it is dependant, if we're going to speak at a meeting of the community liaison committee upon their invite, it is up to the community liaison committee to determine how they want to publicize that; if they want to invite others or if they want to put it in the paper.

When CNSC Staff go and do an open house, we undertake a comprehensive advertising campaign if you'd like. We advertise in the newspapers, we'll do mail drops, we have to taken advantage of electronic billboards in the communities. We send letters to neighbouring communities, to their mayors, we also send letters to Indigenous group leaders and invite them and tell them that we're going to be in the community. So we do publicize that quite well. We also will tweet about it on our website.

MEMBER VELSHI: Thank you. So on this outreach and effectiveness, were you surprised with what the survey indicated? Secondly, at what stage would you more proactively go out in the community as opposed to wait to get invited?

MS GLENN: Karine Glenn, for the record.

The questions in the survey that they discuss were specifically to the knowledge of APM project. Any outreach specific to the APM initiative, or the future repository, that is NWMO's -- at this point, that's part of their role. They're going into the community, explaining

the project, and I'll let NWMO speak to that.

So I'm not surprised with the questions asking specifically about the APM project when the CNSC's -- when we go out into the community at this point in time, we're not speaking to the project, it doesn't surprise me, because that's not our goal at this point in time.

Given the fact that there are still nine large areas still being considered for siting the repository at this point in time, some of them more in northern parts of Ontario, some more in the southern part, it is still too early for the CNSC to really go out and specifically speak to the project, because it is very early in the project. The regulatory process would engage when an application is received or a letter of intent is submitted.

I'll ask Ms Julie Mecke to speak to your first question, which was about the posting of the summaries from the reviews.

MS MECKE: Julie Mecke, for the record.

CNSC does have a comprehensive website on the APM initiative and how we're talking to communities, getting out there early, also on our independent research, our international activities.

So in 2011 we did post information that we are going to be conducting these pre-project technical

reviews/reports. We have posted a summary statement on our website too to indicate the conclusion of our review of those reports, and the recommendations are all in the hands of NWMO. Thank you.

MEMBER VELSHI: So if Northwatch or someone else actually wanted to get a copy of the full report and requested that, would that be made available to them?

MS TADROS: Haidy Tadros, for the record. The answer would be yes. Once requested, the report, once it's been reviewed, would be made available.

THE PRESIDENT: Okay. Well, let's be specific. She makes some allegations here, January 2012, this is on page 18, reports were asked for, not received.

MS TADROS: Haidy Tadros, for the record. So, specifically, to some of the points that were raised in the intervention, the circumstances there was our understanding was the reports would be made available once CNSC staff have reviewed and were submitted all the information that were requested of NWMO. At that time the report, once completed, would be made available.

So again, that specific circumstance was an understanding that the report would be made available once we finished our review and, at that time, the review

had not been completed.

THE PRESIDENT: So this is 2016. Are you telling me it's still in draft form and it's not been reviewed and released?

MS GLENN: Karine Glenn, for the record.

I'll ask Ms Julie Mecke who's the project officer responsible for the APM work that we're conducting to provide the timelines with the submission and the review.

THE PRESIDENT: Okay. While you do that, is it not our policy that all research that we received, supported -- in fact, I thought we setup -- you setup an international advisory group, were supposed to do independent research, and any one of those research that we commission, we receive from our friends internationally would automatically post?

MS MECKE: Julie Mecke, for the record.

So I'll first provide the timelines on the pre-licensing review. Just to clarify, the first time that we received an email from the info account was in 2011, so that was before we actually received the reports.

So the first report for the crystalline was submitted December 22nd, 2012, and then a year later the report on sedimentary was submitted to CNSC Staff. CNSC completed our reviews of the crystalline report on March

3rd, 2014 and February 26th, 2015 we completed our report on the sedimentary. The later timeline was because resources were diverted to OPG DGR, so staff involved in reviewing the pre-licensing reviews were heavily involved in the review of the OPG DGR.

NWMO staff dispositioned both the reports and submitted disposition on the crystalline on November 7th, 2014 and August 21st, 2015 on the sedimentary. CNSC Staff then compiled, dispositioned all their comments into one kind of report which was submitted, which became our executive summary report which was posted on our website.

Between --

THE PRESIDENT: Sorry to interrupt, but I'm missing -- whose reports are they? They were submitted by whom?

MS MECKE: So they were submitted by the Nuclear Waste Management Organization as part of the initial service agreement. So part of the initial service agreement was for CNSC Staff to conduct these pre-project reviews. Both reports are available on their website and they were made available in 2012 and 2013.

THE PRESIDENT: I'm missing something. If they submit a report to us for review, why aren't we posting their report before we do the review? It's their report, it's not our report.

MS MECKE: So it is their report, but we did -- again, on our website we have information since 2011 that we were going to be conducting these pre-project licensing reports, and NWMO did post them on their website. We do have a couple of links on our website. If you want more information, you know, go to the NWMO website to get information on it.

THE PRESIDENT: No, but I'm missing something. Sorry to belabour this. When they submit us a report, do they post that report or do they wait for us to review it before they'll...? You know, they're independent of us, what they submit to us should automatically go out.

NWMO, is that your understanding of what needs to be done?

MR. GIERSZEWSKI: Paul Gierszewski, for the record.

In each case these reports were posted to our website as soon as they were completed, at the same time they were passed on to the CNSC for comment. So they've certainly been on our website.

THE PRESIDENT: Why is Northwatch saying it's not available? The CNSC analysis may not have been available, but the NWMO report was available, is that correct?

MR. GIERSZEWSKI: Paul Gierszewski, for

the record.

Yes, our report is available, and the CNSC review has not been completed and posted to the website.

THE PRESIDENT: Okay, thank you for this clarification. Ms Velshi, I interrupted you.

MEMBER VELSHI: Thank you. Did you have anything to add?

MS TADROS: Haidy Tadros, for the record. Thank you. Just a point of clarification. Our reviews have been posted to the website. As of December 5th, those reviews have been posted to the website.

THE PRESIDENT: Thank you.

MEMBER VELSHI: NWMO, did you have any comments on the outreach activities survey done by Northwatch?

MR. GIERSZEWSKI: Paul Gierszewski, for the record.

No particular comments on their survey. Certainly, we have an extensive outreach program with the communities and we can describe that in more detail when we come before the Commission in 2017.

MEMBER VELSHI: For those communities that are in Step 3, do you encourage them to request CNSC to hold open houses and have meetings with them?

MR. GIERSZEWSKI: Paul Gierszewski, for

the record.

Definitely in the conversations we have with the communities we're very clear that there is a federal -- there's a regulator and who they are, and we encourage them to reach out to them if they wish.

We're not involved in that actual communication, but we do provide some funding for those communities involved in our programs to just help make that happen. But we certainly encourage them to reach out to the CNSC if they wish to.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: No questions.

THE PRESIDENT: So coming back, I don't know if you answered the question, what happened to the International Advisory Group and some of the research that CNSC was supposed to commission? Is that in process? Has anything been produced?

I recall in some measurement that there was all kinds of research was done on their geological practices, internationally, by CNSC. Is that all posted?

MR. McALLISTER: Andrew McAllister, Director of the Environmental Risk Assessment Division.

So I'll start with the Independent Advisory Group, and then move ourselves down to research.

So the Independent Advisory Group is an international best practice where this group is composed of Canadian geoscience experts with really a goal -- I guess multiple goals. One is to look independently and critically at the research program the NWMO has in place as well as to look at ourselves and the research program that we have in place, we have our independent research program in place, and to provide recommendations regarding means to improve them both and certainly looking forward to maybe other items that come up.

So the Independent Advisory Group is not undertaking research, they are an advisory body to ourselves regarding research happening by ourselves and by that of NWMO.

With respect to independent research, I would certainly encourage everybody to look at our website. We have gone through and done a couple of different products to help disseminate this independent research. One is to do more of a graphical timeline, which sort of lays out the evolution of CNSC's independent research program, showing how it evolved during the ACB days, the CNSC days, corresponding with the Seaborn Panel, the OPG's DGR, the APM, really to give that visual of how things have evolved.

Then for the visitor who wants more information, it drops down to giving more short summaries

of key pieces of research and their importance with respect to safety. So all of that is captured up on our website.

To echo your comment, President Binder, as CNSC Staff, we do independent regulatory research, that research gets published in peer review journals, and we make that available through our website. So we continue to disseminate that information in a very transparent manner.

THE PRESIDENT: I think what the interveners are arguing is that there's room for improvement in the relationship between NWMO and us, the CNSC. I don't know, you know, you may want to look at it whether they -- you know, CEAA is a registry, that everything that comes through on a particular project gets published automatically. I'm not suggesting you do that, I'm just suggesting you consider if it's required, better improvement.

I found your outreach programs impressive in fact. I've seen some of their material you actually present, and some of the outreach in there. You can always do more, obviously. But I like the idea that you never say no to anybody who invites you to attend, so that's good.

The intervener makes a couple of suggestions about dating pictures and some of those things. I think they're right on, you should do that. So there's some good stuff in this intervention that you should take

under advisement.

NWMO or OPG, anything you want to add to all of this?

MR. GIERSZEWSKI: Paul Gierszewski, for the record.

No, not at this point.

THE PRESIDENT: We're looking forward to your in-depth presentation sometime in 2017. Presumably, we'll also hear the fate of the DGR sometime in 2017.

So no other questions? Okay, thank you. We'll resume at 1:30, thank you.

--- Upon recessing at 12:45 p.m. /

Suspension à 12 h 45

--- Upon resuming at 1:34 p.m. /

Reprise à 13 h 34

CMD 16-M70/16-M70.A

Oral presentation by CNSC staff

THE PRESIDENT: Okay, we are back. The next item on the agenda is a decision item on a proposed Regulatory Document, REGDOC-2.2.4 Fitness for Duty: Managing Worker Fatigue, as outlined in CMDs 16-M70 and 16-M70.A.

I understand that staff -- somebody from staff will present it. It doesn't say who here, so please identify yourself.

MS OWEN-WHITRED: Bonjour, Monsieur le Président, Membres de la Commission. My name is Karen Owen-Whitred, Director of the Regulatory Framework Division.

With me today are Greg Lamarre, Director General, Directorate of Safety Management; André Bouchard, Director of the Human and Organizational Performance Division; and Helen McRobbie, Human and Organizational Factors Specialist from the Human and Organizational Performance Division.

We are here today to request that REGDOC-2.2.4, Fitness for Duty: Managing Worker Fatigue, be approved for publication and use by CNSC staff in assessing the acceptability of licensees' provisions for managing worker fatigue.

Before turning the presentation to Monsieur Bouchard, I will briefly review where REGDOC-2.2.4 is situated within the CNSC's regulatory document framework.

To enhance accessibility of our regulatory expectations, the CNSC structures our regulatory documents according to the framework shown here. This slide shows

where REGDOC-2.2.4 fits into the CNSC's broader document framework. It is situated within Section 2.2, Human Performance Management.

Fitness for duty is going to be addressed in two different regulatory documents. The one we are presenting today focuses on worker fatigue. In March, we will be presenting a second regulatory document addressing fitness for duty more broadly.

I would now like to turn the presentation over to Monsieur Bouchard.

MR. BOUCHARD: Thank you.

Bonjour. Mon nom est André Bouchard. I am speaking to you today in my capacity as the Director of the Human and Organizational Performance Division, which is the technical lead for this document.

During today's presentation, staff will identify the objectives of the regulatory document and the rationale. We will describe the history of the CNSC's actions addressing worker fatigue and the input considered as the document was developed. We will take you through the public consultation process, identify some of the key themes from the comments received and provide you with an overview of the content of the document. The presentation will close with a discussion about implementation, staff's conclusions and recommendations to approve REGDOC-2.2.4 for

publication.

REGDOC-2.2.4, Managing Worker Fatigue, sets out CNSC's proposed requirements and guidance for managing fatigue-related risks at high-security sites across Canada. The REGDOC will provide a consistent, transparent, risk-informed basis for licensing and compliance activities. The objective of these requirements is to minimize the potential for fatigue-related errors that could affect nuclear safety and security.

I will now turn the presentation over to Ms McRobbie.

MS McROBBIE: Good afternoon. I am Helen McRobbie and I am a Human and Organizational Factors Specialist with the Human and Organizational Performance Division at the CNSC.

The CNSC focuses on risks associated with human performance because workers are a key contributor to nuclear safety and security. The workforce at nuclear plants is well trained and highly skilled. There is a minimum number of people with the right qualifications onsite at all times who can address any operational or security issues that may arise. Some of these workers are certified by the CNSC because of the direct impact they can have on nuclear safety.

The General Nuclear Safety and Control

Regulations require licensees to ensure the presence of a sufficient number of qualified workers. It is implicit in this requirement that workers must be fit for duty.

Science shows that fatigue can degrade a wide variety of cognitive abilities, ranging from vigilance to decision-making. The effects of fatigue have been called cognitive slowing. Fatigue changes a person's brain functioning. No matter how well qualified a person is, fatigue can degrade his performance. Fatigue has been identified as a factor in high-profile events and at various industries. Researchers have also pointed out that many high-profile events have happened in the middle of the night and fatigue was likely a factor. Due to the effects of fatigue on performance, risks related to fatigue must be effectively managed.

The CNSC's limits on hours of work address three types of fatigue.

Acute fatigue is caused by extended hours awake or restricted sleep short term. Research consistently shows significant performance declines after approximately 17 hours awake. A daily limit on hours of work and minimum daily recovery periods are aimed at limiting acute fatigue.

Cumulative fatigue is caused by mild sleep restriction over a series of days that results in

insufficient recovery from acute fatigue. Research shows the performance impairments increase as sleep loss accumulates across consecutive days. Cumulative fatigue is addressed through limits to the number of consecutive shifts and recovery periods.

Night work poses a greater risk for fatigue than day work due to the body's natural rhythm that varies over a 24-hour period, known as the circadian rhythm. People experience fatigue when they work through the night because their body's natural tendency is to sleep at night. Night workers may also struggle to sleep during the day since the body's natural tendency is to be awake. Recovery from fatigue requires sufficient sleep.

To summarize this slide, a person's work schedule can affect fatigue because it sets the boundaries for the timing and duration of sleep.

With this regulatory document, the CNSC will formalize its position on fatigue and provide clear, enforceable and risk-informed requirements for the management of fatigue. This includes expectations related to 12-hour shifts.

Although other jurisdictions in Canada have some limits on hours of work, no other Canadian regulator addresses fatigue and hours of work for the purpose of ensuring nuclear safety and security.

Lastly, fatigue is one of the impairment risks that affects fitness for duty and it needs to be addressed as part of the CNSC's regulatory initiative for strengthening oversight of fitness for duty.

The CNSC has been active in the area of worker fatigue for many years. Nuclear reactors have certain workers who must be onsite at all times. Round-the-clock coverage used to be achieved by three 8-hour shifts instead of two 12-hour shifts, as is done today.

Ontario Hydro was the first licensee to request the Atomic Energy Control Board's approval to change from 8-hour to 12-hour shifts in the 1980s. At that time, Ontario Hydro included what is now Ontario Power Generation and Bruce Power.

During Ontario Hydro's trial period of 12-hour shifts, the AECB hired a research consulting company to prepare a report based on scientific literature and on Ontario Hydro's experience during the trial period. When the AECB accepted Ontario Hydro's change to 12-hour shifts, it issued a letter specifying that certain limits on work schedules had to be included in the licensee's procedures. These limits on work schedules were based on the expert advice provided in the research report.

Since that time, CNSC staff have conducted

oversight activities to assess licensee compliance with their hours of work procedures. These oversight activities have identified opportunities to clarify regulatory expectations and to improve consistency between licensees.

Since 2009, nuclear power plant hours of work procedures have been referenced as compliance verification criteria in their Licence Condition Handbooks. The development of this regulatory document is an evolution based on this history.

There are three key inputs to the regulatory document.

The first input is research. Staff have considered three reports carried out by research consulting companies for the CNSC and research reports conducted by licensees. In addition, staff have reviewed literature, some of which is summarized in the synopsis of science and benchmarking included in the CMD package. Research considered has come from a broad range of industries, including transportation, mining, petrochemical and defence.

Secondly, CNSC staff have benchmarked against other regulators in Canada and with nuclear regulators internationally and have incorporated best practices into the regulatory document.

The third input to the REGDOC is feedback

received during public consultation. Staff considered public consultation comments in light of scientific information, risk and benchmarking.

I will now turn the presentation to Monsieur Bouchard to discuss public consultation.

MR. BOUCHARD: André Bouchard for the record.

Staff has consulted extensively on this regulatory document. Public consultation occurred in two phases. The reasons for two phases is that the regulatory document was changed significantly in Phase 1 and CNSC staff determined that the revised document should be posted for full public consultation a second time around.

Key activities in each phase of the consultation are shown in the slide. The numbering change from REGDOC-2.2.1 in Phase 1 consultation to 2.2.4 in Phase 2 is related to the revised regulatory framework numbering system.

Staff has gained a better understanding of stakeholder positions through the range of consultation activities conducted. The outcome of the consultation activity is that many concerns raised by stakeholders have been addressed.

I will now provide an overview of the themes emerging during the public consultation.

There were four key themes: the worker population, prescriptive limits on hours of work, exceptional circumstances and the potential for administrative burden. I will discuss each of these themes in the next slides.

The initial draft regulatory document included one population and all requirements applied to this single group.

Based on what we heard during the consultation, CNSC staff modified the approach in the second draft of the REGDOC to include a graded approach with two populations.

The programmatic fatigue management provisions would apply to the broad population of workers who have the potential through their work activities to pose a risk to nuclear safety or security.

The limits on hours of work would apply to a smaller subset of workers who fill safety-sensitive positions. A person in a safety-sensitive position has a role where impaired performance could result in a significant incident.

Safety-sensitive positions will be identified by licensees through a risk-informed analysis. However, the regulatory document specifies that this population must include staff certified by the CNSC,

certain security personnel and members of the minimum staff complement unless they are excluded by the risk-informed analysis.

The REGDOC also includes guidance to clarify that licensees may exclude workers from the broad population if they do not have the potential through their work activities to pose a risk to nuclear safety or security. An example might be the administrative staff. An excluded worker would still fall under applicable provincial or federal hours of work limits.

The second consultation theme relates to limits on hours of work. Stakeholders provided comments about certain limits during both rounds of consultation and the apparent lack of a graded approach.

As a result of comments received, the requirements have been modified to further focus on the highest risk aspect of shift work, which are long work days, night work and long work weeks.

The regulatory document now includes two populations and the limits on hours of work apply to those who fill safety-sensitive positions. This constitutes the first dimension of a graded approach.

The second aspect of the graded approach built into the REGDOC is the flexibility for a licensee to choose between 8-, 10- or 12-hour shifts. The complexity

and the prescriptiveness is proportionate to the increasing fatigue potential that is linked with the length of work days and night work.

The third consultation theme relates to exceptional circumstances.

The REGDOC recognized that the licensee may have to exceed limits on hours of work during exceptional circumstances such as severe weather.

The REGDOC also includes guidance about measures that licensees should implement during these exceptional circumstances, including those when workers must remain onsite for longer than 16 hours. Examples of these measures are providing reasonable accommodation for workers to obtain restorative sleep and delaying non-essential activities.

The REGDOC also includes recordkeeping requirements during exceptional circumstances. Records would enable CNSC staff to maintain oversight of these occurrences.

The final theme is the potential for administrative burden. The document has been modified in a variety of ways with the intent of reducing the administrative burden, while not compromising safety.

As already described, the most significant change is applying the limits of hours of work and recovery

periods to a smaller group of workers who fill safety-sensitive positions.

The requirement in the REGDOC focuses on the greatest risk factor for fatigue in work schedules which are, as we said, night work, long work days and long work weeks.

Some advised practices were moved to guidance. As an example, the expectation that daily hours should normally be less than 13 was moved to guidance, while the requirement of 16 hours of work in a 24-hour period was maintained.

In addition, some of the changes requested by stakeholders to match licensees' current practices were incorporated into the REGDOC.

Stakeholders also raised a concern about the administrative burden of providing immediate reports of non-compliances with the limits.

Reporting provisions are set in other REGDOCs like 3.1.1, Reporting Requirements for Nuclear Power Plants. REGDOC-2.2.4 does not set reporting requirements on its own. REGDOC-3.3.1 currently requires a quarterly report of non-compliances, with limits of hours of work for certified staff.

I will now turn the presentation over to Ms McRobbie to describe the content of the REGDOC.

MS McROBBIE: Helen McRobbie for the record.

The regulatory document is divided into two sections. The first section includes fatigue risk management elements that apply to the broad population of workers. The second section includes limits on hours of work that apply to a smaller set of workers who fill safety-sensitive positions.

This slide provides an overview of the programmatic fatigue management elements included in the REGDOC.

The programmatic elements have been identified through a research report prepared for the CNSC in 2013 and through research and benchmarking with other industries. These elements are consistent with licensee management systems and the Canadian Standards Association N286, Management System Requirements, but add specificity related to fatigue management. The programmatic elements are also consistent with the upcoming fitness for duty REGDOC that will be presented to the Commission in March 2017.

Staff want to highlight that the problem identification and resolution section has been based on a best practice from the Transportation Safety Board. The Transportation Safety Board is an independent body that

investigates transportation events. When they investigate events, they look at work schedules and the role of fatigue. The problem identification and resolution section draws on the method used by the Transportation Safety Board.

The second section of the REGDOC, which applies to workers who fill safety-sensitive positions, includes limits on hours of work and recovery periods. The goal of the limits is ensuring workers have sufficient sleep opportunities. Research shows four ways to achieve this goal.

On the far left, people must be provided with sufficient time for sleep daily.

The second box relates to consecutive shifts. If people get less sleep than they need daily, a sleep debt occurs. Performance declines proportionally as the sleep debt builds across consecutive days. The intent of restricting consecutive shifts is to limit the build-up of sleep debt.

The third box relates to time off. Research shows people sleep more on days free from work. Time off gives people time to recover. When night shifts are worked, this time off also allows people's circadian rhythm to return to a day schedule.

The final box in this framework shows

limiting average weekly hours as a safeguard against cumulative fatigue. As hours worked during a week increase, research shows that people sleep less and are more likely to experience errors and accidents.

Underlying this framework is the timing of work. It is clear from research that night work poses a greater risk for fatigue than day work. This framework was used in the performance-based requirements that apply to the broad population.

The requirements in the REGDOC set a maximum number of work hours within 24 and 48 hours. Research reports conducted for the CNSC have stressed the importance of a daily limit on hours of work of 16 hours. The two-day limit is intended to prevent consecutive 16-hour shifts.

The REGDOC includes a recovery period of at least eight consecutive hours between shifts. It also includes guidance that the recovery period should normally be 11 hours so people have a sleep opportunity in the range of 7 to 8 hours daily. Some benchmarking data is included in this slide.

The REGDOC also includes limits applicable to a week and to a longer-term period. The original REGDOC included a limit of 60 hours in a 7-day period. Some stakeholders asked for clarity that this is a fixed period.

Other stakeholders asked for some added flexibility by making the limit 60 hours on average over multiple weeks. Staff have attempted to accommodate both requests by giving licensees the option of choosing between a fixed 7-day period or a rolling 14-day period.

In addition to this weekly limit, the REGDOC also includes one longer-term limit. The weekly limit gives licensees flexibility to schedule higher overtime levels short term. The longer-term limit ensures that people in safety-sensitive positions are not consistently working 60 hours per week. Once again, some benchmarking data is included in this slide.

The REGDOC includes limits on the number of consecutive shifts. The intent of limiting consecutive shifts is to restrict the build-up of sleep debt and related performance impairments.

The next slide shows a relative comparison of fatigue levels associated with different numbers of consecutive shifts. Some of the benchmarking information in this table is shown graphically in Slide 24.

When requests were made by stakeholders to modify the limits in the REGDOC, staff considered the requests in light of science and benchmarking.

As a final check, when considering requests from stakeholders, CNSC staff considered the rank

ordering of limits in terms of anticipated levels of fatigue experienced.

The relative fatigue levels shown in this graph were calculated using software that is based on fatigue science. The Y axis of the graph shows relative fatigue levels and has anchors of low at the bottom and high at the top. The X axis shows various shift sequences.

As a reference point, the first bar shows fatigue levels expected for a person who works five 8-hour days from 9 to 5. All of the other bars represent 12-hour shifts.

Moving along from left to right, the bars show six 12-hour day shifts, two days followed by two nights, three nights, and so on, up to the final bar of six consecutive 12-hour night shifts. This animation shows the limits of the REGDOC and shift sequences that are outside of what is permissible in the REGDOC.

The final animation superimposes colour to provide additional information about the requirements. Both the green and yellow portions of the graph are within the accepted practices in the regulatory document.

For the two bars shown in yellow, the REGDOC includes guidance. For example, the REGDOC includes guidance that a normal work schedule should include three or fewer consecutive night shifts. When a mix of days

followed immediately by nights are worked, the REGDOC includes guidance that a limit of two night shifts should apply. The guidance could be thought of as an administrative limit or advisable practice.

The shift sequences shown in red are outside the limits of the REGDOC.

So on this slide, I had meant to animate this to make it easier to see, but moving from left to right we have added in some benchmarking data. So it's the same graph as was shown on the last slide, with a few extra points added in.

So in France, workers are limited to 44 hours per week when work is done at night. Workers at nuclear plants in France work 8-hour shifts.

The next point at three nights as we move along. The limit of three 12-hour nights is in effect for all workers in Switzerland as well as for U.S. pilots. Transport Canada has proposed a similar limit for Canadian pilots.

The next data point at four nights shows workers in Europe, including workers at nuclear plants. All workers in Europe have a limit of eight hours per night on average for night work.

Canadian Motor Carriers, shown in the second last blue bar to the right, are limited to 70 hours

in a 7-day period.

At the far end, nuclear workers in the U.S. are limited to 72 hours in any 7-day period. Although the U.S. NRC allows up to six nights, minimum day off requirements would prevent this from being done routinely. The U.S. NRC's requirements do not differentiate between days and nights.

Although the REGDOC would allow for six consecutive day shifts, it sets more restrictive limits on night shifts due to the higher levels of fatigue associated with night work.

This is the same graph shown again with sequences currently scheduled by licensees.

OPG and Bruce Power normally schedule up to three consecutive 12-hour night shifts. CNL Security workers are scheduled to work up to two 12-hour day shifts, immediately followed by three night shifts. New Brunswick Power currently schedules up to four night shifts. As a note, all scheduled hours of work fall within the limits of the REGDOC.

This is the same graph with upper limits of licensees shown.

OPG and Bruce Power already have an upper limit of four consecutive nights and are within the limits of the REGDOC. CNL Security is currently permitted to work

two days followed immediately by five nights. NB Power currently allows up to six night shifts.

I will now pass the presentation over to Monsieur Bouchard, who will discuss implementation.

MR. BOUCHARD: André Bouchard for the record.

If approved, REGDOC-2.2.4, Fitness for Duty: Managing Worker Fatigue, would be immediately published on the CNSC website following the Commission's decision.

REGDOC-2.2.4 would be added to the Recommendations and Guidance section of licensees' LCH.

An implementation plan and timeline for including the REGDOC as Compliance Verification Criteria in the LCH would be established through consultation between CNSC staff and each licensee.

CNSC staff would monitor implementation progress.

In the meantime, licensees' hours of work, which are currently Compliance Verification Criteria in the Licence Condition Handbook, will remain for routine oversight.

The next two slides provide an overview of the implementation challenges raised by New Brunswick Power and Canadian Nuclear Laboratories during consultation and

again in letters to the Commission Secretary last week.

New Brunswick Power has identified several sections of the REGDOC that they are currently meeting with their existing governance. Their key implementation challenges are related to two specific requirements, the limits of four consecutive 12-hour nights and weekly or biweekly limits. New Brunswick Power indicated that they would also face challenges during outages.

New Brunswick Power has proposed a phased-in approach with medium- and long-term timeframes for implementation. New Brunswick Power communicated that they would need to increase certified staffing levels to be able to comply with the requirements of the REGDOC. Obtaining more qualified staff will take time.

CNSC staff support New Brunswick Power's proposal for a phased-in approach. The details of the implementation timeframe and oversight will be developed with the licensee. Staff will monitor progress towards the full implementation of the REGDOC and propose to provide updates to the Commission in the annual regulatory oversight report for nuclear power plants.

The Canadian Nuclear Laboratories, CNL, is the second licensee facing implementation challenges. During consultation, CNL has indicated that they have two key areas of concern. One is specific to NRU and the

second one is related to security shift schedules.

To comply with all requirements, CNL would need to increase the number of certified staff for NRU. Since NRU will be shut down in roughly 14 months, increasing the number of certified staff at NRU is not a reasonable option.

For security, CNL has implemented a schedule that includes components that are not aligned with the requirements on the REGDOC. In the letter submitted by CNL to the Commission Secretary last week, they have proposed that the REGDOC be modified to allow licensees to establish their own limits on hours of work for those in safety-sensitive positions.

It is CNSC staff's position that REGDOC-2.2.4 is based on fatigue science and benchmarking and that the limits are necessary regulatory tools for managing the potential risks of human errors caused by fatigue. In that light, CNSC staff recommend that the Commission reject CNL's request to modify the REGDOC. Instead, CNSC staff recommend that CNL develop implementation measures in a reasonable timeframe.

In conclusion, REGDOC-2.2.4 was developed through extensive research benchmarking and consultation with all stakeholders. In response to feedback received during public consultation, the REGDOC has been modified to

the extent possible considering science and benchmarking.

This regulatory document strengthened and modernized the CNSC's fitness for duty regulatory framework in the area of managing worker fatigue.

The approach taken balances the relative risks posed by various facilities and worker positions with the measures required to ensure worker fatigue is effectively managed through a graded approach.

This regulatory document improves clarity of the CNSC's expectations and provides a consistent basis for licensing and compliance activities across Canada.

I will now turn the presentation over to Ms Owen-Whitred for the recommendation.

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

As such, CNSC staff believe that REGDOC-2.2.4, Fitness for Duty: Managing Worker Fatigue, is ready for final approval and publication. CNSC staff propose that any outstanding issues be addressed through implementation plans tailored to the specific circumstances of each licensee.

Thank you for your attention and we remain available for any questions you may have.

CMD 16-M70.1

Submission from Énergie NB Power

THE PRESIDENT: Thank you.

I understand that New Brunswick Power may have a statement, as outlined in CMD 16-M70.1. I understand that you would like to make a statement. I understand also that Mr. Plummer will make the presentation. Over to you.

MR. PLUMMER: Yes. This is Brett Plummer, I am the Chief Nuclear Officer and VP Nuclear for NB Power, for the record.

NB Power appreciates the opportunity to discuss this important issue today.

Point Lepreau fully accepts responsibility for safe operation of our nuclear facility. Fitness for duty and fatigue are an important aspect of our nuclear safety culture. We have managed fatigue successfully since the start of commercial operation. We manage work hours in accordance with our current procedures, while respecting the collective agreement. Point Lepreau is confident that fatigue is being managed appropriately and therefore there is no risk to personnel or nuclear safety.

We appreciate the overall intent of the fatigue REGDOC but believe a licensee should be allowed to

evaluate alternate work schedules to demonstrate an adequate level of safety. A cognitive function comparison can be performed of our current shift schedule to verify it meets the intent of the REGDOC. The other alternative is to have a phased implementation approach due to the required additional certified staff that we need to meet the REGDOC in the working hours as written.

Point Lepreau presently has three streams of certified training ongoing to increase certified staff. We have presented a letter to the Secretariat to detail what could be implemented in the short term, the medium term and the long term.

We would be glad to answer any questions.

CMD 16-M70.2

Submission from Canadian Nuclear Laboratories

THE PRESIDENT: Thank you.

I also understand that Canadian Nuclear Laboratories have a statement, as outlined in CMD 16-M70.2. I understand that Mr. Cox will make the presentation. Over to you.

MR. COX: Yes, thank you, Mr. President. Thank you for this opportunity. For the record, David Cox, Chief Nuclear Officer and VP of Operations.

I appreciate this opportunity to summarize the intervention that CNL provided in writing. I'm not going to read that back directly but I want to emphasize a few points in particular with respect to the CNSC staff presentation that we have just heard.

I must say to begin with though, CNL of course accepts our responsibility for ensuring nuclear safety is maintained and we recognize that fitness for duty, a part of which is fatigue management, is one of the essential building blocks to achieve that outcome.

CNL has had procedural controls in place in order to manage hours of work and fatigue management for many years. I note that we have utilized the current shift operating schedule in the NRU reactor facility since 1988. We had four shifts in the two- and five-day rotation, actually since 1998, and we have moved to a five-shift rotation with the same hours of work sequence in 2007. This schedule has been successful over the years.

However, as has been pointed out, the two-day/three-day shift arrangement would not be compliant with the requirements established specifically for the recovery periods, the rest recovery periods coming off of night shift, which weren't shown explicitly on the graphical presentations from the staff.

With the timeline for the shutdown of the

NRU facility in 2018, the resulting business impact on CNL from this REGDOC really would not be significant because of the remaining timeline, but that on its own, I must emphasize, does not make it acceptable to us. And in fact, on the contrary, as has been pointed out, we recognize that our Nuclear Security Officers are on a shift schedule essentially the same as our other licensed staff working in the reactor and this shift schedule is essentially the same one used by the Ontario Provincial Police in their shift operations across the Province of Ontario.

So in summary, CNSC staff have pointed out that there is a regulatory gap regarding fitness for service -- pardon me, fitness for duty. That was the earlier presentation.

--- Laughter / Rires

MR. COX: Fitness for duty, one element of which is managing worker fatigue. It's quite important. However, it's CNL's view that there's not a significant safety gap in the safety and control area regarding managing worker fatigue.

So finally, as indicated in our letter, the REGDOC we believe is too prescriptive in terms of setting limitations on hours of shift work and recovery periods, instead of taking the approach of specifying more generally the requirements to be met by licensees.

CNL proposes that the REGDOC be modified to enable licensees to establish their own shift schedules, once demonstrated to be safe through the scientific process that has been utilized in the formation of this REGDOC.

Thank you. I will be happy to take any questions.

THE PRESIDENT: Thank you.

Anybody else who wants to make a comment?

MR. SAUNDERS: Yes, Frank Saunders for the record. You knew I couldn't pass this up on a REGDOC, right.

So a couple of points, I think. Yes, for sure, like everybody else, the industry has, as long as I can remember, always treated managing hours of work and fatigue as a significant issue and we have always done that. In fact, I was a Certified Shift Supervisor in '85 when Ontario Hydro changed from 8 to 12 hours, so I experienced the change firsthand and worked a number of years under that regime, and I don't think anyone disagrees. So we have a long history with that.

The issue then becomes sort of is the REGDOC exactly what it should be?

I do recognize that CNSC staff offered a number of opportunities, workshops for stakeholders and the like, and the document, in our view at Bruce, has improved

greatly because of that work. So, you know, I'm not claiming that we didn't get a chance to be heard. However, we do believe that there is still a kind of fundamental flaw in this document that should be addressed and could be addressed reasonably easily.

To illustrate that point, I would get you to look at section 4.2. 4.2 is the limits to the hours of work for safety significant -- or safety-sensitive positions. So what you have here is a fairly prescriptive --

THE PRESIDENT: Wait a second, let us catch up with you here.

MR. SAUNDERS: Sorry, I'll let you find it. It's on page 7.

--- Pause

THE PRESIDENT: Yes.

MR. SAUNDERS: Okay. So what you have here and on the table that follows is sort of very specific controls on the hours of work and they have broadened this section based on the feedback they got from us, so it's more applicable than it was when it started. And from Bruce Power's point of view, because of the shifts we work, we can actually meet this.

The issue with this schedule is it's really focused on a five-crew rotation working a 2-3 split

on the shift schedule and it's set up with limits on hours of work that mostly focus around that. And that's okay as long as you're working that schedule, but there's no guarantee you always will.

So we already do at Bruce cognitive analysis programs. We run these on our shift schedules already. We run reasonable perturbations on them so we know the impacts of working an extra shift or working extra hours and so forth, and we build our management controls to support that program.

In our view, what this section should require us to do is that. The section should say, "You will run the cognitive analysis by a recognized program to analyze the impact on your shift schedule and on the kind of perturbations you might want to run over time on various things and you will set within your control system the hours of work limits that are appropriate for that schedule."

This gives us the flexibility to adapt to changing circumstances when we need to, because although certainly fatigue is absolutely important to nuclear safety, or any other kind of safety for that matter, so are many other things, and our job as an operator is to be able to balance those things. So we need the flexibility to do the analysis, to set the limits that are appropriate for

the circumstances we find ourselves in.

CNSC can always check these things. And as a fallback, you know, it can say, "If you don't want to do your own analysis through a prescribed vendor who does this, then these are the limits that you need to follow." But there should be an option for you to do that analysis, because we don't know whether we are always going to work a three-two schedule, right? In fact, in some cases we don't even today.

So in reality, the controls ought to be through a process rather than trying to specify them, because although I appreciate CNSC staff trying to run all these shift schedules and provide us with the advice, they can't possibly know all the circumstances we might face in doing this.

So in my view, this is really the crux of the argument, is do you control the actual limits on a day-by-day, hour-by-hour basis or do you tell us what the means of establishing those controls are? From my view, you should be telling us the means because it exists today. It didn't exist sort of 10 years ago, you couldn't find people to run these programs for you, it was pretty rare. These days, this analysis is easily obtainable. In fact, I think we use the same analysis that CNSC staff did when they did theirs. So it is not hard for us to run a shift

schedule and come up with the limits that make sense.

CNSC could certainly say there are some obvious limits, 60 hours a week, that sort of thing, right, which says you ought to balance those, but we don't need the detail in here about time off and all that, because we should establish that ourselves and then CNSC should do inspections to see that in fact we ran qualified programs, that we established the limits appropriately and so forth. It allows us the flexibility to run the business the way it needs to be run and to address the concerns we need to.

This is an argument I have had on a number of regulatory documents where in essence they try to teach me how to fish instead of trying to tell me what the limits are, right? My job to know how. I think it's CNSC's job to establish the limits.

The other qualification I would like to make is really around the guidance. And again, this is something you have heard from me before. The guidance gets too specific. The definition for guidance in my mind is not really guidance, the definition for guidance is instructions in another form. I think guidance should be guidance.

But let me point out a couple of things in the guidance that I would argue with, right.

Shift turnover -- I'm still on page 7

about halfway down -- shift turnover should normally be less than 30 minutes per shift. Well, I agree why that's put in there, it's put in there so that we won't somehow make an excuse and work people an extra three hours under the guise it's shift turnover. I mean that's not the intent but that's a control.

But in reality, shift turnover needs to be whatever shift turnover needs to be and we need to take into account those hours if they are too long, because actually an extra 15 minutes on shift turnover will make no difference in somebody's cognitive awareness. It could make a huge difference in nuclear safety if the turnover is not completed properly.

So here you have a limit that I think was good intentioned, but it's stated inappropriately. The guidance makes this the priority rather than nuclear safety the priority. So the guidance ought not to do that. The guidance ought to state more clearly, "You shan't use shift turnover as an opportunity to extend people's work schedule, because that's not the intent, right, and so you shouldn't do that."

You know, another case, although I don't think this one is quite in guidance. It says, "Staffing levels shall be sufficient" -- I'm on page 8 at the top -- bottom right after D. "Staffing levels shall be sufficient

to ensure training activity, sickness, et cetera, do not lead to non-compliances with the hours of work." Well, generally speaking, non-compliance with an hour of work is always some kind of a staffing issue. It's not normally a staffing level, it's usually a surprise -- somebody is sick, winter weather or somebody can't get to work, and it takes you a couple hours to actually bring somebody in to fill in that spot. So it's a statement just doesn't quite make sense.

Certainly I would agree that you should have sufficient staff that you should very seldom be breaking hours of work because of that. But it'll never be zero. I mean, I could double the number of people on shift, and I guarantee you that it still wouldn't be zero. Right? And doubling the number of people on shift is not exactly an economic -- in fact, it's not even practical, because I couldn't train that many people anyway.

So, you know, so there are places where these things I think need to be clarified and put in slightly different words around what the objective is rather than just that.

So but to me, the fundamental thing that I really worry about is 4.2. I think 4.2 should be more specific. Know your schedule, analyze your schedule, have your limits of hours of work appropriate to that schedule,

giving some high-level limits at the CNSC which set around total number of hours, et cetera.

THE PRESIDENT: I'm sure staff would want to react to that, but I'm going through the list. Anybody else want to raise an issue?

MR. MANLEY: Thank you, Mr. President.
Robin Manley, Ontario Power Generation for the record.

Mr. Saunders and the others spoke very eloquently already on a couple of the points that I would make, so I'll just say them briefly and then come up with one new point.

Like the others, OPG believes that the regulatory document ought to be written in a way to provide sufficient flexibility for the licensees to both maintain safety and operational performance, and thus Mr. Saunders' suggestion that a licensee be able to do the analysis, have that in hand, CNSC can inspect it, and as long as that analysis supports safe shift schedules, then that ought to be acceptable because it meets the fundamental requirement.

Currently, Ontario Power Generation is able to meet the limits that are prescribed in the document as the CNSC staff presentation made clear. So that's good; however, who knows but that something in the future might cause us to want to develop a new shift schedule that might be outside that box. As long as we're able to do the

analysis and demonstrate adequate safety, that should be acceptable.

So the new point that I would make is -- and this relates to something that I believe has been said in front of the Commission before with -- related to hours of work. A couple of the licensees, OPG included, had had concerns with previous draft versions of the REGDOC related to major projects like refurbishment activities. And we appreciate that the fact that the CNSC staff have listened to that concern and as was described today broken the previous sort of single-size-fits-all proposal into safety-sensitive positions, a broad population. That was helpful.

And in addition, the CNSC staff have recognized in the REGDOC the opportunity for licensees to prepare a rationale to exclude certain staff from the broad population on the basis that they would have no safety consequence, no safety impact. So we do intend to avail ourselves of that opportunity by putting together the rationale for certain kinds of workers involved in our Darlington refurbishment project. And again, I appreciate CNSC staff listening to that concern, which was very important to us. Thank you.

THE PRESIDENT: Thank you. Anybody else?
Okay.

Staff, you want to -- let's see how we'll do this in order, since there was a specific comment made, maybe you'll have the first opportunity to respond.

MR. BOUCHARD: Thank you. André Bouchard for the record.

Obviously, when writing a regulatory document there's many components that needs to be taken into account. But first and foremost, I would just acknowledge what was expressed with regards to the work that has been involved and how we work towards accommodating as much as possible the requests from the licensees and stakeholders, because unions also were a big part in that discussion that we've had over the years that we prepared that REGDOC.

Components that comes in into developing a REGDOC, as we were saying. We, as a regulatory agency, need to look at the governance that Canada may have from the IAEA, other agencies. So we start our benchmark abroad and we bring it home as well, looking at what other regulatory agencies like ours are doing with regards to fatigue management in the different aspects. This is where we actually looked at their practices and came up with also the model that is also published in literature, which requires several components as part of a balanced fatigue management approach.

A portion of that approach requires having specific hours of work limits. And one of those reasons is that humans are humans, whether they are piloting a plane, driving a truck, or running a nuclear power plant. Humans have limitations. These studies shows at some point where humans may start getting into a weaker spot into it. CNSC as well has a point where we are obviously dealing with human performance and the support and how we make sure that people with high responsibilities in nuclear power plants can be ready at any time to respond to normal operations or events and emergencies as well.

So in that analysis as well, I would just like to stress the point that although we've gone through several iterations of discussions with licensees, the point that was brought up with regards to the shift rotation hasn't been brought up in writing, if you could see that, in front of you through the comments that we at least received or dealt with. However, it is -- as it was said and pointed out, it's part of the guidance. It's not -- it's a non-binding part of the requirement document to which licensees are not necessarily to follow, but we felt it was appropriate to account for a period of 30 minutes each shift so that at the bottom end of the day we could have a good feeling of the number of hours' total work.

THE PRESIDENT: I'm more -- look, the

philosophy between guidance and the "shall" and "should" -- we will never get over that. I'd just like to remind you when I got on this job, the clarity of what was in a licence or outside the licence wasn't very clear. Those are the trouble of 2007-2008. None of you -- I don't know who remembers them. Maybe you, Mr. Saunders.

So I actually don't agree that you don't want to give some shoulds which tell staff how they're going to benchmark compliance. When they go in and check to see whether you are gaining their regulation, at least they're telling you what they think is good management practice. I can understand it's very specific, but from their perspective is -- it's kind of a thing that they will measure what you do.

I'm more interested in staff reaction to the very prescriptive four points here, 1, 2, 3, 4 on 4.2. I was reading them to be as giving them flexibility, in other words, am I -- do I understand this right? Is that flexible? Or each one on itself is a limit? Go ahead.

MS McROBBIE: Helen McRobbie for the record.

So one thing I want to make clear, in case it wasn't clear from the presentation, is the prescriptive limits on hours of work apply to those in safety-sensitive positions. Safety-sensitive positions are defined as ones

where impaired performance could result in a significant incident affecting the environment, the public, for example. Part of this, in determining who is a safety-sensitive position, is that the actions that are assigned to that group could contribute to a significant incident or could result in an inadequate response to a significant incident. So the positions who we've defined, such as certified staff, minimum staff complement, and security staff, are the ones who are there to respond to an incident.

So as far as the proposal for rather than setting prescriptive limits for this population of just leaving it performance and just allowing licensees to establish whatever limits they feel are appropriate, I don't think it's warranted for this population of workers.

So we know that work schedules contribute to fatigue because they dictate when sleep opportunities occur and the maximum duration of the sleep opportunities. So for this group of workers, I think it's important for a regulatory body to have limits in place. So as far as the assessment of schedules, CNSC staff feel it would be great for the performance-based, the broad population. But we see the need to have a prescriptive approach for the SSPs.

As far as the question about the limits, so what we've done, there are the four limits that we

expedct to be in place. But for the number 3 -- so some licensees express that they have a fixed time period of seven days. They didn't want to change from that fixed time period of seven days. They asked -- they said -- they expressed a preference for more limits, which kind of are the result of the consecutive -- limits on consecutive shifts. So they expressed a preference for having more limits like that, but sticking with a fixed time period. So we've accommodated that request.

Other licensees requested more flexibility. So rather than having it 60 hours in seven days, they asked for an average of 60 hours over XX weeks. So we've given that flexibility. We followed the model used by commercial vehicle regulations, and we give them the option of choosing a seven-day period or a rolling 14-day period. So the limit over the longer-term period does also apply. So all four of these limits apply, but they can select either the fixed period or the rolling period.

THE PRESIDENT: Okay. I think I'll pass the baton here for a second to Dr. McEwan.

MEMBER MCEWAN: Thank you, Mr. President.

Maybe I could start by going to the shift turnover section, because I'd marked that as well. What happens during the shift turnovers?

MR. SAUNDERS: Frank Saunders for the record.

So the shift turnovers are an incoming shift and an outgoing shift. There's a transfer of information that occurs in the shift turnover to make sure that the incoming shift understands the status of the work of the plant and is ready to, you know, take over and move forward. So that's the purpose of the shift turnover. It's a combination of one shift coming in a little early and the other leaving a little late to handle that. It's an important element, though, because obviously you don't want a crew coming in cold and really just not knowing what the status is.

So depending on your level -- and virtually everybody on the shift goes through a shift turnover. It obviously gets more significant as you get up to the shift manager level. And sometimes, if you're in a certain circumstance, they can be longer.

But my point there was really just to point out that we ought not to, when we're doing these regulatory documents, assume that this area alone is responsible for nuclear safety. Nuclear safety is an integration about how the plant operates. There are always decisions that need to be made one way or the other. There are days when that shift turnover is important and if it

took three hours it takes three hours. And if you need to give the guy the next shift off because of that, then that's what you do. But in reality, it's important that that happen appropriately.

I would agree that in general it certainly shouldn't be used as an excuse to extend shifts, right, and that sort of thing. But it may happen, and certainly we monitor these things to make sure they don't get extended.

But it's an important activity. The way it's written in this REGDOC downplays it, right, says that's less important than the hours of work. I disagree. I don't think that's true at all. Hours of work are important; shift turnover's important; plant equipment's important. It's all important and you have to integrate it as a whole. So when a REGDOC tries to pull one area out and make it more important than the rest, we generally argue about that because we don't believe that that's right.

There are limits and they have to have limits to say -- no one is arguing there shouldn't be hours to limits of work. What we're saying is it's a very recognized way now to set those hours of limits of work. They are very dependent on the shift that you work. So what, you know, the appropriate rest periods for one set of rotations can be very much different than another set of

rotations. And so they should be set based on what you actually plan to work so that you get the flexibility to do it properly. Don't want to not have them. Do want to have them. Just want to set them for the schedule that you actually plan to work rather than try to do a bunch of general ones, which is what staff have tried to do. And I understand what they're trying to do. Don't disagree with the limits. I'm just saying those limits now limit us to the kind of shifts we can work, whereas other ones might actually be more beneficial and in fact be more productive.

MEMBER MCEWAN: So thank you. So I can't disagree with that, and certainly if I look at my own industry that would not be something that would necessarily be easy to fulfill simply because the turnover is the most important part of the shift coming in. And so when I read that, I had real concerns that it is -- recognizing it's a guidance statement, it's not a shall -- I would see that as constraining in the long-term development of good shift handover practices. So maybe staff could comment.

MR. BOUCHARD: I'll address the first part first, which is obviously the reasons why we're doing this REGDOC is to improve the current practices, which is already good, but it's into a continuous process of improvement. The second part is that we do recognize that obviously what is needed is for people to be fit for duty.

That's one of the approaches in it. And this is to increase the chance and the capacity of staff and support staff to respond to events.

I will turn the question over to Helen McRobbie, which will describe what we have observed also in the benchmarking as far as the staff rotation practices, the current practices in the nuclear industry, and address the point as to why this is just part of the guidance section of the REGDOC.

MS McROBBIE: Helen McRobbie for the record.

So obviously we recognize that shift turnover is crucial for nuclear safety. We've worded this in such a way that it should normally be less than 30 minutes, which is -- our understanding is the current practice. And we've also given a buffer in the requirement that they have up to 16 hours in any 24-hour period. So there's certainly a buffer that if they needed to go longer with their shift turnover that that's permissible within the limits of the REGDOC.

MEMBER MCEWAN: I'm still not comfortable with that statement as it is. I think it needs a caveat, because I think you do need to recognize that the shift turnover and the way in which the information is handed over is critical to successful functioning. Again, I look

to my own industry for the importance of that handover of information. And it may take 15 minutes, it may take 50 minutes if it's -- if there are problems. It may take an hour if there are problems. To have that constraining statement without a caveat recognize the importance and the likely variability I think is a possible problem.

MR. BOUCHARD: So André Bouchard for the record.

Just to bring you back, as the current practice in the licensee's document at LCH is that a day's work should not exceed 13 hours. And we've initially started the REGDOC with that limit per day. And some of our licensees were saying to us every minute in exceedance of that 13 hours would actually be reported as a non-compliance through our work. What we have decided to do was actually go to the limit you're seeing here as to 16 hours, making sure that this one is actually reflecting risks.

And in light of that, if you look at the other guidance as an example, we're saying as well that a normal shift should only be 12 hours just because of those are the scheduled limits. The 30 minutes in the guidance here is really not undermining the capacity of a licensee to keep one of their certified workers for longer than 12 hours in a given day. What it does, however, and

exceptional circumstances are doing the same, if a licensee deems necessary to keep one of their workers for longer than even 16 hours, they can resort to exceptional circumstances and actually do it. And it's recognized in the REGDOC.

MEMBER MCEWAN: So again I'm going to come back to the specific phrasing of that sentence. There needs to be, I believe, a recognition that the handover, the turnover of information is a critical part of it. And to put -- I mean, it's my -- I guess my concern is that there is a number on it. Numbers eventually become enshrined in practice. So I -- my belief is it needs rephrasing.

The other thing I noticed is -- and I don't know whether it's deliberate -- you don't define "exceptional circumstances."

MR. LAMARRE: Greg Lamarre for the record.

Perhaps I can just add a little bit to what staff's already mentioned about that line on shift turnover. Couple of important things. It is guidance. We all acknowledge that it is guidance. And it also has to be taken within the context of which that section is written, which is around limits on shifts. And it's to provide a little bit of clarification in terms of what that shift turnover component should be within the context of the

limits on an entire shift.

The other thing I want to make clear is that shift turnover is not just called out within this proposed regulatory document. We've got REGDOCs on training that talk about how one worker turns over to another worker and what that should comprise. We've also had a good discussion recently on the management system, management system requirements for licensees such as the licensees represented today. Those have elements in terms of how those types of elements of shift turnover should be conducted as well.

So I just don't want us left with the impression here that this guidance statement is the only thing that the CNSC staff has to say about how turnover should be conducted, handing duties from one worker to the other. There are other requirements here that certainly spell out the extent of what information should be provided in an adequate way to make sure that worker A turning over to worker B has the opportunity to provide all the key elements to ensure that that shift turnover happens appropriately.

But that being said, staff certainly could add a caveat without altering any of the requirements to satisfy Commission's concerns about that guidance statement as written.

MEMBER MCEWAN: One last word on this. So I recognize that the requirements of the handover, it's going to vary from worker to worker and work group to work group, clearly. You define how all the information flow or how that information flow will occur and the requirements for that information flow, and yet you put a guidance on the amount of time that people can spend on that flow of information.

So again, I really think you need -- I would urge you to consider some framing of that in a way which recognizes the other guidances and rules you -- around information flow. And maybe you'd simply say it's built into the 16 hours. You know, you can't add it as an extra period of time, which is perhaps an implication of reading that as well.

MR. BOUCHARD: André Bouchard for the record.

Point taken. Thank you.

THE PRESIDENT: Ms Velshi.

MEMBER VELSHI: Thank you. I think I'll start off with a comment before I go to my first question. I would have found it helpful if in the regulatory framework you would have shown what the different elements for fitness for duty are. I know we're talking about managing worker fatigue today. You said you're coming

forward with something else next year, but I think it would be helpful to see what the full picture looked like.

I haven't heard any concerns expressed around the broad population and the programmatic elements of that. So with a nod, is that because you don't have any concerns, licensees?

MR. SAUNDERS: Frank Saunders for the record. In general, the broad population is broad enough, I guess, as it's written that we can work the shift schedules within it. Most of these crews actually work the same schedules as the certified staff, so they're not significantly different in that regard. It does allow us to have different schedules and outages and things which are necessary. So I think we can accept the broad thing.

But the issue that we continue to have, whether you talk about broad population or the safety-sensitive staff, is about our ability to demonstrate we have a safe schedule and ability to make that work within our needs. And if there were more limits on the broad population, we'd have the same concerns, but it's more general.

MEMBER VELSHI: And the others feel the same way:

MR. PLUMMER: Brett Plummer, for the record.

We feel the same way. The broad population we can manage around the requirements.

Again, when it comes to the safety-specific or sensitive population -- and part of the difference at Point Lepreau NB Power is what wasn't mentioned is this really is a five crew three-two split shift.

We work a six-crew shift different than our other colleagues. We've been trying to get to a five-crew, but due to basically our limitation of certified staff and the folks on the pipeline, we have not been able to get to that five crew. So these limits being based on a five-crew situation is not applicable to where we are right now.

THE PRESIDENT: Can I jump on this? How long does it take you to get those in the pipeline up to, say, the right complement of crew that you need?

MR. PLUMMER: Brett Plummer, for the record.

Presently, right now, we have three initial CRO classes running in parallel, and with the projections we've done, we do have a 10-year plan of certified staff. It'll take till 2021 to get to the point where we're comfortable with certified staff where we can sit there and go to a five-crew complement and meet these

requirements -- most of these requirements.

Some of them we can meet in the short term, but some of them, especially four-night limitation, we won't be able to meet that until we go to five crew.

The -- I want to give you one other example to put in perspective, though, that balance between making a decision from a nuclear safety perspective.

Right now, we work four nights, typically, but if somebody calls in sick or we have an upset, we'll extend an individual for a night or two. We make that decision based on what staff we have available.

And sometimes people don't understand that if we take another certified operator out of our day shift mix, which may be somebody that's actually preparing safety-sensitive work through the work management system for work to be performed in the next week or two, we take that individual off, we throw them on the night shift which is a fatigue issue in itself for one or two nights, and then we have to give them a rest period after that.

Now we've taken that person out of the mix that's actually directly supporting nuclear safety and work management for approximately five days.

So there is an impact with trying to force fit us to -- with the crew complement that we have into a schedule that's not applicable to six crew.

We can meet it in time, and that is one of the alternatives that we've suggested, but it'll take time.

THE PRESIDENT: I understand it will take time. I'm just not buying it it will take 10 years.

MR. PLUMMER: Brett Plummer, for the record.

It'll take five years, 2021.

THE PRESIDENT: Okay.

MR. PLUMMER: We have a 10-year plan.

THE PRESIDENT: That's what I thought you said, 10-year plan to --

MR. PLUMMER: But 2021 -- 2021 to meet these requirements.

THE PRESIDENT: Thank you.

MEMBER VELSHI: So let me just get back to my broad population before we get into this hours of work for the -- for the safety-sensitive positions.

So there is clarity on who would fall within that broad population and who wouldn't.

MR. MANLEY: Robin Manley, for the record.

Yes, I believe there is clarity because the Regulatory Document lays out that the safety-sensitive population is essentially three groups of workers, right.

So certified staff, we know very clearly who those are. Certain kinds of security personnel, we

know very clearly who those are. And then it states "positions that are part of the minimum shift complement unless documented as not".

So it is important for the Commission to understand that the minimum shift complement at our facilities is a large population of people, right. It's a large percentage of the operations personnel on the plant, some number of the maintenance crew, et cetera, et cetera because while, you know, perhaps you only have two chem techs or whatever that are part of the minimum shift complement at any one time, you don't necessarily know for sure that only those two are always going to be there, right. It might be anyone who's on the crew needs to be counted as minimum shift complement.

So you have to keep track of the hours for essentially the entire crew for all these people, which, you know, might be in the order of hundreds or 1,000, you know, people overall.

So there is a large population of people that's within the safety-sensitive population, but we know who they are and we would have to specifically go and exclude perhaps civil maintenance personnel, you know, cleaning staff or whatever, you know, even though they might be, by definition, as part of the minimum shift complement -- by default, we might exclude them by doing

the analysis. So that's fine.

MEMBER VELSHI: My question wasn't so much the distinction between broad population and safety-sensitive positions; it was between broad population and your overall workforce.

MR. MANLEY: Okay. So that -- Robin Manley, for the record.

So that is not defined within the document. The accountability is on the licensee to make that rationale and document it, and then CNSC staff can inspect it.

MEMBER VELSHI: And so the question was, is there clarity on how you're going to make that determination.

MR. MANLEY: Well -- okay. Robin Manley, for the record.

I don't think it is entirely clear on how we're going to do that. I think there's going to be a certain amount of learning that goes on.

Frank Saunders might want to jump in here because I know Bruce Power has already done some work in that area, so they're probably leading the pack in that regard.

MR. SAUNDERS: Yeah, I think I would say -- Frank Saunders, for the record -- that the

definition that we have here of safety sensitive is reasonably clear, we believe.

We won't really know until we test it through supplying some of the -- some of our analysis, but I -- it was adjusted somewhat during the process to make it clearer, and I think it's -- I think it's reasonably clear as it's stated.

MEMBER VELSHI: Not the safety-sensitive positions; the broad population compared to your overall workforce.

MR. SAUNDERS: Yeah, sorry. But the key one was kind of around what you're working on, right, so the -- basically, the broad population includes most everybody except for contractors we might bring in to do -- you know, for example, to work on an outage or something like that.

So the safety significant, even though it doesn't appear to apply, actually appears a fair bit here because if they were working on safety-sensitive work, it wouldn't matter. If it's not safety sensitive and they're not part of our normal staff, then, by definition, they're not part of the broad population.

So it's really about whether they fall into that safety-sensitive thing in the end of the day. At least that's our interpretation.

If they don't and they're contractors working on an outage and the plant is isolated and separate from risk, then we would not count them as part of that broad population.

We believe that's a reasonable interpretation but, like I say, we have not tested it yet by making a submission, so we will see.

MEMBER VELSHI: Okay. Let me ask staff because when I read this, that was not my understanding. I thought if you've got 1,000 person workforce, maybe 100 or 200 are your safety sensitive and maybe 600 are the broad population, but the rest are not because they have no potential for impacting on safety and security. But maybe staff can clarify that for me.

MR. BOUCHARD: Yes. This determination of distinction also is stemming from a recent Reg Doc 2.2.2 on training where there is already a good piece of the work in there that has been done where similar concepts have been inputted in the Reg Docs that requires the licensee, from that standpoint, to look at that.

In our own review, when we refer to minimum shift complement, we also refer to the licensee's own procedures. What's important is -- to understand is from a licensee to another, depending on their own operation procedures and their approach to event response,

they will identify positions that are required to do certain actions at given time and moments, and this is where we will draw our -- let's say are challenging when the licensee will come and have their own analysis of the broad population versus safety sensitive where we could identify some of these positions and emergency response scenarios and challenge them with where that position should be into the given population of the Reg Doc.

This is what we intend to use, and we have discussed how that analysis, from our concept, would actually be done through our workshops and our common disposition as well.

MEMBER VELSHI: Thank you.

So for this broad population where one of the elements is establishing limits on hours of work and recovery periods, and I heard this cognitive analysis being mentioned a number of times, is that what you expect them to do, then? Is this the analysis, then out pops, okay, this is acceptable or -- I mean, is it something very definitive like that?

MS McROBBIE: Helen McRobbie, for the record.

So in preparing this Reg Doc, I guess the advantage that we have is that we already know the practices of licensees, so we know that there are already

procedures in place covering all employees for hours of work.

We could already pretty much slot the requirements they have in place against each of those four pillars that we have in that framework, so the licensees can do additional work through a cognitive analysis, which is basically aligned with those graphs that I showed you, or they could probably rely on their current procedures applicable to employees.

Although it's important to note that the Reg Doc does not differentiate between an employee versus somebody hired on contract, so according to the regulations, a worker is somebody who does work under the licence.

So there's no differentiation for us on that part, so we'll be looking at identifying people who pose risks to nuclear safety or security.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So if I look at page 4 of the Reg Doc, there are, I guess -- number 5 at the top at the top of the page and the third bullet under the guidance, so this is sort of work environment.

How practical, how easy is it for the licensees to provide that or modify the current environment to comply with it or, indeed, is it already there, i.e. is

it actually doable within the context of the operating environment?

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

Mostly it's already there. It depends on, in some cases, how broad some of the interpretations are. In most cases, we already have sleep areas. We -- our lighting is already conducive to these things for a variety of reasons, not just for -- not just for the -- for fatigue, but for accuracy and so forth.

So -- and we do have, you know, our supervisors are trained in this and they look for people, and it really doesn't matter whether you're in safety-sensitive position or on shift or during days. If we're aware that there's -- you know, obviously you're not fully fit for work, you're falling asleep at your desk or something, then we react to it irregardless.

The shift controls are more stringent because of the nature of the work they do, but in reality, hours of work controls apply to all our staff. They always did in the provincial statutes, at any rate. It's just a slightly different set of limits.

So most people, of course, working days and the like don't even come close to approaching these kind of limits, but yeah. I don't see any real issue with

meeting these.

There are some things in the guidance here that I wouldn't agree with at all. I'm more worried about the second-last bullet from the bottom. That's so impractical as to be kind of laughable, quite frankly, so --

MEMBER MCEWAN: That was my next question, is --

MR. SAUNDERS: You know --

MEMBER MCEWAN: -- to me, that looks -- because I think I read in the dispositions many of these tasks have to be done at that time because of normal operations.

MR. SAUNDERS: If, for some reason, a shift is held over and they're working extended hours, you do apply these kind of rules. So you know, if the shift is tired, yes, we would reduce the work and do those sorts of things.

However, if you've only been at work for five or six hours, we provide you, like I say, the proper lighting, we provide you the proper breaks, coffee if you need it, all these kind of things, so you know, it's -- it's not about not doing the work. It's about making sure that work is done properly.

We provide several layers of checks on all

things that are safety sensitive, so you need to do the work in preparation for the next day shift in order for them to be able to do their work safely, so you really just can't eliminate four or five hours of work and say that's okay. That just won't work, right. Not practical.

But you do need to be sensitive, you know. Like say if we have a snowstorm in Bruce County, which happens, and you've been on the site for 14 hours, then we do go into what we call quiet mode, which limits all these kinds of activities.

MR. MANLEY: Robin Manley, for the record.

Maybe I could just add a couple points on that second-last bullet, which I thought was a good point Frank brought up there.

The Commission may recall that, a number of years ago, Ontario Power Generation moved to primarily a days-based maintenance schedule. And we had various reasons for doing that, but -- because it used to be that our shifts that we had basically the same -- well, not exactly, but largely the same number of maintenance staff on each crew, Alpha through Echo, A, B, C, D. And now most of our maintenance crews work during the daytime.

So it's aligned with this. Even if this wasn't necessarily the number 1 reason for doing it, it's -- you know, to the extent possible, we are doing most

of our work activities on days except during outages where, for practical reasons, it's basically necessary to run a 24/7 operation.

Of course, during that outage, your reactor is shut down in the guaranteed shutdown state.

MR. BOUCHARD: Andre Bouchard, for the record.

I'd like to address the first point of your question. And the third bullet is actually human factors and design practices where the design of some of the components.

Areas in the nuclear power plant have to relate to that. We wanted to make a clear linkage to these expectations with regards to design.

And the second one as well, it's -- the 2:00 to 6:00 a.m. in the morning reflects the circadian rhythm, and as we've actually addressed in the consultation, we've added the "when possible" after the consultation which kind of reflects the fact that, as much as possible, trying not to schedule during 2:00 to 6:00 a.m. because those are the worst times for that issue with circadian rhythm.

THE PRESIDENT: Ms Velshi.

MEMBER VELSHI: As I was looking at your benchmarking information slides 20 on, and so in some, you

picked -- or whatever the requirements are consistent with, say, U.S. nuclear workers and some it's, say, some others. And I wondered, was this because you wanted to align very much with current practice or are these really what your experts said the best numbers?

So I mean, I can give you some as an example. If I look at daily limits lines up with nuclear workers, right -- U.S. nuclear workers. If I look at some of the others, they don't.

If I look at the weekly ones, U.S. nuclear workers is 72, and yet we've picked 60.

So is there a reason why we wouldn't have just said, okay, that is the best practice and that's what we want to go with?

MR. BOUCHARD: Andre Bouchard, for the record.

The number you're seeing there is the benchmarking, obviously, but the numbers we came up with are benched (sic) on the research we've done in looking at numerous studies that relate to the limitations we were saying, some of the limitations of humans and how they were observed and documented through these research.

I will pass on the question over to Helen McRobbie, which could discuss some of the variations between these limits and the different aspects of them.

MS McROBBIE: Helen McRobbie, for the record.

Just with respect to benchmarking, I would also like to draw your attention to the synopsis of science and benchmarking included in the CMD package because it includes larger tables of benchmarking. So the slides we did present some of it, and more is presented in that synopsis.

So just to repeat, was your question why do we not just adopt one regulator's strategy?

MEMBER VELSHI: I wondered if what you had picked was driven, to a large extent, by what the current practice amongst licensees is as opposed to a best practice.

MS McROBBIE: So I think the one point to come back to is what we were really trying to achieve with this Regulatory Document was to formalize a letter that we had written in 1989.

So that letter was based on a scientific report that was done during Ontario Hydro's transition to 12-hour shifts, so we updated that science in 2013 and got feedback from an external consultant that the limits were still reasonable.

So in looking at the benchmarking, we have done an extensive review, but we were really -- CNSC staff

was really trying to formalize long-standing practice which a more recent review said is still reasonable.

THE PRESIDENT: I guess if you were attempting to pick the best in each section, you shouldn't be apologetic to this. We want to be the best. And we want to be as good or better than anybody else, particularly since you are now modernizing common practices everywhere.

So I assume that's what this table is supposed to indicate. And in fact, some of the material in the scientific addendum, I don't know why we're afraid to sometimes append this to our Regulatory Document so everybody can see where some of this stuff came from because I found some of the science-based evidence here more compelling than the Reg Doc itself.

So -- and again, I'm sure not everybody in agreement on all of this, but this is nuclear, so these -- we want to make sure that we have gone as far as we can to make sure that we've done as much as we can to get the best risk -- lowest risk possible.

So nevertheless, there's some kind of -- some of the things that's really got to me since we are now on benchmarking, I actually love your slide 24 -- sorry, 25 and 26 which, to me, is the crux of what we are debating here.

And I see that everybody is now on side. In 26, to me, aside from New Brunswick and CNL for two days, five nights and six nights, OPG and Bruce Power are now all in agreement with all of this, if I read this slide 26 and slide 25 properly.

Is that correct?

You're now complying with this Reg Doc as --

MR. SAUNDERS: Frank Saunders, for the record.

Yes, we do comply. That's what I said at the front end. But it is based on the shift that we work today.

The benchmarking is great, but in reality, the best shift is -- has to be analyzed for the shift that you are working.

I can show you a shift that works five nights in a row and five days in a row, will give you better cognitive analysis than the two-three split that we work today, yet that would be disallowed under this particular thing, right.

So the question is, do you want to put limits that are very specific to a particular shift or do you want to allow the option to analyze better shifts and more appropriate shifts for the work you're doing provided

that analysis is done with a certified, approved program that --

THE PRESIDENT: No, that's not the question. The question is, do you believe in the science or you don't believe in the science.

MR. SAUNDERS: I do believe in the --

THE PRESIDENT: Do you believe that six night shift is unacceptable? Then you should do something about that.

MR. SAUNDERS: I do believe in the science, but I don't know that six night shift is unacceptable. I haven't read it. I haven't run that scenario, right, so what I know is I can run the scenarios and I can find out which shifts are acceptable and which one gave me the best cognitive awareness and that I make the shifts go with that.

So arbitrarily saying six might not be, I don't know. It depends on the --

THE PRESIDENT: But all this science that staff produced and some of the documentation is the six night shift is unacceptable, 12 night -- 12 hours, six night shift is unacceptable.

If we don't buy this from the beginning, we have no common ground to find a common agreement to move forward on this.

MR. SAUNDERS: Yeah. My point would be that I haven't run the analysis. I haven't seen their analysis, so I don't know. I didn't have any intention of running six shifts, so I didn't analyze it, so I don't know the answer, quite frankly.

MR. MANLEY: President Binder, may I have a shot at that? Robin Manley, for the record.

I guess I'd say that I completely agree with you in terms of the science is important in nuclear. We're both physicists, so we understand that. But I guess I'd say also that the science isn't necessarily 100 percent known and understood, scientific knowledge evolves over time.

So who's to say but that some further analysis might not be done, it might come back and say that something is acceptable. Well, I don't know that. So let's not necessarily set in stone an absolute requirement when it's possible to come along and find that the science says it's okay, and that's really what the licensees are proposing to you today.

THE PRESIDENT: Well, first of all, none of these regulatory documents are set in stone. Anytime you find something that doesn't work and you bring in the argument, it'll be changed. So I don't see what this argument is about.

In fact, if you have some analysis -- Staff has been consulting on these now for three years. If you've done an analysis that six night shifts is okay under certain circumstances, I don't understand why you didn't sent the analysis to Staff so they can incorporate it into their arguments.

I read what is presented to us. I read the scientific analysis here and some of the material background. It's convinced me that there is time to move forward to more formalized limits and then we can debate on how you implement it. I have no argument with this approach.

We are debating now how to implement. But I'm still hearing that some people don't agree with the original science limits. So I'm trying to ask whether those, you know, the charts that deal with beyond the scope of the regulatory document, slide 23, if you guys don't agree with the way the outside limits are described, then we've got a real problem here.

If we do agree, then we're talking about how to implement it. If it takes a lot of time to implement, what kind of mitigation you can do in the meantime. Really, that's the way I understand what's in front of us. Because, otherwise, we can go in circles here about philosophy.

Member McEwan, you wanted to --

MEMBER MCEWAN: Can I just, as we're talking about the science, what struck me as I read the synopsis, and I agree, it's well written as far as it goes, how few papers there are after 2010. I think I counted five in 2011/2012 out of you've got 70-75 in there.

Has the science really not developed since 2010? Have there been no publications in this field since then that would be relevant to this?

MS McROBBIE: It certainly has and we're certainly keeping up with it. This was called a synopsis because it's a summary of some of the science we've looked at. There's certainly more, including a joint consensus statement from the American Academy of Sleep Medicine about the recommended amount of sleep that adults need in 2015. So there --

MEMBER MCEWAN: So why wasn't that in here? Because I would actually have gone to that reference to look at it.

MS McROBBIE: Oh, this one is in there, I think it's reference 45.

MEMBER MCEWAN: I missed it totally. But that was the thing that concerned me about the synopsis, is that there was so little current documentation in there, and that you were recording things back from 1988, 1989?

MR. BOUCHARD: Andre Bouchard, for the record.

Just to set the concepts around it. As we were discussing, back in the 1980s we worked the first analysis to determine these practices come up with these draft limits on hours of work.

When we launched this initiative for the REGDOC we've asked reconfirmation of that science base as well as what was new into it and what we have obtained in there were the elements that were making to change or influencing us to change not necessarily the whole brick of all sciences and research that may have reconfirmed previous science that we've had.

So we focused on this and the changes and the delta to redraft the current REGDOCs that you have in front of you. That may explain why it's not the entire body of science around fatigue.

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

As Mr. Bouchard has already described, the particular reports that we picked out for that synopsis were we were trying to tell a story of a history arc in an evolution. But point taken that it's perhaps more relevant to emphasize the most recent research. As Ms McRobbie has already mentioned, we have that. So that's something that

we can look at for a revision of this synopsis is to weight it more heavily in favour of more recent research.

Just to Dr. Binder's previous point, this is something that we can explore as well in terms of attaching this entire document as an annex, for example, to the draft REGDOC should the Commission approve that.

THE PRESIDENT: I think I interrupted -- you guys were -- did you want to comment?

MR. SAUNDERS: You asked the question about the science. Frank Saunders, for the record.

I mean, we do use the science, we have been using the science all along. What you're doing with this REGDOC is restricting our use of the science by saying this one version of it is it, right? You have to follow this. We're saying, the science allows you to use different shifts provided you provide the appropriate rest periods and so forth to keep the awareness where it needs to be, and that you ought to be able to use that science.

I don't buy your argument that we can come back to the Commission and argue for a different shift schedule, I just see that as unnecessary when we could be doing it scientifically, properly, setting the proper limits within the REGDOC. In my view, yes, you should have limits. In fact, we've always had limits, they've just been slightly less formal than they would be in the REGDOC.

But those limits really ought to let you use the science appropriately, right? We're not talking about anybody's science, we're talking about, you know, qualified programs properly used to do this kind of analysis.

So the issue we have is not about the science, the issue is about this REGDOC limits the science you can use, fixes on one solution to the problem, when there are actually multiple solutions to the problem which may be more appropriate. Right now, the solution works, but why limit yourself when you do not need to?

That's really the question. I kind of see this in the REGDOCs from time to time, it's an easy answer just to put a limit in, but it may not actually be the best answer. The best answer is to use the science, do the appropriate analysis, and set the limits as required. I mean, we see that as part of our job as the operator. It's our job to plan the work, schedule the people do those things. It's our job to get that right.

I agree, your job's to set some reasonable limits around what we use to do that, and certainly well within the requirement to say you must use an appropriately qualified and certified program, you must use appropriately qualified people to run these analyses and provide you the results. It can't just be anybody who wants to sit down and

do it and so forth.

To me, that's where the REGDOC got a focus, not on the specific limits which, in my view, limit the science, don't use the science.

THE PRESIDENT: Staff, do you agree that this document now limits the science here? I didn't get that impression. In fact, I thought you went backwards to be very flexible here about the existing ability and to allow for any innovation that can come forth. What am I missing here?

MR. BOUCHARD: Andre Bouchard, for the record.

We actually did what you're describing, which is we started initially with the current requirements and expectations from the licence that we have and then worked our way through extensive benchmark, extensive science reviews as well.

What we've seen in the benchmark I think is important to relay here, is the fact that both internationally and nationally any agencies that regulate fatigue management has the same approach that we did and brought forward. We all feed from the same common need, which is at certain limits the human is the limit, and these limits must reflect human capacity on an average human basis, and that's what the REGDOC is actually looking

like at the current moment.

This is the same approach that Transport Canada has for pilots as we demonstrated in the slide there, as well as transportation for road, as well as what we're seeing -- European is a bit different, because it's an society that decide on the 12 hours where's the limit on a given day, and that was the end of it.

Several countries are not even entertaining the notion of 12-hour shifts, like Korea, like Japan, they're staying at 8-hour shifts. So the work that we have done here was with the decision made by the licensee back in 1989 to go to 12-hour shifts we brought in what we believe to be the appropriate requirement level to handle 12-hour shifts.

There's always that flexibility to go back to 8 hours if simplicity is actually the name of the game, because it would bring a hell of a lot less requirements, because 8-hours shirts are less problematic from a fatigue-management standpoint.

However, we hit the same limit, which is a human is a human and, at a given point, it has the likelihood of inducing human error. In moving forward for that, this is what we're trying to regulate, here is a potential for causing human error.

THE PRESIDENT: Okay, thank you. Ms

Velshi.

MEMBER VELSHI: So in interest of wanting to pursue more options of greater flexibility, is it possible to say these are the limits but, hey, licensee, if you can come and demonstrate to us that with this regime, with these additional controls and having run through this cognitive analysis this is as safe as the limits that are in the REGDOC, is this acceptable? Is that even an option to consider?

THE PRESIDENT: I think you can actually build this suggestion into the REGDOC in terms of -- in case there's any other, you know, proposal that they want to come in, they can always come in with a proposal, so --

MS VELSHI: Well, isn't that what one of the licensee's is suggesting?

THE PRESIDENT: Yes.

MR. SAUNDERS: Yes, in fact, that's our recommendation. It's not to take the limits out, it's to say the limits exist unless you provide us evidence to the contrary so that we have flexibility to work other shifts.

THE PRESIDENT: Again, I'm missing something because I thought I was already built in. Staff? Ms Velshi, go ahead.

MEMBER VELSHI: To build into the REGDOC the option of -- so these are the hours of work for the

SSPs, but to give them the flexibility to come to you with an option of a different regime where they've got a different schedule with whatever controls, they run the analysis, this cognitive analysis, and they said this is as safe or equally safe as what the REGDOC limit hours of work are, and that option exists.

MR. BOUCHARD: Andre Bouchard, for the record.

I thank you for the question. As it was alluded to, the CNSC often opens that window of having a licensees making a proposal with the equivalent level of safety, and we're receiving it and analyzing it in the face value with the science and the facts and the OPEX that are related to these proposals. So, yes, it is in principle there.

I could add as well that every time that during the consultation process such a demand or request was brought forward to make accommodation in changes to those limits we went back to similar models, simulate these similar models, and analyzed it in sort of a same graph as we showed you with regards to where does that fit with regards to the potential risks of human errors. So, yes.

I will pass it on to Helen McRobbie.

MS McROBBIE: So the graphs that were shown in the presentation given today are based on what I

believe the licensee's are referring to as a cognitive function analysis.

It's been simplified, so it's given one point, it's given kind of the peak level of fatigue that this program is predicting. But what it's not showing is that with each successive night there's more and more of the shift that I would be expecting people to come into work at high levels of fatigue, that the people who authored the program would recommend that should be avoided in a high-reliability operation.

So once, if we were to do this option, it just takes us from limits that are based on science and that are strongly supported by benchmarking and it would take us off onto a tangent of discussing models and the limitations of the models and how much sleep does that model predict. It would be a very different approach than having clear limits that are science-based and that have already been tested based on models.

If there really is evidence that licensees have that shows that five nights or six nights or two days followed by five nights where you have 84 hours of work on consecutive days is reasonable based on a model they have, I would be very interested to review it. But at this point, based on the modelling we've done, I'm not sure how that would work.

THE PRESIDENT: Again, I'm not concerned with your concern, because you have to approve it. So I don't understand, what are we debating here? They'll have to come to you with a proposal. But the way, it's not necessarily a different kind of -- it could be also what kind of new mitigations they would put in a particular shift, I don't know, to bring in maybe less certified people or more people in training, I don't know.

But if they can come up with an innovative creative way to that you have to approve, what is the concern?

MR. LAMARRE: Greg Lamarre, for the record.

Totally agree, and I think we have to be open to the opportunity the licensees could present something that may give an equivalent level of safety. But what I will say is that the REGDOC we're presenting to you today is based upon our best knowledge, a very sound science that's been ongoing for a long long time now based upon the research, based upon the presentation that you've been given, and based upon what Mrs. McRobbie is detailing to you as well.

So if there is something out there that the licensees want to provide in terms of a cognitive analysis model that might move those limits, obviously it's

a learning organization, we have to be open to that. But we don't see anything coming forth immediately that would change our view that the limits proposed in the REGDOC are sound.

Those limits, we talked a lot about the limits themselves, but the limits are also there in addition to the programmatic elements. So we're not trying to point these limits as some sort of a cliff edge effect, what we're doing is telling you that at those limits we're starting to get into an area of higher risk which is what staff is trying to lay down as an area that we do not want to go beyond. With those limits, come the other programmatic elements that also have to be in place there as well.

So it's an entire defence in-depth approach that we're providing here based upon very strong science. But to round this up, of course we're going to be open to a proposal that the licensee might make to bring forth some new knowledge.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So I'm going to go back to the publications. I did find it, I apologize. But it was a fairly generic sleep recommendation, if I understood it correctly without having read it, for 2015.

MS McROBBIE: Helen McRobbie, for the

record.

That one was actually a review of hundreds of studies and experts coming together to rate them.

MEMBER MCEWAN: So the model that you are using to define this fatigue profile, that model is a model that was derived in 2015, 2010, 2005.

MS McROBBIE: So that model came out in the 2000s. The reason it was used is there's evidence that it is able to differentiate between more fatiguing schedules and less fatiguing schedules. So that's why in the slides presented it's used kind of to give you a relative ranking of fatigue levels expected from different shift sequences.

MEMBER MCEWAN: So there have been no modifications to the model since 2000? Nobody had actually derived new modelling algorithms in the last five years that would have applicability to how we interpret this 2000s model?

MS McROBBIE: I would have to get back to you on the most recent update to the model.

THE PRESIDENT: But you did say there's a bunch of experts got together and did a generic review of all existing literature and other stuff to come up with sort of a consensus?

MS McROBBIE: Helen McRobbie, for the

record.

So that, I was referring to a specific study just related to the recommended amount of sleep in a day. As far as the model, we also did a cross-check using another model. So I would have to get back to you on the dates of when the models were most recently updated.

MEMBER MCEWAN: So this consensus statement, if I understood the title, was simply related to the amount of sleep required in a day, not sleep, fatigue, the work environment, and shift work.

THE PRESIDENT: No, I thought -- if I understood what Ms Velshi was asking, I thought it was the whole thing. In other words, if there's a proposal on how to do this better, they'll come up with it and stuff, we'll have to review the whole thing.

MR. SAUNDERS: Just a comment from our point of view on this, listening to the discussion. Frank Saunders.

It's not that we think that the work that CNSC Staff did is wrong, it's just that it has certain limits like everything else. It cannot cover all situations or all shift schedules. So we should have the opportunity to present that analysis for a different shift schedule if it's appropriate to the work we do.

Bruce Power doesn't have any intention of

changing our shift schedules in the near future, and I don't expect to take advantage of it, but it seems silly to me just to lock yourself into something when there's a very clear science and a very clear ability to do this. I mean, CNSC is not the only people that can run analysis and hire people to do that. We do it and we have done it for a long time on things a lot more complicated than this.

So we think that the opportunity and the REGDOC should contain that statement, which basically says if you can present something else on a scientifically-sound basis that makes sense, then CNSC staff should consider it.

The reason we want it in the REGDOC is because once the document is in our licence, the only way we can change it then is to come to the Commission to change it, and that's a very onerous process to do when the scientific basis is there to do it more simply.

So, you know, it's really just about providing that flexibility which we think, as operators, that we deserve. You know, I need to remind people I guess to say that we're every bit as interested in this as the regulator is, for sure, right? Because it's our staff and it's our operation that's impacted, so we're not at all interested in being I guess careless with this. We're very interested in doing it well. We just want the flexibility to make the right shift that works best for the

circumstances that we're in, and that will change with time.

Like I said, I've been around the industry a long time and the shifts have changed, even the 12-hour shift, we started it out the other way around, it was three days followed by two, versus two days followed by three. So, you know, we changed those things with experience and they will change in the future. So we want that flexibility.

THE PRESIDENT: But, you know, I've got to answer. The reason the Licence Conditions Handbook is to allow for some little bit more flexibility and changes as they occur. So if something comes around during the year in which you find that something should change, there's almost ability to change relatively quickly and easily something that both sides agree to.

So I don't see what the concern on that one is.

MR. SAUNDERS: If it's in the compliance verification sections of our licence, what this will essentially be, then we must meet the requirements of the REGDOC or come to the Commission to change it. Staff cannot change the REGDOC unless the REGDOC gives them that power. So that's why this one should say, unless an alternate schedule is provided to Staff, because then it gives them

the authority to review that schedule and decide. Right?

THE PRESIDENT: I thought we were in agreement not to put this clause in. So that's fine, but once it's in, it'll give you the ability to change in case something comes up. I thought that's what you're arguing. Right.

MR. SAUNDERS: Frankly, that's all we were asking for through this whole conversation.

THE PRESIDENT: Okay. Ms Velshi.

MEMBER VELSHI: I just want a clarification from New Brunswick Power. In your submission you talked about short-term, medium-term, long-term requirements or implementation.

So the long-term timeframe is five years for you?

MR. PLUMMER: Brett Plummer, for the record.

That is correct.

MEMBER VELSHI: And what's short term and medium term?

MR. PLUMMER: Short term is if the REGDOC gets approved, we could do it within a matter of, you know, months. We need to evaluate that once it gets approved, but it would be in the shorter term. The medium term is, you know, we need to evaluate, it may involve training,

potentially renegotiating contracts with the union, and it could take months.

MEMBER VELSHI: Thank you.

THE PRESIDENT: Can you explain a little bit the relationship with the union? I don't get it. Where in the union contract does that kind of work come into play?

MR. PLUMMER: In the union contract, it spells out specifically what the work schedule is and the requirements. It also spells out what needs to be done to change it. I will give you an example. Recently, just a shift turnover, we changed from essentially 7:00 in the morning -- or 7:30 in the morning to 7:00 in the morning, we had to go back and renegotiate with the union and amend the contract for that change. So it's very prescriptive on basically the work hours they work and the turnover and the times.

THE PRESIDENT: How come you're so prescriptive in the thing and you are beating staff here about being too prescriptive?

MR. PLUMMER: We're trying to learn the lessons from our past.

THE PRESIDENT: A little bit of humour.
--- Laughter / Rires

THE PRESIDENT: I was going to say that it

would be strange that fatigue would be a concept that the union would fight against, you know. But aside from all this, I was going to say that if we have this clause in the REGDOC, in terms of implementation, maybe New Brunswick can come up with a creative way of implementing it faster, because once this REGDOC is out, you know, there will be an expectation that those limits will be abided by the nuclear operators. So you may want to come on board as fast as you can.

MR. PLUMMER: Yes. Brett Plummer from New Brunswick. We will work with the staff. If we have that ability to evaluate our shift, we will do it right away and determine what we can do to go forward to meet the intent of the REGDOC.

THE PRESIDENT: Thank you.

MR. FRAPPIER: Gerry Frappier for the record. If I could add to that, sir.

Because implementation is very, very key here and we are talking about, in the case of New Brunswick Power, a need for additional certified staff. Certified staff training takes three to five years and we certainly would not want to be having this training compromised in any way, so we would expect them to be following the appropriate training package.

And as you were just discussing, the hours

of work is very fundamental to all employees. Therefore, we need to make sure that this change is managed in an effective way. As such, I just want to say that from staff's perspective we would be expecting a detailed implementation plan personally from all of the licensees as far as implementing a new REGDOC and we would expect that there would be a need to take some time before this REGDOC could be implemented, certainly in the case of New Brunswick Power, and we want to make sure that that is done in a way that doesn't compromise safety in any way.

THE PRESIDENT: I assume CNL also will have to figure out what to do.

MR. COX: David Cox for the record. That is correct.

THE PRESIDENT: Anything else?

Okay, thank you.

--- Pause

MR. LEBLANC: So just for your information, we will resume at 4 o'clock with the next item, but we also will not be proceeding with the presentation on small modular reactors that was planned for this evening. We are already somewhat late and that will bring us way too late, so we will have to reschedule that item.

Thank you very much.

--- Upon recessing at 3:40 p.m. /

Suspension à 15 h 40

--- Upon resuming at 4:06 p.m. /

Reprise à 16 h 06

CMD 16-M49/16-M49.A

Oral presentation by CNSC staff

THE PRESIDENT: The next item on the agenda is an information item on the 2015 Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada, as outlined in CMDs 16-M49 and 16-M49.A.

The public was invited to comment in writing. November 14, 2016 was the deadline set for filing interventions.

Representatives from the licensees are here with us today, so welcome. They will get the opportunity to comment, as usual.

Also available to answer questions via videoconference from our Saskatoon office, we have representatives from the Government of Saskatchewan and Dr. James Irvine from the Population Health Unit.

Also available to answer questions via

videoconference from our Saskatoon office, we have representatives from the Government of Saskatchewan and Dr. James Irvine from the Population Health Unit. Hi, I can see you now.

This presentation will be done in two parts. Part 1 addresses the operations of operating uranium mines and mills, and after a break we will resume with the rest of the report.

So I will turn the floor now to staff, and Ms Tadros, the floor is yours.

MR. LEBLANC: So if I may, Mr. President, could I do a roll call for the people on teleconference to see who we have with us?

THE PRESIDENT: Okay.

MR. LEBLANC: Thank you.

So I will start with the list I have been provided.

So Mr. Andy Poole with EWL Management.
Are you with us, sir?

Mr. Paul Brugger from Barrick Gold?

UNIDENTIFIED SPEAKER: No, that's for the second presentation.

MR. LEBLANC: Second part only. So they are not online at the moment, okay.

So let's proceed then. I will do the roll

call for the second part then.

MS TADROS: Thank you and good afternoon, Mr. President, Members of the Commission. For the record, my name is Haidy Tadros, I am the Director General of the Directorate of Nuclear Cycle and Facilities Regulation.

With me to support for this presentation are Mr. Robert Lojk, Director of the Uranium Mines and Mills Division; Ms Karine Glenn, Director of Waste and Decommissioning Division; Ms Nancy Greencorn, Project officer in the Uranium Mines and Mills Division; and Ms Karina Lange, Project Officer of the Waste and Decommissioning Division.

We also have a number of colleague licensing and compliance staff as well as subject matter experts with us here in Ottawa and in Saskatoon, as noted, by videoconference to help answer any questions the Commission may have.

We are here to present Commission Member Document 16-M49 entitled Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada for 2015.

The CNSC currently produces a number of regulatory oversight reports, as shown on this slide and as you saw this morning. This is the fifth ROR that CNSC staff presented to the Commission in public proceedings

this year.

The 2015 Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites presents CNSC staff's assessment of the performance of operating, active remediation and decommissioned uranium mines and mills in Canada.

This is the fifth annual regulatory oversight report on operating mines and mills presented to the Commission. The public has been invited to comment and participate on each of these annual reports. The scope of the 2015 annual report has been expanded to include active remediation projects and decommissioned sites.

This report includes an introduction that summarizes the CNSC's regulatory efforts at the uranium mine and mill sites, including the Independent Environmental Monitoring Program and public information and community engagement. Also included in the introduction are lessons learned from the Mount Polley event.

The report is then organized by operating facilities, active remediation projects and decommissioned sites. For each of these sites, the report includes licensee information on operation and major developments in 2015, CNSC staff's safety and control area performance rating, and detailed performance rating on the three safety and control areas of radiation protection, environmental

protection and conventional health and safety, which provide the key performance indicators for these sites.

So on this slide what I would like to do before continuing the presentation is draw your attention to a few errors in the CMD 16-M49 that we noted after the submission deadline had passed.

On page 10, Table 2.1: The 2015 McArthur River authorized annual production of 8.1 MKg U/year is incorrect. McArthur River was approved for 9.6 MKg U/year in April of 2015.

On page 10, Table 2.1: The 2015 McArthur River total mining tonnage is incorrect at 86,772 tonnes. The total mining tonnage is 88,236 tonnes of ore mined in 2015.

And finally, Table A-3 on page 155 does not include a reference to the change made to the McArthur River Licence Condition Handbook in 2015. The Licence Condition Handbook Revision 2 was issued on April 2, 2015 and included revised wording in Part 1 section 2.4 to allow an annual production of up to the 9.6 Mkg per year.

These changes do not impact CNSC staff's overall conclusion of the performance of the facilities discussed in the report. These errors and any minor errors that are noted throughout this presentation will be corrected in the final version. Once again, we do

apologize for any confusion.

The CNSC awarded \$19,672 in funds through the CNSC's Participant Funding Program for reviewing the 2015 ROR on uranium mines and mills. The funds were awarded to the Saskatchewan Environmental Society, in collaboration with the Athabasca Chippewa First Nation, and Mr. Rodney Gardiner.

Four interventions were received on this ROR and are listed on this slide.

Our presentation today starts with an overview of the CNSC's risk-informed regulatory oversight activities listed on this slide, followed by the relevant aspects of the Eastern Athabasca Regional Monitoring Program and lessons learned on the Mount Polley event.

In line with the regulatory oversight report, the presentation is then grouped by the operating facilities, active remediation projects and decommissioned sites. For each we will present the licensee's 2015 operational highlights as well as CNSC staff's regulatory efforts, safety performance ratings and conclusions.

I will now pass the presentation to Mr. Robert Lojk.

MR. LOJK: Good afternoon, Mr. President, Members of the Commission. I am Robert Lojk and I am the Director of Uranium, Mines and Mills Division at the CNSC.

The CNSC regulates Canada's uranium mines, mills, historic and decommissioned sites to protect the health, safety and security of Canadians and the environment.

The CNSC delivers its mandate using risk-informed regulatory oversight for licensing verification, enforcement and reporting activities, which include onsite inspection, desktop reviews, technical assessments, reviews of licensee reports and ongoing exchange of information. The nature of the oversight is commensurate with the risk associated with the licensed site, the risk associated with the activity or program and the performance of the licensees.

The base level of risk is reflected in CNSC staff's facility-specific compliance plans, which include the number and scope of inspections. These plans are regularly reviewed and if need be revised.

CNSC staff evaluate licensees' performance using topical safety and control areas, SCAs. The 14 safety and control areas are common to all CNSC licensees but the relative importance of each SCA is related to the type of operation being regulated. While in the case of mines and mills we focus on environmental protection, radiation safety and conventional health and safety, CNSC staff assess licensees' performance in all 14 SCAs for the

operating mines and mills and where applicable for the active remediation projects and decommissioned sites. Licensees' performance is rated for each SCA as either fully satisfactory, satisfactory, below expectations or unacceptable.

CNSC staff assign readings based on the results of oversight activities for a given SCA and its component parts. Performance is based on meeting set criteria such as defined metrics, the level of program implementation, events and licensee action in response to events as well as the nature of the events themselves.

Each SCA comprises several specific areas that define its key components. For example, the conventional health and safety SCA consists of specific areas of performance, practices and awareness. CNSC staff consider all the factors on multiple inputs and assign a rating that best represents licensee performance in a holistic manner.

Staff will now discuss regulatory limits and action levels.

Radiation regulatory limits are established to limit the dose received to workers and members of the public. Controlled environmental regulatory release limits are established to limit the quantity of nuclear and hazardous substances released into the

environment and are based on a regulatory dose limit for the public. Actual levels are set by licensees using national or international guides on best practices. These levels are part of the radiation environmental protection programs forming part of the operating licences.

Action levels are designed to alert licensees before regulatory limits are reached. *Uranium Mines and Mills Regulations* define action levels, a specific dose of radiation or other parameter that if reached may indicate the loss of control of part of a licensee's radiation protection program or environmental protection program and so triggers a requirement for specific action to be taken.

An actual level exceedance requires the licensee to notify the CNSC, perform an immediate investigation and carry out subsequent corrective actions and preventive measures to restore the effectiveness of the program.

The following slide will provide a graphic representation of regulatory limits and action levels.

This graph shows a representation of relationships between the regulatory limit, action level, and concentration or dose within the normal ranges of operation.

The regulatory limit is a concentration or

dose that may if exceeded warrant enforcement action. It is shown as the red line in the graph and licensees must, during normal operation, remain at all times below the regulatory limit. The concentration or dose within the range of normal operation as well as the administrative level is shown as the green region of the graph.

Exceedance of an administrative level indicates an operating parameter at the upper range of normal operations. Such an event triggers an internal review by the licensee.

Exceedance of an action level, shown as the yellow line, is a concentration or dose that may indicate a potential loss of control of part of a licensee's program. The CNSC is advised of action level exceedances, but it's important to recognize that an exceedance of an action level does not imply a potential risk to the people or the environment, but it identifies that the operating parameter may be outside of the norm based on facility design.

Licensees are responsible for identifying the parameters of the program that represent timely indicators of potential loss of control. For this reason, action levels are licensee-specific and may change over time depending on operational conditions and location.

To keep the public informed of regulatory

activities occurring in mines and mills, CNSC staff regularly engage with the public, indigenous groups and their leadership to attend community meetings, site tours and technical information sessions. In addition to these outreach activities, the CNSC also provides information through its website, social media and CNSC online, and also communicates with indigenous leadership and representatives on a regular basis through phone, email, fax and letter.

For example, for the Gunnar remediation project in 2015, staff hosted a workshop with interested indigenous communities to discuss the Saskatchewan Research Council's remediation plans for the Gunnar site and helped them prepare for their participation in the Commission hearing held in September 2015.

Licensees continued to have in place public information programs to engage communities and keep them informed of the overall performance of any major developments at uranium mines and mills. These programs are regularly reviewed and verified by CNSC staff.

To complement existing and ongoing compliance activities, the CNSC implemented an independent environmental monitoring program, IEMP, designed to verify that the public and environment around CNSC-regulated exercises are safe. This verification is achieved through independent sampling and analysis by CNSC staff of the air,

water, soil, vegetation and various foods.

A five-year plan for IEMP at operating uranium mines and mills was established in 2015. As part of this plan, a sampling campaign took place around McClean Lake operation in the summer of 2016.

CNSC staff are currently developing a sampling cycle plan for the remediation of decommissioned sites. During 2015, a three-to-five-year-cycle plan at the Denison and Rio Algom sites was developed. Samples were collected around the City of Elliott Lake and the Serpent River watershed. The results from the IEMP demonstrate that the licensee's environmental protection programs are effective and indicate that the public and environment in the vicinity of these sites are protected. Detailed results are provided in the CNSC's IEMP webpage.

Complementary to the IEMP, the Eastern Athabasca Regional Monitoring Program was initially established in 2011, building on previous cumulative effects monitoring programs. In partnership with the Government of Saskatchewan, industry and Saskatchewan communities, the program monitors the safety of traditional harvested country foods from representative communities located in Northern Saskatchewan. The intent of the program is to evaluate the quality of country foods, to assess any potential impacts resulting from industrial

activities in and outside of Saskatchewan, and to provide confidence to community members that traditional country foods remain safe to eat for future generations.

CNSC staff support the EARMP and are working towards opportunities to collaborate on this valuable program. The study gives good representation assurance that country foods are safe to eat, the water quality is safe to drink and the environment is protected.

The following slides will provide information to lessons learned for the failure of a dam at the Mount Polley gold mine.

As previously presented to the Commission in October 2014, breach of a dam at a gold mine released a large quantity of contaminated water and tailing slurry into the environment. This prompted the CNSC to issue written requests to facilities with above ground tailing storage to reevaluate the safety of the dam.

In addition to the work carried out by licensees in response to the CNSC's information request which concluded their tailings management facility remains valid, dams were in good condition and in no danger of breach or failure.

Staff also carried out a series of activities to confirm the work done by licensees and further informed their knowledge. The activities carried

out by staff included conducting focused geotechnical inspections of all dam structures at licensed sites in 2014 and 2015, the review of the root cause analysis of the Mount Polley event as well as dam safety assessments. A review of CNSC requirements did not result in any changes.

Based on their inspections and desktop reviews, CNSC staff conclude that all CNSC regulated dams are in good condition and perform as designed. The dams are not at risk of a dam breach similar to what occurred at Mount Polley as they are better designed, maintained and inspected.

The simple lesson learned is that our licensees are doing a good job. There were no immediate regulatory actions identified. Nevertheless, CNSC staff continue to be vigilant and ensure that all best practices are being incorporated into operations, inspections and future licensing submissions.

I will now pass the presentation over to Ms Nancy Greencorn. Thank you.

MS GREENCORN: Good afternoon, Mr. President and Members of the Commission. My name is Nancy Greencorn and I am a Project Officer in the Uranium Mines and Mills Division at the CNSC.

The presentation will now transition to focus on operating uranium mine and mill facilities. This

section will review operational highlights at individual facilities in 2015, followed by CNSC staff's performance rating, assessments and conclusions thereof.

There are currently five operating uranium mine and mill facilities in Canada, all located in the Athabasca Basin in Northern Saskatchewan. Cameco operates the Cigar Lake Mine, McArthur River Mine, Rabbit Lake Mine and Mill, and Key Lake Mill, while AREVA operates the McClean Lake Mill.

The picture on the right of this slide shows the Cigar Lake Mine. Cameco's Cigar Lake operation is the world's second-largest known high-grade uranium deposit. Uranium ore mined at Cigar Lake operation is ground into ore slurry, loaded into containers and shipped by truck to the McClean Lake Mill. Cameco's Cigar Lake licence is valid from July 2, 2013 to June 30, 2021.

At the Cigar Lake operation during 2015, commissioning activities for ore preparation, storage and handling processes were completed. On May 22, 2015, the Cigar Lake operation formally announced that it had met all criteria necessary to achieve commercial production targets. In addition, in June 2015, a third jet boring system was commissioned. Surface construction activities at the Cigar Lake operation included upgrades to the modular freeze plant.

Cameco's McArthur River operation is the world's largest high-grade uranium mine. High-grade uranium ore is mined, mixed with water and ground in a ball mill to form slurry and pump to the surface. The ore slurry is loaded into specifically designed containers and transported to the Key Lake Mill.

The picture on the right of this slide shows the surface facilities at the McArthur River Mine. Cameco's McArthur River licence is valid from November 1, 2013 to October 31, 2023.

During 2015, the McArthur River operation focused on underground development for ongoing ore production and ground freezing continued to ensure the effective control of groundwater. As well, mine exploration and development of ore production zones continued.

The picture on this slide shows the Rabbit Lake facility. Cameco's Rabbit Lake facility has been in operation since 1974 and has both a mine and a mill. Cameco's Rabbit Lake licence is valid from November 1, 2013 to October 31, 2023.

Mining and milling activities continued at Rabbit Lake throughout 2015. In early 2016, Cameco announced the start of a prolonged period of care and maintenance, suspending both mining and milling operations

at Rabbit Lake. Care and maintenance activities have been put in place to ensure safety and protection of the environment, workers and the public. Reclamation activities continued in 2015 in accordance with the approved reclamation plan.

Cameco's Key Lake Mill is the world's largest producer of yellowcake. The picture on the right of this slide shows the Key Lake Mill operation. Cameco's Key Lake Mill licence is valid from November 1, 2013 to October 31, 2023.

In July 2014, the Commission accepted the environmental assessment report for the Key Lake extension project. This allowed an increase in the annual uranium production rate and an increase in the elevation of tailings disposal within the existing tailings management facility. In 2015, Cameco's Key Lake operation continued to mill McArthur River high grade ore and the operation continued to optimize recently installed equipment.

In January and February 2015, two Key Lake Mill events resulted in exceedances of the weekly dose action levels and were reported to the Commission as event initial reports. These events were related to malfunctions and component failures with the existing vertical calciner. CNSC staff conducted inspections immediately after each of the two Key Lake calciner events and later followed up with

additional compliance verification inspections of the events and assessed the corrective actions as acceptable.

Following the February event, CNSC staff issued requests according to subsection 12(2) of the *General Nuclear Safety and Controls Regulation* to all operating mills in order to obtain the following information: design and operational features that help prevent unplanned releases of yellowcake; equipment, processes and procedures that monitor and identify any weakening of containment systems that might lead to unplanned releases of yellowcake; radiation monitoring equipment and procedures that will quickly identify any unplanned releases of yellowcake; and report corrective actions and implementation schedules for short-term and long-term measures to address any significant gaps. CNSC staff reviewed and accepted the licensee's responses, lessons learned, corrective action plans to the 12(2) requests.

In September 2016, the CNSC sent letters to Cameco and AREVA formally verifying acceptance of the actions taken in response to the 12(2) requests. Although the 12(2) responses have been accepted as satisfactory, CNSC staff will continue to monitor the calciner and drying operations through compliance inspections and reviews. This update closes Commission Action number 8486.

The picture on the right of this slide shows the McClean Lake Mill operation. The McClean Lake Mill has been designed to process high-grade Cigar Lake ore. A licence was issued in July 2009, amended in 2012, and expires on June 30, 2017.

AREVA's McClean Lake suspended milling operations in July of 2010 due to lack of ore. Restart of production at the McClean Lake Mill began in September of 2014 processing Cigar Lake ore slurry. Ramp-up of production continued throughout 2015.

As stated in the previous slide, the McClean Lake licence expires in 2017. A request for a licence renewal has been submitted to the CNSC and a public hearing for the licence renewal is scheduled for June of 2017.

To ensure compliance at the operating mine and mill facilities, CNSC staff conducted 30 inspections in 2015. The estimated staff person-days or regulatory effort to plan, execute and report these 30 inspections is displayed on this slide as person-days for compliance.

Also shown on this slide is the person-days for licensing activities at each of the five operating facilities. The 30 inspections resulted in one directive, 33 action notices and 42 recommendations. No orders were issued at the operating facilities in 2015.

Findings from these inspections were provided to the licensees immediately in preliminary reports and followed by detailed inspection reports.

All enforcement actions arising from the findings were recorded in the CNSC regulatory information bank to ensure all enforcement actions are tracked to completion. CNSC staff have reviewed, verified and accepted the licensees' responses and corrective actions. All 2015 enforcement actions have now been closed.

The 2015 performance ratings for each of the 14 safety and control areas determined by CNSC staff based on regulatory oversight activities are shown on this slide. For 2015, the operating uranium mine and mill facilities received a satisfactory performance rating across all safety and control areas.

As mentioned earlier, the three key performance indicators for these facilities are radiation protection, environmental protection and conventional health and safety. The following slides will provide detailed performance reporting for these three SCAs.

The primary sources of radiation exposure at uranium mines and mills comes from gamma radiation, long-lived radioactive dust, radon progeny and radon gas. As part of routine and focused compliance activities, CNSC staff verified and confirmed that licensees have effective

radiation protection programs and practices to monitor and control radiological hazards. CNSC staff concluded radiation doses were kept as low as reasonably achievable and workers were being protected.

This graph shows the maximum and average individual effective dose measured for nuclear energy workers, NEWS, at each of the five uranium mine and mill facilities during 2015. The annual maximum individual effective dose for NEWS at the five facilities was well below the annual regulatory limit of 50 mSv.

The five operating facilities have the same maximum radiological action levels for NEWS of 1 mSv per week or 5 mSv per quarter of a given year.

In 2015, radiation protection accident level exceedances occurred at the Key Lake operation, McArthur River operation and McClean Lake operation. There were no radiation protection action level exceedances at Rabbit Lake or the Cigar Lake operation in 2015. CNSC staff assessed and were satisfied with the actions taken by the operations to address these action level exceedances.

As part of routine and focused compliance activities, CNSC staff verified and confirmed that licensees have effective environmental programs to monitor and control the protection of the environment.

In 2015, no environmental regulatory

limits or action levels were exceeded at the operating uranium mines and mills. CNSC staff's compliance activities verify that the environment was being protected in 2015.

Licenseses are required to report to the CNSC and any other regulatory authorities any unauthorized release of hazardous substances or nuclear materials to the environment. The number of reportable spills in 2015 at each of the uranium mine and mill facilities is displayed on this slide. For each of these spills, the licensee investigated cause and implemented corrective actions to remediate and prevent a reoccurrence. CNSC rated all spills in 2015 at mine and mill facilities as low significance, and all spills were mitigated leaving no residual impact to the environment. CNSC found that the licensees reporting and the responses to environmental spills during 2015 was acceptable.

This slide displays treated effluent annual average concentrations in 2015 for the five operating mine and mill facilities. All metal mines and mills in Canada are subject to the Metal Mining Effluent Regulation, MMER, of the Federal *Fisheries Act*. As shown, all annual average concentrations are well below MMER discharge limits and the site-specific action levels.

This slide displays the treated effluent

annual average concentrations in 2015 for radium, selenium, and uranium at the five operating mine and mill facilities. I will note an error on this slide. The Rabbit Lake uranium level should read 0.052 milligrams per litre. The correct value is found in the regulatory oversight report.

As shown, all facilities are below the applicable licence release limit and site-specific action levels. CNSC staff are satisfied that treated effluent concentrations at the uranium mine and mill facilities are protective of the environment.

On this slide, effluent quality compliance data for uranium mines and mills is compared to base metal, precious metal, and iron mines. Compliance with the MMER provides a good environmental performance indicator across the metal mining industry. This table illustrates the number of mines in each mining sector that are out of compliance with at least one MMER parameter in 2014, and also provides specific information on the individual parameters that are out of compliance. Data presented on this slide comes from Environment and Climate Change Canada and is provided for the year 2014 as it is the most current information available. In 2015, the uranium sector was in full compliance with the provisions of the MMER for all regulated parameters and compares well to the other metal mining sectors.

This slide shows radionuclide concentrations measured in ambient air at uranium mines and mills in 2015. High volume air samplers are used to collect and measure total suspended particulate in air, and the particulate samples are also analyzed for metal and radionuclide concentrations. Concentrations of lead-210, radium-226, thorium-230, and uranium are below the referenced annual air quality levels. CNSC staff confirm all uranium mine and mill facilities demonstrate strong performance, mitigating atmospheric effects on their operations, on the environment, and conduct regular air quality monitoring. CNSC staff concluded that the results indicate no risk to the environment from atmospheric releases and that the environment was protected.

Lost-time injury statistics are a key measure of licensee performance for conventional health and safety. A lost-time injury is a workplace incident that results in a worker being unable to return to work for a period of time. CNSC staff also consider the injuries' frequency and the severity rating. CNSC staff and Saskatchewan's Ministry of Labour Relations and Workplace Safety monitor and review each reportable injury to ensure that cause is identified and satisfactory corrective actions are taken. CNSC staff confirmed that the operating mine and mill facilities implemented effective management

of conventional health and safety in their activities.

For 2015, CNSC staff confirmed that all operating uranium mine and mill facilities continued to have satisfactory performance in all safety and control areas. The licensees' radiation protection measures were effective in keeping doses as low as reasonably achievable. Their environmental protection programs were effective at protecting the environment, and their conventional health and safety programs continue to protect the workers. CNSC staff conclude that each regulated facility operated safely and met performance expectations with respect to the health and safety of persons and for the protection of the environment and to Canada's international obligations.

I'll now return the presentation to Ms Haidy Tadros.

MS TADROS: Thank you. Haidy Tadros for the record.

I believe we're going to break at this point and take questions or move to the licensees' presentations.

THE PRESIDENT: You get the break.

--- Laughter / Rires

THE PRESIDENT: We will now proceed with the presentation by Cameco Corporation on the Cigar Lake Commissioning Status Report number 5, as outlined in CMD

16-M49.5 and 16-M49.5A. I understand, Mr. Mooney, you will make the presentation. Over to you.

CMD 16-M49.5/16-M49.5A

Presentation by Cameco Corporation

MR. MOONEY: It's Liam Mooney for the record. And at the risk of disagreeing with you with the first statement, I'm going to provide some overview remarks, I'm going to pass the microphone to AREVA, who will provide some overview remarks, and then it'll come back to Mr. Les Yesnik, who will present on Cigar Lake.

So with that, I'm Liam Mooney, the vice-president of Safety, Health, Environment, Quality, and Regulatory Relations at Cameco. I typically take a deep breath then to catch it. With me today is Kevin Nagy, our director of Compliance and Licensing at our uranium mining and milling operations in northern Saskatchewan. Also joining me is Les Yesnik, the general manager of the Key Lake and McArthur River Operations, and Kirk Lamont, the manager of Safety, Health, Environment, Quality, and Regulatory Affairs at Cigar Lake.

Les and Kirk are here today to provide an update on our Cigar Lake operation after AREVA provides their opening statement.

I will start by saying Cameco's highest priorities are the safety and health of our workers and the public, protection of the environment, and the quality of our processes. These priorities are the foundation of our work and remain an integral part of our key measures of success. Cameco's strong performance in these areas is demonstrated in the annual CNSC staff report. We sustained our ratings on all safety and control areas while responding effectively to events at our operations.

Some highlights from 2015 are the start of production at the Cigar Lake mine, which we will be discussing in a subsequent presentation, and managing our operations safely through a severe forest fire season in northern Saskatchewan, which was a subject of a previous presentation to the Commission.

Also during 2015, the McArthur River Operation received its second consecutive John T. Ryan Award for outstanding safety performance for a metal mine. We effectively engaged our key stakeholders and sustained strong public support for our mining and milling operations. Polling conducted in 2015 found 81 percent of northern Saskatchewan residents support the uranium mining industry. High levels of public support and trust rest on a foundation of strong operational performance. That performance is driven by robust management systems that are

assessed and verified by our regulators.

In 2015, Cameco remained compliant with our licences and licence conditions handbook while operating within the objective of the relevant licensing basis. Regardless of difficult market conditions and the resulting changes we have made, Cameco remains committed to the continued safe operation of our facilities.

Overall, we believe the report you see today reflects Cameco's ongoing commitment to achieving strong performance in protecting the environment and the health and safety of workers as well as the public.

With that, I'll turn it over to Mr. Huffman.

MR. HUFFMAN: Thanks Liam.

Good afternoon. My name is Dale Huffman. I'm the vice-president of Health, Safety, Environment, and Regulatory Relations at AREVA Resources Canada. I have with me today Diane Martens, our Health, Safety, Environment project manager. And I have colleagues joining us in Saskatoon: Eric Pacquet is our vice-president of Operations and Projects; Vincent Laniece is the general manager at the McClean Lake Operation; and Tina Searcy is our Regulatory Relations manager.

We've reviewed the CNSC staff regulatory oversight report and find it accurately summarizes

performance at the McClean Lake Operation and for the Decommission Cluff Lake project.

At McClean Lake, 2015 was a year of many milestones. We received high-grade ore slurry from Cigar Lake and successfully ramped up our production at our mill, which has been in care and maintenance for four years out of the eight years of our licence term. We processed our ore slurry at grades approaching 25 percent uranium at monthly production rates that would exceed 18 million pounds a year. We did this while achieving worker radiation doses as low as when we processed grades of less than one percent and at production rates of less than 3 million pounds a year.

Cluff Lake will be the subject of a presentation later today. At Cluff Lake, we continue to progress towards entry of the site into the institutional control framework developed by the Province of Saskatchewan.

We're available to answer any questions you may have. Thank you.

THE PRESIDENT: Thank you.

MR. YESNIK: Good afternoon, President Binder and members of the Commission.

For the record, I'm Les Yesnik, general manager of Cameco's McArthur River Operation and Key Lake

Operation. I'm a professional engineer, and I've spent the last 13 years working for Cameco. And during the final stages of commissioning and the transition to production, I was general manager of the Cigar Lake Operation as well.

I'm joined today by my colleague Kirk Lamont. He is Cigar Lake's manager of Safety, Health, Radiation, Environment, Quality, and Regulatory Affairs.

When the operating licence for Cigar Lake Operation was granted in April 2013, the Commission included a condition that the final status report on commissioning in ore be presented at a public proceeding to the Commission. In response to that condition, our presentation today will provide an overview of the commissioning process and our performance in key safety and control areas during the final stage of commissioning through 2014 to the end of September 2015.

Overall, commissioning went very smoothly. We're proud of the environmental and safety performance we achieved through commissioning and the transition into production at Cigar Lake.

The Cigar Lake mine is located in the Athabasca Basin region of northern Saskatchewan, about 660 kilometres north of Saskatoon. Supplies and materials are transported to and from the site by an all-weather road. People commute to the site by air, working on a rotating

schedule, typically one week in and one week out.

The Cigar Lake deposit, discovered in 1981. And for the next 20 years extensive work was completed to delineate the deposit, conduct engineering and test work, and complete environmental assessments and economic reviews. Construction began in 2005 under a uranium mine construction licence from the CNSC. The project was initially expected to be completed by 2008, but groundwater inflow events in 2006 and 2008 delayed construction. The formal transition toward production occurred in 2013 when Cameco received a uranium mine's licence from the CNSC. Since then, several important milestones were achieved from the start of ore production in March 2014 to the formal declaration of commercial production in May 2015.

The transition to production at Cigar Lake was completed through a systematic process documented in the operation's Quality Management Program. The goal is to ensure all health, safety, and environmental risks are identified and managed and that design criteria are met for all systems at the operation. The process examined each of the mine systems through four stages leading to system acceptance. The operation's Change Management Process ensured that any proposed changes were subjected to the proper level of review and approval before proceeding to

implementation. Status reports were submitted to the CNSC staff at key stages to ensure effective oversight of the commissioning process. This is the final report on commissioning as well.

Safety risks at Cigar Lake are managed through the operation's Safety and Health Management Program. The program proved effective during commissioning, despite the significant increase in activity and non-routine work involved in the transition to commercial production. The operation's safety system includes regular safety meetings, site inspections, five-point safety cards, job task observations, and work permitting. No significant changes to the program were required as a result of our commissioning experience. The systems and controls in place prevent injuries and protect health and the safety of our employees and contractors, and these continue to be effective.

Cigar Lake entered the commissioning phase with a mature Radiation Protection Program and Code of Practice. Radiation protection was one of the design objectives in engineering the jet boring system and underground processing circuits in the mine. Workers do not enter the ore body to mine at Cigar Lake. The ore is broken using a jet of high-pressure water and transported to the underground processing circuits as a slurry within

steel pipes.

The inherent advantages of the jet boring method are reinforced by ventilation and shielding systems. These are complemented by administrative controls including monitoring of individual doses and radiation levels in work areas. Training, radiation work permits, and personal protective equipment are included as well. As the graph shows, doses were in line with expectations and remained low through the commissioning process and into continuing operations, with the average effective dose remaining less than 1 percent of the regulatory limit. There were no changes to the program or code of practice as a result of commissioning.

Cigar Lake's approach to environmental protection is documented in the Cigar Lake Environmental Management Program, which details our processes for identifying, controlling, and monitoring potential impacts to the environment. The program is complemented by the Environmental Code of Practice that describes required actions to be taken in response to environmental monitoring results or issues. The two key areas of environmental control are preventing spills and managing treated mine water prior to discharge. Six reportable spills occurred during this commissioning period. The environmental impact of the incidents following remediation was negligible and

current controls in place for preventing and limiting the impact of environmental spills are considered effective. These events were managed in accordance with established procedures and regulatory requirements. There were no significant changes to the program or code of practice as a result of stage 4 commissioning activities.

As part of Cigar Lake's environmental management program, Cameco monitors the quality of treated water prior to discharge. Results are reviewed internally and reported to regulatory agencies as part of quarterly and annual reports. Mine water is collected in sumps underground and pumped to the water treatment plant at surface. The treatment plant uses a two-stage chemical treatment process that relies on pH adjustment and particle settling to remove metals and radionuclides from mine water. The plant has capability to handle routine inflows as well as maximum estimated inflow to the mine in upset conditions. Treated water quality remains well below the applicable regulatory discharge limits.

I will now provide an overview of work done to optimize performance of the water treatment process during commissioning.

In 2015, we observed uranium concentrations that were above the predicted range of performance. Through benchmarking and test work, Cameco

confirmed that these uranium levels vary according to the pH profiles in the ore grinding and process water circuits. To resolve the issue, we increased the pH in those circuits. This change was effective in reducing uranium concentration in treated water. The work was conducted through our internal change control process and all regulatory approvals were obtained.

We also identified and addressed an increasing trend in molybdenum concentrations during commissioning. This was a result of the configuration of treatment plant infrastructure and settling behaviours with the first stage water treatment circuit. Following our facility change control process, we addressed this in part by optimizing some flows and rerouting piping. We also enhanced settling in the first stage circuit by optimizing reagent addition. Following implementation of these measures, molybdenum concentrations in the treated waters were reduced to previous levels.

Also in 2015, we observed elevated arsenic concentrations in treated water. Arsenic concentrations remained well below the regulatory limit, but were above the predicted range of performance. In response, Cameco has set up a cross-functional technical team to address this issue. The team has developed an action plan that includes advancing options to reduce concentrations to

levels as low as reasonably achievable. In the meantime, monitoring continues to show that the receiving environment remains protected. Cameco will continue to provide mine water treatment updates as part of the quarterly and annual environmental reports.

Another parameter frequently discussed with the Commission is selenium. The Cigar Lake operation has demonstrated effective control of selenium in treated water and concentrations remained within the predicted range of performance through commissioning and into production.

Cameco defines how Cigar Lake prepares for and responds to emergencies in its Emergency Preparedness and Response Program and the Fire Protection Program. Together these programs ensure that effective emergency response and contingency plans are in place and maintained in a state of readiness through events with potential to affect the health and safety of the workforce or the environment. There were no changes to the Emergency Response and Fire Protection Programs during stage 4 commissioning activities. Regular audits and training exercises help to identify potential improvements and provide assurance that the management systems are effective.

The mine rescue team was activated on two

occasions during the final stage of commissioning. In both cases, emergency procedures were effectively implemented and workers remained protected.

The innovative jet boring system, or JBS, used at Cigar Lake has exceeded expectations as a safe and efficient method to mine the high ore grade. The JBS is a semi-mobile mining machine that is positioned below the ore body. The mining sequence involves drilling a pilot hole up into the ore. Special tooling is then inserted into the hole to mine the ore using a high-pressure jet of water. Cuttings are contained within the JBS, which delivers the ore slurry in steel pipes to storage sumps. Once excavation of a cavity is complete, it is backfilled with concrete. There are currently three jet boring machines at Cigar Lake.

The primary goal of stage 4 commissioning activities for the JBS was to have two units operating on high-pressure water at the same time. Using separate high-pressure pump banks, we were able to achieve this. This test had two hydraulic conveyors running as well as both banks of high-pressure pumps. A test was completed and criteria was met without equipment or hardware issues or any significant changes to the mining method, JBS design or operation. Overall, Cameco considers stage 4 commissioning of the JBS units successful, with all testing

meeting requirements. The JBS units are now fully commissioned and are safely operating at design capacity to meet production targets.

Once removed by jet boring, the ore is processed through a series of underground circuits and is then pumped to the surface for loading and transportation to the McClean Lake Mill. The first stage is the run-of-mine circuit, or ROM, which consists of two steel-lined vessels used to store ore. Ore stored in the ROMs is picked up using a clamshell bucket system and delivered to the grinding circuit where it is fed to the ball mill.

The ball mill crushes ore to the proper size and from there it passes through a grinding cyclone and is then pumped to a clarifier. From the clarifier, ore slurry moves to a pachuca, where it's stored until it is pumped to the surface by ore slurry pumps.

The final stage is the ore loadout facility, it provides surface storage capacity and loads the ore slurry into containers for transport to the McClean Lake operation for milling.

Overall, no significant changes were required to the underground ore processing facilities during commissioning.

The commissioning process did not identify

any need for changes in our mine development strategy. However, we did implement significant enhancements to both our free strategy and mine tunnelling method in response to operational factors. Bulk ground freezing is used at Cigar Lake to control groundwater and provide additional ground control. The original strategy was to drill freeze holes from dedicated tunnels underground.

However, following remediation in 2010 Cameco implemented surface freezing to advance freezing in the ore body during mine construction activities from 2010 to 2013. Freeze holes were drilled from the surface, which avoided the need to develop underground freeze tunnels and allowed us to begin the lengthy process of bulk freezing earlier in the schedule.

Cameco conducted a trade-off study to examine our ground freezing options and a decision was made to continue with the surface freeze option at this time.

Another change to the initial mine design was the adoption of a different tunnel liner technology. Initially, we planned to use a system of concrete liners in the development of mine production areas. However, deterioration of these tunnel liners was observed and, as a result, Cameco conducted a risk assessment that identified issues related to the future ore production and operation costs.

A new liner design known as the new Austrian tunnelling method was tested. Instead of rigid supports the new method uses specifically-designed yielding segments to control and manage deformation.

CNSC staff granted a staged approval to transition to the new method in October 2012. The approval was conditional upon third-party supervision of initial tunnel construction and submission of an as-built performance report after the work was complete. All regulatory commitments were met and Cigar Lake has successfully transitioned to the new method.

In conclusion, we're pleased to report that Stage 4 commissioning of the Cigar Lake operation has been successfully completed. Commissioning criteria were met with all equipment and circuits functioning as intended. Our management programs proved effective in ensuring the health and safety of our workers and the protection of the environment.

As the ramp-up to full production continues, we will strive for improvement in all areas in accordance with our management systems.

Thank you for your attention, and we'd be pleased to answer any questions you may have.

THE PRESIDENT: Thank you. So before we get into the question section, I'd like to now consider the

written intervention from Saskatchewan Environmental Society and the Athabasca Chipewyan First Nation as outlined in CMD 16-M49.1.

Who wants to start? Ms Velshi.

MEMBER VELSHI: Give me a few minutes.

THE PRESIDENT: Okay. Dr. McEwan.

MEMBER MCEWAN: I think this is a question for Staff really relating to the general comments at the beginning. They have a number of recommendations and a number of discussions around very long-term considerations, vague terms.

But if we just take the first four pages, could you react to each of those recommendations? Because I think some of them are fairly obvious questions, some of them are less obvious, and some clarity might help.

MR. LOJK: Bob Lojk, for the record.

Thank you very much for the question. You're looking at -- you'd like to discuss all four pages that would be up to Recommendation Number 4?

MEMBER MCEWAN: I think we could stop there because there's a whole pile after that as well that we could discuss, but I think some of those are fairly easily addressed and the background to them can be easily address.

THE PRESIDENT: Some of them are for the

next part so, again, we've got to make sure that we've got our sequences right here.

MR. LOJK: Thank you, Dr. McEwan.

I will provide a general comment and we have staff available, both in Saskatoon and present here in Ottawa, to provide as much depth as necessary to answer your questions.

The recommendation that CNSC undertake a consultative process to clarify methodology for establishing performance expectations or evaluating success, that is the core work that we do. That is our work. I mean, we do this as part and parcel. This particular commission meeting and commission hearings are in fact used to establish what is required in terms of regulatory documents, in terms of requirements.

We've got Mr. Andrew McAllister here who can provide a bit of background on the view from the environmental end and how we ensure that the environment is protected. We also have Madam Caroline Purvis who's here to provide information on radiation protection. But essentially, we benchmark ourselves against best practices in addition to doing our own internal work.

So if I could pass it on to Mr. McAllister, it would be appreciated.

MR. McALLISTER: Andrew McAllister,

Director of the Environmental Risk Assessment Division.

So just to situate us around environmental protection, we were before you not too long ago seeking your approval on REGDOC 2.9.1, and that is really the cornerstone document that really drives our environmental protection framework. Certainly, it was one that was very much subjected to a thorough consultative process. Then underpinning a lot of the regulatory documents, that particular regulatory document, is aspect such as CSA standards.

So we now have that suite of environmental CSA standards that have been developed, that have undergone public consultation, and really are transparent in the means by which we look at the environment, we assess the environment in how we evaluate performance.

So from our perspective, we are transparent, the expectations are clear in the regulatory documents and in other tools that we use. With everything else, there's always room for improvements to clarify language here and there, and certainly we look for those opportunities.

MR. LOJK: Bob Lojk, for the record again.

Just continuing on from there, if you'd like, the second recommendation is to deal with ongoing responsibilities for protecting --

MEMBER MCEWAN: So I think those come actually with the next section.

MR. LOJK: Okay.

MEMBER MCEWAN: Sorry. I think the inspection system, again, has partly been answered with what you've already said. Perhaps the next one to go to would be five on page 5. The different between fully satisfactory and satisfactory, because that again is something that keeps coming up.

So I think it's all part of the same suite of questions and answers, how do we assure that how we inspect meets the criterion that we set and are set for us?

MR. LOJK: Bob Lojk, for the record.

There is extensive discussion on satisfactory and fully satisfactory. Essentially, no one's perfect, and we're looking for in fully satisfactory is perfection. These are complex, very large facilities, they provide a great number of opportunities for looking at things and working at things and the like.

I think, in one case, we had a large crew of people working and trying to bring the mine up to production, you know, huge number of staff, not a single injury or occupational event. That merited fully satisfactory, because it was truly stupendous and above it. That's the very very high

standard.

So normally, we're very happy because not only are they satisfactory, they're satisfactory trending towards fully satisfactory. Previously, we used to have an arrow that denoted whether they're level or they're increasing, but they're striving for perfection. When they achieve perfection, they get fully satisfactory.

I would appreciate if Mr. Mark Langdon in Saskatoon could in fact provide more clarity on how his staff who do the actual inspections come up with the readings.

THE PRESIDENT: It is strange, nevertheless. You get five mines, been around for a long long time, against 14 section control here and they're all satisfactory from security to environment, you name it. It seems like -- and we have had this discussion in the past. If we are not going to give anybody ever fully satisfactory, then we should think about a different rating system.

Saskatoon. Anybody who wants to tell us how do you --

MR. LANGDON: I'm Mark Langdon --

THE PRESIDENT: Go ahead.

MR. LANGDON: -- Mark Langdon, for the record.

I'll add a little bit to what was said. Satisfactory reading provides that the licensee was in regulatory compliance and meets the CNSC's expectations. For fully satisfactory, the licensee's compliance must exceed regulatory requirements and CNSC expectations.

The rating for a safety and control area isn't based on one indicator such as the number of spills, the number of action level exceedances, or the number of lost-time injuries, but on the performance of all within that specific safety and control area, this would also include how the licensee reacts to performance issues, including staff enforcement actions.

A strong factor for both a satisfactory or fully satisfactory rating is continual improvement. For 2015 CNSC staff rated the licensee's 14 safety control areas at a satisfactory level or higher, but below fully satisfactory. CNSC staff have very high expectations when it comes to demonstrating fully satisfactory.

As Mr. Lojk suggested, the last time he gave a fully satisfactory was in 2012 when Cigar Lake had over twice as many staff and contractors constructing the mine and had no lost-time injuries. Cigar Lake's safety control care for conventional health and safety was executed that year overall at a level that exceeded CNSC staff's expectations.

THE PRESIDENT: Maybe Cameco doesn't want fully satisfactory, is happy with satisfactory.

MR. MOONEY: Liam Mooney, for the record. We would really like to receive a fully satisfactory --

--- Laughter / Rires

MR. MOONEY: -- to state the obvious. But I guess we look at it as being within the care and control of the CNSC, we look at the safety control areas with a particular emphasis on safety and environmental performance and protection of the public with a view to continual improvement and opportunities in that regard.

So we look at our performance through a number of different lenses and we see room for improvement ourselves. So we're satisfied with a satisfactory rating, but we feel there's room for improvement and we could do better in some of these safety and control areas.

MEMBER MCEWAN: So can I perhaps use as an example where the public, I think have some challenge in understanding the satisfactory and the fully satisfactory. If I look at McClean Lake -- actually, let me just go to page 39, I think that's Cigar Lake, we'll stay with that at the moment.

There are 10 events reported to the CNSC of which seven are caused by the same issue, a failed

condenser coil. What this doesn't say is the timeframe of which those seven events happened, whether it was over a week or over three months. It certainly implies that there is a lack of satisfactory approach to recognizing and resolving a persistent issue.

It's a little unfair to pick this one example, but I think it's a good example of why we have some difficulty in understanding where it goes. So why does is this recognized by a satisfactory, when clearly the performance isn't actually very satisfactory with the same issue in seven events?

MR. LOJK: Bob Lojk, for the record.

This particular event where a series of events dealt with the condensers for the freeze cooling system and leaks of ammonia, that it all happened for a fairly limited period of time. The design of the equipment at the -- of course the licensee can provide more specific details, and so I would also ask our staff, Denis Schreyer to comment, as he's inspector for the site.

But it was recognized that the equipment did not function at the level that it was required to function in the northern environment. The events happened basically in January, and then condensers, which are aluminum, they just were not able to function in the event.

Now, the end result, the consequences to

the environment were not severe or of a large significance, but it does show to a weakness in the original equipment selection if somebody would have looked at it. Those things have been looked at and all those pieces of equipment, as the problem was discovered, new pieces of material were ordered in order to replace the condensers from aluminum to steel. Our staff kept on monitoring to make sure that it wasn't a question that it would have to be stopped completely.

Perhaps Mr. Schreyer can provide some details on what sort of thinking he went through, and the licensee may want to add their quality assurance system that allowed us to bring back -- to come back on board.

MR. SCHREYER: Denis Schreyer, for the record.

Four of the events had occurred in the month of January of 2015. At that point, we saw the reoccurrence happening and we required Cameco to develop a plan for the permanent solution of the problem, along with a timeframe for the implementation, which we reviewed and accepted.

The issue was investigated by Cameco to determine what was causing the failures, and they determined, as Bob was indicating, that the aluminum coils weren't suitable for the application and therefore the

entire condenser header had to be replaced with the units with steel coils.

Now, unfortunately, these are not off the shelf items, and we were given a timeline by Cigar Lake to do the replacement. As Bob indicated, we monitored the progress of this but, unfortunately, along the way there were three other failures that had occurred. Then finally, the units were all replaced I believe in July of 2015, or 2016, sorry. We haven't seen a reoccurrence of that kind of failure again.

Now, in consideration with respect to the satisfactory nature of our judgment was that, number one, they reported that in accordance to the requirements, they identified the issues appropriately and made plans to do the correction of the failures, and they also did the follow-up to ensure that the coils had been replaced and the ammonia seepage was under control.

So in the whole, we felt that they did follow process, they were proactive in identifying the issue. Unfortunately, it appeared to be a common fault failure that was occurring in these modular units that were the result of probably poor selection in terms of the design of that installation.

So in the whole, that would be the consideration that we used; not only the fact that they had

an event, but how they reacted to the event and made the corrective action. So that then resulted in our view that they were carrying out their program and their actions were satisfactory.

THE PRESIDENT: We're going to have this debate forever until you guys come up with concrete examples how you add up all the things almost to come up with a bottom line depending on the significance of this particular event.

I'd like to return back, we're dealing with the intervention here, so there's quite a few other comments here that require attention. Ms Velshi.

MEMBER VELSHI: I'll save that for the next phase. I don't have any for the first part.

THE PRESIDENT: But I think for this phase still they're talking about using a nuclear weapon. I'd like to make sure that this gets answered. This is on page 5, the last recommendation.

MR. LOJK: Bob Lojk, for the record.

We have the assistance of Mr. Larry Chamney, and we have Madam Elaine Kanasewich from NPCD of the CNSC here to provide more background.

But essentially, the CNSC has a responsibility in assuring that the requirements of Canada's Nuclear Non-Proliferation Policy are respected and

implemented when it comes to assessing and authorizing experts of uranium.

This principally involves assuring that the provisions of treaty-level bilateral nuclear cooperation agreements entered into by the Government of Canada with its nuclear trading partners are respected, both prior to expert authorization and following transfer.

Such provisions include obtaining peaceful end-use assurances prior to transfer of uranium, ensuring there are international safeguards administered by International Atomic Energy Agency existing facilities in which uranium will be used, administering prior consent controls on proposed retransfers to third countries, and regular accounting of the inventory supplied uranium. In short, it's done safely and it's to ensure there is no proliferation.

Perhaps Madam Kanasewich can add clarity to this.

MS KANASEWICH: Thank you very much.

Elaine Kanasewich, for the record.

Just to add on to what Mr. Lojk said, it's important to note that on top of the responsibilities that were listed, Canada Nuclear Non-Proliferation Policy is actually administered by Global Affairs Canada. Global Affairs is responsible for establishing the nuclear

cooperation agreements that Canada enters into with its bilateral trading partners.

So while the CNSC does have a role in providing technical advice to Global Affairs Canada in implementation of this policy, including during the negotiations of the nuclear cooperation treaties, we don't have a direct role in the policy itself. That said, the CNSC does work exceptionally closely with its Global Affairs counterparts in consultations with stakeholders, both domestically and internationally.

While the issue raised in regards to Canada's Nuclear Non-Proliferation Policy is quite an important one, we do recognize that we, as providing technical advice to Global Affairs Canada, do have and are quite amenable to bringing the recommendations made by the intervenor to our officials at Global Affairs Canada so that they can, indeed, see what they can to consider approaches to public outreach on Canada's policy.

Thank you.

THE PRESIDENT: I just want to reiterate my understanding, Canada will not ship any uranium to any country without this assurance of peaceful use, end use, okay. Just -- I think that's what they're aiming here at, and this is a treaty -- international treaty. And I think our licensing actually demands that.

So can we -- did I get it right?

MS KANASEWICH: Elaine Kanasewich, for the record.

That is correct. We will not ship Canadian uranium to a partner we have not established a nuclear cooperation agreement with.

THE PRESIDENT: Okay, thank you.

I'd like to move now to the other intervention from Mr. Rodney Gardiner.

Okay. We've got a little bit of a mix-up between this part and the next part.

CMD 16-M49.3

Submission from the

Canadian Nuclear Workers' Council

THE PRESIDENT: So the following written submission is -- or intervention is from Canadian Nuclear Workers Council as outlined in CMD 16-M49.3.

Ms Velshi.

MEMBER VELSHI: Question for Cameco. Cigar Lake and Rabbit Lake are kind of conspicuous by their absence, so you don't have CNWC member unions there?

MR. MOONEY: It's Liam Mooney, for the record.

That's correct. Cameco has the unions at our Key Lake and McArthur River operations. I would add that we're recognized as one of Canada's leading employers, which is across all of our operations, and the performance on a number of metrics as rated by a number of different organizations.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: Just the same glitch comment that was in the earlier documents, and find out what it was.

MS TADROS: Haidy Tadros, for the record. We noted. We will follow up to make sure that that glitch is reconciled.

THE PRESIDENT: Anything else?

Okay. So that covers all the interventions for this part.

Okay. So now is for the general questions, and I don't know whose order it is. I'm going to start with you, Ms Velshi.

MEMBER VELSHI: Thank you.

So thank you for the report and for covering historic and decommissioned sites.

Before Dr. McEwan raises this, maybe I will jump it -- into it. It's on page 3 of the CMD where you use the term acquiesce, that you did increase the scope

of this annual report because the Commission made you do it. And I just didn't like that choice of word, so I thought I'd just let you know because it is very valuable to have those two sections in here.

So similar to the question around fully satisfactory, there is no statement that I could find that said over this five-year period there is actually an improvement trend, which is that it's been satisfactory, satisfactory. So whether it's the same or getting better within that whole range, I think it would be helpful again -- and when we hear from the licensees about continuous improvement, and there was no mention of that there.

And on that similar note, you provide in your slides a comparison of the mines and mills -- on the mines with other -- other mines for environment protection, but you don't for conventional health and safety. You do in the CMD.

So this is, I think, pages 31, 32.

And unfortunately, the uranium mines don't compare terribly favourably when it comes to lost time injuries and severity rates, which is on page 32.

So one, I think there needs to be a comment here that as you compare, what do you conclude and, more importantly, I'd like to hear from the licensees

follow-up to your earlier statement, you're always looking for room for improvement.

What, specifically, is, you know, having the performance not as good and what are your plans for making it better?

MR. LOJK: Bob Lojk, for the record.

The accident rate is -- we've got staff -- and of course, I'd like Cameco to comment. But when we have -- when we have -- what we have here in -- when we look at the frequency rate, at the severity rate, you have to understand that these plants are remote, so even a cut finger requiring four stitches will require evacuation from the site that will require three days or four days turnaround to get the finger sewn up where the other facilities are closer by to medical facilities and, therefore, they don't incur that four-day turnaround.

And you can see from the number of -- so if you look at the -- the frequency rates are very, very similar across all the industry. The severity rate, yes, there were a couple of events. Cameco can detail on them. But a lot of it is also attributed to the fact that the transportation of the -- of the particular injured person adds a lot to the time off.

Not necessarily fully indicative of the severity of the injury; more of the remoteness of the

location.

And perhaps Cameco can add information.

MEMBER VELSHI: Thank you.

Before Cameco gets to that, just a very quick question for clarification.

So on page 32, the total number of LTIs for uranium including contractors is eight. On page 31, as I add them across the five mines, it's nine. So what's the difference there?

MR. LOJK: I would like Doug Humphreys to try to answer the question. In the meanwhile, staff here will try to sort out numbers.

Thank you.

MR. HUMPHREYS: Good afternoon. It's Doug Humphreys, for the record.

The data presented in 210 is reported by the licensees and tracked in CNSC's instant tracking database, but whereas the data in Table 2-1 comes from the Province of Saskatchewan so we can do the comparison.

There was one event that occurred in 2015, but it was later classified as a lost time injury -- it was not classified as a lost time injury in that year. It was originally considered to be a first aid. However, this event was reclassified as a lost time injury in May of 2016 and, therefore, it does not appear in the provincial

statistics that the CNSC obtained when it was made -- the table was made up.

MEMBER VELSHI: Thank you.

MR. MOONEY: It's Liam Mooney, for the record.

And I just wanted to start by indicating that when we look at our safety performance, we look at it through a number of different metrics; lost time incident frequency rate is one of those.

As we saw over a number of years, our performance improved six fold in that regard, and we got down to very small numbers. So the curse of small number statistics are that your performance can jump around quite a bit.

That being said, if you look at Cigar Lake, one LTI in the previous year, four in 2015 and, to date the facility, one LTI.

I have a fellow sitting next to me that will tell you one LTI is still too many, and we take all of those workplace injuries seriously. And our intention using our mature safety management programs is to drive that number to zero and to reduce the severity rate along with that.

MEMBER VELSHI: Thank you.

MR. HUFFMAN: Just to add to Liam's

comment, I think that we're quite proud of the -- what we're accomplishing in Saskatchewan, and both Cameco and AREVA work together within the Saskatchewan Mining Association on safety topics. So the mining industry's in it together, and we've been collectively working to improve safety across the province.

And as Liam says, we've driven these numbers down to quite low numbers, so we're quite happy about that.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So to keep with LTIs, page 84, Table 6.3, Key Lake.

This is just -- in 2013, how can you have a severity rate with no LTIs?

MR. MOONEY: It's Liam Mooney, for the record.

And actually, this question came up last year, and we all looked blankly at each other, but it really goes to the attribution.

Mr. Humphreys covered it earlier, that if you have an LTI in 2013, it can be attributable -- you take the incident there, but you take the days that are missed in the year that they take place. So you could have zero incidents, but you could have a severity rate that is what you see there because of an incident that was back

calculated to the previous year.

So in the example, if you have a first aid in 2014, and in 2015, complications ensue and it becomes a lost time, that's attributed to 2013, but the days lost are attributable to 2014 because that's actually where you lost the days. And that's what your severity calculation is based on.

MEMBER VELSHI: I don't think that's a standard calculation. I know in NPPs or -- unless it's changed, and it is a very rare occurrence. They actually try to estimate at the end of the year how much longer the person's going to be away from work for.

Now, it's different if it's a medical attention that then becomes an LTI in the following year, but if it's a lost time injury that carries over into the next year, they actually try to estimate.

MR. MOONEY: So what we're talking about is the same thing, that it's a first aid in the year and that's how it's counted in the statistics, but there's some complication that may ensue in the following year so it becomes a lost time instance, so it's operated from the medical aid or first aid, and that is adjusted in the statistics from the year before, but the severity, the days that are lost, are counted in the days that you experience them.

So you have -- you can have that sort of disconnect where you show zero for an LTI, but you have a severity rate in a year where you have -- did not have an LTI. But it's because of the date on which the LTI is actually pushed back to.

MEMBER MCEWAN: So the example -- do you have first aid capacity to put a suture on a finger on site, or...?

MR. MOONEY: It's Liam Mooney, for the record.

We have health centres that are staffed by registered nurses at all of our Saskatchewan facilities. There's been a fair bit of dialogue with changes made by the Saskatchewan Medical Association with the services that can be provided under the -- what used to be transfer of medical functions going away to a bit of a different model where you have these specialty practices and nurses can practise within the scope and then there's specific directions provided.

So the answer is that sutures can be provided if there's a specialty practice in place in relation to that particular activity.

MEMBER MCEWAN: And you'd obviously try and get nursing coverage in remote areas with that capacity?

MR. MOONEY: It's Liam Mooney, for the record.

We try to have those specialty practices. That change is just happening effective December 1st, so we would be putting in those specialty practices to cover those activities that would be outside the registered nurse's scope of practice normally.

MEMBER MCEWAN: So again, this sort of goes back to the SCA question.

On page 11 where there is a table showing staff inspections and you notice or you report 12 action notices related to the MacLean Lake operation which is two per inspection, so at what stage does that type of finding with multiple action notices reflect how you would approach a satisfactory?

MS TADROS: So Haidy Tadros, for the record.

Just maybe a point of clarification. The 12 action notices may not necessarily represent two per inspection. It does depend on the findings for those inspections.

But coming back to your specific question with regards to how does that sort of come together, the finding will be analyzed with regards to the risk and the safety significance based on the non-compliance that was

noted.

And maybe I can pass it on to Mr. Mark Langdon in Saskatoon to give the details around the MacLean Lake inspection.

MR. LANGDON: Mark Langdon, for the record.

MacLean Lake did have 12 in that year. Most of these were I wouldn't say low in significance, but fairly low. None of them were very high level where you would look at taking more drastic action if they didn't do something immediately.

For the satisfactory, again, the -- we look at how they deal with these issues. All of the issues that they -- that we raised with them, they took them very seriously, they took appropriate action, made corrective actions. And we verified them in other inspections, that they did implement the actions that we said and they dealt with them appropriately.

So based on that type of view, we do give them a satisfactory performance.

MEMBER MCEWAN: So repetitive problems doesn't factor into it.

MS TADROS: So Haidy Tadros, for the record.

I think the point is well taken. I think

we do need to be in a position to put some context from a public perception when these ratings are given. I think what we would need to do from a CNSC staff perspective, as was noted several times, we do have a very robust system whereby inspections are planned, compliance inspection guides are used, specific criteria that denote meeting regulatory requirements are used so our baseline going into any inspection is always with the assumption that we are seeking satisfactory, meeting regulatory requirements.

Given the conversations here today and, again, at Port Hope, I think what we would need to do from a regulatory oversight report is really be able to put these kinds of data and metrics into a perspective which shows from the public's perspective when you see numbers like this, what is the thinking and the considerations that we tend to provide verbally, but I think the report itself needs to already have that ingrained in it when we come before the Commission to help a better understanding of how these ratings come.

So thank you for the comment, and we will take that back.

MEMBER MCEWAN: Thank you.

THE PRESIDENT: Ms Velshi.

MEMBER VELSHI: If I can get both Cameco and AREVA to comment on, is there a correlation between

production level and maximum and average radiation dose.

And I ask because I think that with Cigar Lake, there was a comment when the maximum dose for 2015 was very high that it was because production levels were higher, and yet when I looked at Rabbit Lake over the five years, production levels went up, but neither the average or the maximum dose changed in any significant way.

But is there a correlation between -- between those?

MR. HUFFMAN: Dale Huffman, for the record.

What we've observed at MacLean Lake is that our average dose is staying about the same irrespective of what our grade or production level is, and the maximum dose is more driven by events or upsets.

We have a uniquely-designed mill that's been built to accommodate very high grade ore, so we -- so our doses are less sensitive to those -- to those changes.

Dose rates may be or are more sensitive to those fluctuations than the doses tend to be, so that's what we've observed.

MR. MOONEY: It's Liam Mooney, for the record.

And I should defer to the fellow with the radiation background, but I would just add that, you know,

with transitioning Cigar from a project to a mine, we see this as a real success story at the facility that, you know, handling high grade ore using the jet boring system as was described earlier in the presentation. We've managed to keep doses really quite low. And that doesn't mean that we're not using our programs to look for opportunities to improve that, but as Mr. Huffman mentioned, the annual maximum tends to be driven by incidents or events or upset conditions and is not necessarily that strong an indicator on radiation performance.

MEMBER VELSHI: There's a comment on page 37 at the bottom on the 5.99 millisievert maximum effective dose, and the comment that it's due to increased production from 2014. And I know there's a significant increase from 2014 to '15, so it -- is that it?

MR. MOONEY: It's Liam Mooney, for the record.

And we don't see a one-for-one relationship. It really is the transition from a project to an operating mine, and there is a significant increase in production -- Les could give you the numbers -- year over year, but we don't see that -- a similar increase. So we look at more the transition from Cigar Lake as a -- as a project and into an actual mine, that these increases are

in line with that transition.

MR. YESNIK: Les Yesnik, for the record. I'll just add a little bit to Liam's comments.

Certainly if you compare the production achievements in 2014 and 2015, 2014 there was less than a half million pounds produced, and then 2015 we were 12.8 million pounds produced, so quite a remarkable change in production. And this year, we're more than that as well, of course.

And if you look at our current data, the maximum dose that we've seen to date is just over three millisieverts, so that certainly -- it speaks to the robustness of the mining process.

I would say that the process has -- contributes greatly to the -- to the dose results as well. In Cigar Lake, we're very fortunate in that it's very much non-contact. We're drilling up into an ore body, jetting the ore, and that goes into a pipe and is carried away into a processor, so it's certainly non-contact and conducive to low exposures, which is great.

THE PRESIDENT: Dr. McEwan.

MEMBER MCEWAN: So just a couple of comments on pages 27 and 29.

So Table 2.6, I think it's just, again, a use of English. Would it not be more accurate to say

"effluent non-compliance by mining sector" as you're identifying mines that are non-compliant?

And then on page 29 when you were talking about the AR&P and the country food data -- thank you for the web site. It was very helpful. I was able to get straight to it and look at the reports. Really, really helpful seeing that.

I just thought it would be helpful to have a little bit of data from previous years about the surveys that have been done and just a little bit more explanation of what the processes are in terms of the data collection.

I think this is obviously an important element of the oversight, and I think it would be good to put a little bit in there.

And a final question --

THE PRESIDENT: Are you --

MEMBER MCEWAN: I'm talking about this.

THE PRESIDENT: Yes, but this is associated with the Athabasca, right?

MEMBER MCEWAN: Yes. So you can go into the reports quite nicely from the website that's given in this report, but the bottom paragraph, just above section 2.5, to have just a little bit of the data that has been presented over the last five years.

And then a final question that comes up

two or three times through both sections, the importance of blueberries as a target fruit. Why? Why blueberries? Just out of interest.

MR. LOJK: Thank you very much for the question. Bob Lojk for the record.

We have two people in our Saskatchewan office that kindly have shown up. We have Keith Cunningham -- sorry, we have Dr. James Irvine, Medical Officer of Health for Saskatchewan; we have Tim Moulding, Manager, Uranium Mines -- Manager, Uranium and Northern Operations, and I would invite them to probably come. And then of course we have Mr. Rinker here who is the expert on specifically why blueberries. Perhaps because we like them.

THE PRESIDENT: Okay, let's hear from Saskatoon. Dr. Irvine...?

DR. IRVINE: James Irvine for the record. The main fruits that are gathered in the Athabasca area are predominantly blueberries.

THE PRESIDENT: Can you speak closer to the microphone?

DR. IRVINE: Yes, I can. Yes, so there are a couple of different fruits that are commonly used and consumed in the Athabasca area. The most common is blueberries. Cranberries -- or Lingonberries would be the

other. So I think this is partly based on the discussion with local community members in terms of what types of things are gathered, and because blueberries is such a common consumed item, that's likely why that's the one that's included in the reports.

THE PRESIDENT: The Athabasca -- not only that, the Athabasca study, I found it a very useful kind of study that we should do periodically because it basically, if I understand correctly, measures the cumulative effect over many, many years of all of northern uranium mining. You know, we talk nowadays about cumulative effects, so that's one way of demonstrating the impact on the environment of many, many mines over many, many years. And it covers a vast territory. So is there a plan to do another one in a few years?

I hear somebody from staff. Mr. Rinker.

MR. RINKER: Mike Rinker for the record.

So the Saskatchewan program, the environmental monitoring program that's conducted in the North, has been around for some time, since the '90s when there were panels on uranium mining that were conducted and, as you have seen on the website, it's an extremely robust and valuable study.

It has slightly different objectives than for example our independent environmental monitoring

program, which we also do in the north of Saskatchewan. We are looking at publicly accessible areas closer to the mines and this other provincial program is making sure communities are protected.

But we do see a relationship between the two, so we have a meeting on 20th of December with the coordinating manager of this program to look on how we can share resources and perhaps work together so the next rounds may be a bit more inclusive of CNSC and the province working together on this.

In addition, I would just note, similarly, Health Canada has a program for monitoring country foods and we are meeting with them on this Friday to look at better ways to coordinate and share our independent environmental monitoring data with their monitoring data to see if we can link it on our websites and find ways to be better informed.

THE PRESIDENT: Ms Velshi...?

MR. MOULDING: I'm sorry. Just on that point, I wanted to emphasize the technical program for the Eastern Athabasca. The last year it was completed was in 2015 and the next scheduled year is 2018. Every year there are country foods that are collected and provided. So the community country foods part of the Eastern Athabasca program runs every year and the samples that are provided

to the CanNorth are run through the various analyses and results provided to the communities through visits and the website that you referred to earlier. That information is broadcast throughout the North.

THE PRESIDENT: Ms Velshi...?

MEMBER VELSHI: So just to follow up from that. Has that greatly increased the public's confidence in the safety of country foods and, you know, increased consumption of it? Maybe I will ask Dr. Irvine that.

DR. IRVINE: I think there's a lot of things that -- parts of the program that contribute to providing information to the community. I think engaging them in the discussions as it relates to things like what types of country foods should be gathered, locations where the procurement of those samples should be done, engaging community members, whether it's Elders or youth, in the procurement of the samples, I think is valuable, and then having confidence in the analysis and interpretation as well as the communication of that. I think that all goes together and so I think those are all important components of the Eastern Athabasca monitoring program.

I think it has likely contributed significantly to communities feeling somewhat more comfortable with that concept, but I think there may be times in which other information is made available through

other formats that may increase concern. So I think it shows the ongoing importance and value of this monitoring program to counteract maybe some misinformation that may come from elsewhere.

THE PRESIDENT: Dr. Irvine, I hope you will be with us for the next section where we are getting into some of those issues in a little bit more depth on some of the other facilities.

DR. IRVINE: Yes, I will be here.

THE PRESIDENT: Okay. Just checking.
Dr. McEwan...?

MEMBER MCEWAN: That's it.

THE PRESIDENT: Ms Velshi...?

MEMBER VELSHI: No.

THE PRESIDENT: So I have a couple of them. On page 22, this annual average concentration of uranium in effluent -- so again, you know, I'm not going to even debate with you the unit, because the units are yet in other ones -- but here it's 2.5 mg/L but the objective is .1 mg. So when is this .1 mg going to kick in and maybe even become a national kind of a benchmark?

MR. RINKER: So the 2.5 mg/L is the provincial limit for effluent water quality for uranium. However, many years ago, about 15 years ago, uranium was considered by Environment Canada as something that was CEPA

toxic, it means considered a toxic substance under the *Canadian Environmental Protection Act*, and they worked with the CNSC to ensure mitigation measures are put in place to better control uranium from the uranium mines, particularly Rabbit Lake in this case.

And so out of that work -- there was quite a bit of work done by Cameco to put in treatment technologies and to bring down the releases of uranium from these facilities, and out of that work came an objective of 0.1 mg/L as a better control for uranium.

So it's related to uranium mines and I think if there is ever a uranium mine that we would be regulating, we would be using that same science to put in place what the release limit would be. So I think if you are looking for how it would be implemented across the country, I think it's really us that would be putting that into place and I think we would be using the same science.

THE PRESIDENT: Is it going to be us or Environment Canada who are going to kind of try to impose this as a standard?

MR. RINKER: Mike Rinker for the record.

So the results of that collaboration with Environment Canada was for us to take the regulatory control and we put that limit into our licences, so it would be us.

THE PRESIDENT: The last question I have, and again it's associated with the reference level, this is on page 41 and it's with radon reference level. So explain to me what reference level we are talking about. Isn't radon very well -- I thought there were Health Canada limits on radon.

--- Pause

THE PRESIDENT: And while you are looking at that, since there is a limit in there, why is that not reflected in your table at 3.2? If you control all those references, why is radon not in there?

DR. KWAMENA: This is Dr. Nana Kwamena for the record. I am an Environmental Risk Assessment Officer with the CNSC.

So the Health Canada value that you mentioned is for indoor air quality and what we are providing to you in Figure 3.3 is referencing to outdoor locations. At the uranium mines and mills, radon is one of the constituents of concern, and so using the ICRP and the *Radiation Protection Regulations*, a derived a value of 60 Bq per metre cubed is used in terms of referencing the measured values to a value that is coincident with a member of the public being exposed to an incremental dose of 1 mSv. So it's to provide some context to the radon values that are measured.

THE PRESIDENT: So it's not the level in the mine itself?

DR. KWAMENA: This is Dr. Nana Kwamena for the record.

No, this is not the radon concentrations in the mine itself. This is an average value of the radon concentrations at various monitoring locations that are surrounding the mine, and the number and location of the mines varies by the different operations.

THE PRESIDENT: Well, what is it in the mine, in the mines themselves?

DR. KWAMENA: This is Dr. Nana Kwamena for the record.

So the radon concentrations near a vent or a stack would be significantly higher because that is near the source of the radon, but as you move away from that point source, the concentration decreases. And so when we are talking like hundreds of becquerels, becquerels per metre cubed, if you are near a source, you are getting down to background levels, which is between about 7.5 to 15 Bq per metre cubed within a few hundred metres of the facility.

THE PRESIDENT: I'm sorry, I'm a bit missing. I'm not looking for what goes through the stack. What I'm looking for is, is there a measurable in the mine

itself, because many times the mining operation of uranium go out of their way to put in very high-powered ventilation systems to take away, to remove the radon out of this. Are there any traces left and how come it is not measured through the stack?

MR. MOONEY: It's Liam Mooney for the record.

With respect to the radon concentrations in the mine, it really does depend on the activities that you have ongoing and how much water, radon-bearing water you may have in play because of the different development or production activities that you might have. I think the important thing on the radon side is its expression, radon and its daughter products, on dose. And looking at how dose is well controlled at the underground mines is a product of the radiation protection programs that we have in place that carefully look at potential worker exposures and, as you mentioned in your question, the ventilation to ensure that workers are well protected.

THE PRESIDENT: You know, you measure practically everything inside a mine. It just seems to me strange that radon would not be one of the contaminations that you would actually measure.

MR. NAGY: It's Kevin Nagy for the record. I think you had asked the question, do we

measure what's coming up out of the mine, of the exhaust drifts. The original environmental assessments for the facilities did look at the different air emissions, you know, from the facilities and from the mines, and with respect to radon those were found to be not very significant. So the approach we have taken and what's in our licences for monitoring is we monitor the ambient levels of radon around the properties, around those vents, and compare those to background levels, and those generally are within background range at our facilities.

THE PRESIDENT: I still find it strange that there is a reference number rather than an actual limit set up by Health Canada, et cetera, or internationally.

MR. MOONEY: Sure.

THE PRESIDENT: Go ahead.

MR. MOONEY: It's Liam Mooney.

I would like to ask Kirk Lamont to provide some further detail.

MR. LAMONT: Kirk Lamont for the record.

Just to get back to your question about the measurement of radon in the mine, we do measure radon in the mine as part of our monitoring program. As part of the radiation protection program, we do have concentration limits in our code of practice which dictate activities and

actions we have to take based on the levels of radon in the mine. So it is a very active part of our radiation protection program.

THE PRESIDENT: I thought so. I'm just curious why it's nowhere to be seen in this document. Staff? Anybody?

MR. LOJK: Bob Lojk for the record. I would like to have William Stewart provide some background to this if he's able to.

MR. STEWART: Sure. William Stewart for the record, Senior Project Officer, Uranium Mines and Mills Division.

So as was mentioned, radon is measured in the mine. It is a factor that's -- the important thing is to get radon out of the mine, so it's captured through the ventilation or removed, and the radon progeny is the factor of concern for worker dose. So the important part about radon is identifying it and that is why it is measured on a daily basis, determined what the concentrations are to ensure the ventilation is sufficient to remove it from the operation, and then radon progeny is the factor of concern for actual worker dose. Does that answer the question of concern?

THE PRESIDENT: Thank you.

Anything else? Okay.

--- Pause

THE PRESIDENT: Okay, we will take a 10-minute break and we will come back for the next part.

Thank you.

--- Upon recessing at 6:05 p.m. /

Suspension à 18 h 05

--- Upon resuming at 6:23 p.m. /

Reprise à 18 h 23

MR. LEBLANC: So before we proceed with the second part, I would like to now do the roll call of the people who may have been able to join us.

So I would like to verify if the representative from the Ontario Ministry of the Environment and Climate Change, either Mrs. Faaren or Mr. Dagilis, are you with us?

MR. DAGILIS: Yes, it's Trevor Dagilis.

MR. LEBLANC: Great. Thank you very much.

MR. DAGILIS: Thank you.

MR. LEBLANC: How about Mr. Reitzel from the Ministry of Northern Development and Mines? No, we will try you later.

Mrs. Berthelot from BHP Billiton?

MS BERTHELOT: Yes, I'm here.

MR. LEBLANC: Good afternoon.

Mr. Andy Poole with EWL Management?

Mr. Paul Brugger from Barrick Gold?

Mr. Ian Wilson or Skye Kettleson or Mr. Chris Reid from the Saskatchewan Research Council?

MR. WILSON: Ian Wilson is here on the call.

MR. LEBLANC: Thank you very much.

Mr. Ron Breadmore with Indigenous and Northern Affairs Canada?

MR. BREADMORE: Yes, I'm still here.

MR. LEBLANC: Thank you very much.

And Ms Janet Lowe with Denison Environmental?

MS LOWE: Yes, I'm here.

MR. LEBLANC: Thank you very much.

Mr. President...?

THE PRESIDENT: Okay, back to staff for the next part of the presentation.

MS TADROS: Thank you. Haidy Tadros for the record.

So this section provides information on CNSC's oversight of uranium mine and mill sites undergoing remediation and sites that have been decommissioned and are under long-term care and maintenance.

This part of our presentation provides background information and performance highlights for 2015 for the active remediation projects, followed by the decommissioned sites.

This map shows the locations of active remediation projects and decommissioned uranium mine and tailing sites in Canada.

There are three sites currently undergoing remediation, the Gunnar mine site and Lorado tailing site which are located in Saskatchewan, and the Deloro mine site located in Ontario.

There are 10 decommissioned sites listed on the left of this figure. They are all located in Saskatchewan and northern territories and Ontario.

I will now pass the presentation to Dr. Karina Lange to provide information and to walk you through the slides on the active and decommissioned mine sites.

DR. LANGE: Good morning. My name is Dr. Karina Lange and I am a Senior Project Officer for the active remediation projects and decommissioned sites, or for most of them.

The following section will provide you with information on performance highlights for the active remediation projects.

The objective of active remediation

projects is to establish long-term stable conditions, ensuring the safe use of the site for both current and future generations. Active remediation projects consist of ongoing cleanup activities using full-time staff and contractors and of frequent monitoring and reporting on licence requirements.

The legacy Gunnar mine and mill site is located approximately 600 kilometres north of Saskatoon on the north shore of Lake Athabasca. The Gunnar mine began operations in 1955 and was closed in 1964. The ownership of the site then reverted to the Province of Saskatchewan.

The Saskatchewan Research Council is carrying out the remediation of the Gunnar site, which was authorized by the Commission in January of 2015. The remediation project consists of the cleanup of mine tailings, waste rock piles, an open pit, mineshaft and demolition debris.

Following a public hearing in September of 2015, the Commission approved the partial removal of a licence hold point that allows SRC to implement the remediation plans for the tailings area. In November of 2016 this year, the Commission approved the removal of the remainder of that hold point to allow for all remediation activities to take place.

SRC's objective is to complete all

remediation activities by 2023 and enter into a long-term monitoring and maintenance phase for approximately 10 years. The site is expected to be transferred to Saskatchewan's Institutional Control Program in 2035 upon approval by the Commission.

The Lorado tailings management site is located 8 kilometres south of Uranium City, Saskatchewan. The Lorado mill operated between 1957 to 1960 and was closed with minimal decommissioning in 1961. At the end of operations at Lorado, the uranium mine tailings covered an area of about 15 hectares, including some tailings that were submerged in the adjacent Nero Lake.

The Saskatchewan Research Council is remediating the site on behalf of the Province of Saskatchewan. At the end of 2015, SRC completed remediation of the Lorado site. This included lining of Nero Lake to raise the pH and covering the mine tailings with an engineered cover. This work took approximately two years to complete.

In 2015, CNSC staff verified that remediation followed engineering design plans and that other remediation measures were performing as expected. The next step is for the site to enter the long-term monitoring and maintenance phase, which will last for approximately 10 to 15 years. It is expected that the site

will be transferred to the Province of Saskatchewan's Institutional Control Program in 2030 upon approval by the Commission.

The Deloro mine site is located approximately 65 kilometres east of Peterborough, Ontario. This site was an abandoned gold mine and later operated as a smelting and processing site where some of the wastes produced contained very low levels of radioactive waste.

In 2009, CNSC issued the Ontario Ministry of Environment and Climate Change, MOECC, a licence to remediate the Deloro site which is valid until December 2016. MOECC has applied for a short-term renewal of this licence.

The remediation at the Deloro mine site was organized into three cleanup projects: the tailings area, the industrial and mine area, and the Young's Creek area. Remediation of the tailings area has been completed, remediation of the industrial mine area is nearing completion, and remediation of the Young's Creek area is approximately 60 percent complete. The main contaminant of concern at the site is arsenic and arsenic continued to be above CCME objectives in Young's Creek in 2015.

There were no exceedances of any radionuclides in surface waters at or near the site in 2015. CNSC staff inspections verified that the constructed

waste facilities complied with design objectives and met CNSC regulatory requirements.

In July of 2016, MOECC applied for the conditional release of the Deloro site from CNSC's regulatory oversight. Public Commission proceedings on this matter are planned for next year in 2017.

This table shows the licensing and compliance effort from CNSC staff in 2015 for the active remediation projects.

In 2015, CNSC staff spent 108 person-days on licensing activities and 316 person-days on compliance activities. There was one Commission hearing for a licence condition for the Gunnar remediation project in 2015. Additional compliance efforts were required for Deloro due to a CNSC order which is discussed in more detail later in this presentation.

CNSC staff performed six compliance inspections at the remediation sites. Findings resulting from these inspections were provided to the licensee immediately in preliminary reports, followed by detailed inspection reports. All enforcement actions arising from these inspections were recorded in the CNSC Regulatory Information Bank and all items have been closed.

For 2015, CNSC staff rated all applicable SCAs as satisfactory for the active remediation projects in

decommissioned sites, except for Deloro mine site's management system SCA which received a rating of below expectations.

This report focuses on radiation protection, environmental protection and conventional health and safety, the three SCAs which cover many of the key performance indicators for these sites.

For the Gunnar site, the safety and control areas for management systems, operating performance and physical design were not rated because remediation activities had not yet begun and there were no workers full-time onsite.

This graph shows the maximum and average individual effective doses measured for workers at each of the three remediation projects in 2015.

The maximum individual effective dose to a NEW was 1.35 mSv at the Lorado remediation project. The annual average individual effective doses and the maximum individual effective doses at the three sites were well below the annual limit of 50 mSv in 2015. CNSC staff's compliance activities verified radiation doses were kept ALARA and workers were being protected.

CNSC staff rated the 2015 performance of all remediation projects for the environmental protection SCA as satisfactory. CNSC staff are satisfied that

environmental protection programs for all remediation projects were effectively implemented and met regulatory requirements.

The purpose of environmental monitoring at these sites is twofold. First, it serves to ensure the environment is protected during remediation activities and, second, additional data is used as a baseline to measure the effectiveness of remediation performance verification.

Lost-time injury statistics are a key measure of licensee performance. There were no lost-time injuries at any of the remediation projects in 2015.

The rating for this safety and control area also considers occupational health and safety programs and their implementation onsite and the workers' awareness of these programs. All sites maintained an effective occupational health and safety program that protects workers, contractors and visitors to the site. The rating for conventional health and safety at all three sites was satisfactory in 2015.

As mentioned, CNSC staff rated management systems at the Deloro remediation project as below expectations. Following the release of non-radiological wastewater to the environment, CNSC issued MOECC an order to stop activity in the Young's Creek area and address issues related to water management in June of 2015.

CNSC staff reviewed and assessed the circumstances leading to the release and determined the underlying cause to be linked to unclear roles and responsibilities and poor contractor oversight, areas covered under the management system SCA. MOECC complied with the order and following several follow-up inspections, CNSC staff determined that MOECC met all of the conditions of the order and that remediation work in that area could resume.

Subsequently, in March of 2016, the order was closed. CNSC staff have continued to closely monitor this area to ensure the licensee continues to meet regulatory expectations. CNSC staff confirmed through site inspections that the situation at the site has significantly improved. This update closes Commission Action number 8491 related to the Deloro order.

In 2015, CNSC staff's compliance activities concluded the following. All applicable SCA's were satisfactory, with the exception of Deloro; radiation protection programs adequately controlled radiation exposures, keeping doses ALARA; environmental protection programs were effective at protecting the environment; and conventional health and safety programs continued to protect workers.

The next part of the presentation focuses

on the 10 licensed decommissioned uranium mine and mill sites in Canada.

Activities at decommissioned sites consist of routine monitoring and maintenance activities and in most cases there are no permanent staff onsite. All sites, with the exception of Cluff Lake and Beaverlodge are expected to remain under a CNSC licence for the foreseeable future.

The Beaverlodge site is located in the northwest corner of Saskatchewan, north of Lake Athabasca. Mining and milling activities began at the Beaverlodge site in 1950, with closure in 1982. Decommissioning commenced shortly after operations ended and was completed in 1985 to the standards in place at the time. Cameco has a 10-year CNSC licence for Beaverlodge site that expires in 2023.

Although some concentrations are above CCME guidelines at some locations due to historical mining activities, the levels are generally stable or decreasing with time. Due to the legacy mining impacts and the size of Beaverlodge Lake, there is no practical remediation option that would be able to meaningfully accelerate the natural recovery of Beaverlodge Lake.

In August of 2015, there was a release of turbid water into a shallow bay of Vernon Lake during excavation of frozen waste rock. An increase in water

flowing through the project area exceeded the capacity of the settling basin and sediment fences on the work site, which led to water overtopping the silt curtain in Vernon Lake. Additional controls were implemented and activities of the excavation were safely resumed. With the work now completed, water flows within the channel are stable and are estimated to be the same entering and exiting the channel.

Five Beaverlodge properties were released from CNSC licensing and entered into the Saskatchewan Institutional Control Registry in 2009. Cameco's goal is to eventually transfer all of the properties to the Institutional Control Program by 2023, which is also the end of their current licence. CNSC staff will review the transfer proposal and present it to the Commission if deemed acceptable.

The decommissioned Cluff Lake uranium mine and mill is located in Northern Saskatchewan approximately 75 kilometres south of Lake Athabasca and 30 kilometres east of the provincial border with Alberta. Cluff Lake operated from 1981 to 2002. The majority of decommissioning activities were completed within five years of closure. AREVA had a 10-year CNSC licence for the Cluff Lake site which is valid until July of 2019.

Concentrations of radiological and

hazardous substances in surface waters in 2015 were all below decommissioning objectives. CNSC staff continue to review monitoring results to confirm that water quality is stable or improving as predicted.

AREVA may request the transfer of the Cluff Lake site to the Saskatchewan Institutional Control Program at the end of their current licence period in 2019. CNSC staff will review the transfer proposal and present it to the Commission if deemed acceptable. The mid-term update in the ROR along with this presentation and AREVA's presentation closes action number 8485.

The Port Radium idle mine site is located in the Northwest Territories on the east shore of Great Bear Lake, about 265 kilometres east of the Dene community of Deline. The Port Radium mine was in operation for 50 years from 1932 to 1982. The site covers approximately 12 hectares and was partially decommissioned in 1984 according to the standards at that time.

In 2006, the Government of Canada reached an agreement with the local community and completed remediation of the site in 2007 and 2008 under a CNSC licence that was issued by a designated officer to Indigenous and Northern Affairs Canada, INAC. This licence is valid until December 2016. INAC has submitted an application to CNSC for the renewal of their licence

whereby INAC would carry out another 10 years of long-term maintenance and monitoring activities.

The site itself consists of remediated mine tailings, closed mine openings and a landfill. CNSC concluded that in 2005 INAC maintained the site to a level that is consistent with CNSC requirements and remediation measures continue to perform as intended. Concentrations of contaminants in the major water body in the vicinity of the site, which is called Great Bear Lake, including the local bay, LaBine Bay, were all well below Canadian Council of Ministers of the Environment Water Quality Guidelines for the Protection of Aquatic Life in 2015.

The Rayrock site, also located in the Northwest Territories, was formerly a uranium mine and mill. The former uranium mine and mill operated from 1957 to 1959, when the site was abandoned. The site was decommissioned by INAC in the late 1990s. The site consists of remediated mine tailings, closed old mine workings, a landfill and some demolition mining debris. A CNSC designated officer issued INAC a licence for Rayrock, which is valid until June 2017. INAC has indicated their intent to apply for renewal of this licence to allow for an additional 10 years of maintenance and monitoring activities at the site.

CNSC concluded that INAC is maintaining

the site to a level that is consistent with CNSC requirements and that remediation measures are generally performing well. Environmental monitoring data collected in 2014 and 2015 showed that water quality in down gradient lakes were below CCME Water Quality Guidelines.

The Agnew Lake mine is located about 25 kilometres northwest of Nairn Centre, Ontario. The former uranium mine site was decommissioned and monitored by Kerr Addison Mines from 1983 until 1988. The site was then turned over to the Province of Ontario in the early 1990s. A CNSC designated officer issued the Ontario Ministry of Northern Development and Mines, MNDM, a licence for Agnew Lake which is valid until, January 2021. For the foreseeable future this site will remain under long-term monitoring and maintenance.

MNDM measures surface water concentrations at several locations around the site every two years. The last reported measurements were submitted to CNSC in 2014. CNSC staff reviewed the results and found that contaminant concentrations in water bodies in and around the site were below CCME Water Quality Guidelines.

During the 2015 CNSC staff inspection, staff verified that the licensee performed maintenance work on the dams consistent with Canadian dam safety requirements, issued an action notice to repair the cover

on the mine tailings after observing some portions of the cover were thinning, and requested an update to the gamma survey of the site after noticing some hunting activity was taking place on the site. MNDM has complied with all requests and maintenance on the cover is scheduled for completion in 2017. CNSC staff concluded that MNDM has maintained the site consistent with CNSC regulatory requirements.

The Madawaska site is a legacy uranium mine site located near Bancroft, Ontario, that operated between 1957 to 1982 and was decommissioned in the 1980s. The site includes the footprint of the mining operation, a number of capped and sealed openings, underground workings and two tailings dams. EWL Management Limited is the licensee. A CNSC designated officer issued a licence which is valid until July 2021. For the foreseeable future the site will remain under long-term monitoring and maintenance.

Under their CNSC licence, the licensee performs environmental sampling. Concentrations in some water bodies adjacent to the site exceeded the CCME Water Quality Guidelines for uranium in 2015. These measurements are consistent with those from previous years. For example, on the figure you can see the highest value measured was 49 mcg/L in Bow Lake, which can be compared to

the Water Quality Guideline of 15 mcg/L.

CNSC staff reviewed these results and concluded that uranium concentrations are historic and from historic practices but have remained stable over the past 10 years and the risk assessment is still valid, which states there is no risk to human health under any current use scenario of those water bodies.

However, improvements to water flow and the cover system are currently underway at the Madawaska site to further limit migration of contaminants into the surrounding environment. In 2015, EWL undertook the first stage of this work to improve the cover and surface water management on the tailings management areas. The work is expected to further limit radiation from the tailings, improve local surface water quality and reduce future maintenance.

Bicroft is located about 2 kilometres west of Cardiff, Ontario. Barrick Gold Corporation is the owner and licensee of the site. The Bicroft facility was constructed to contain tailings from mining operations that were carried out at the nearby Bicroft mine which operated from 1956 to 1962. The uranium tailings stored in the Bicroft tailings storage site resulted from processing low-grade uranium ore at the Bicroft mine. Remediation work has included vegetation of exposed tailings in 1980

and upgrading of dams in 1990 and 1997. A CNSC designated officer issued Barrick Gold a licence for Bicroft which is valid until February 2021. For the foreseeable future the site will remain under long-term monitoring and maintenance.

The Bicroft site has an environmental sampling program and the results were provided to CNSC in 2015. Water quality sampling is carried out every five years at the site. Water sampling of the site did occur during the 2015 field season. CNSC staff reviewed the results and concluded that all except one onsite location for uranium surface water samples met the CCME Water Quality Guidelines. However, concentrations for all contaminants were well below CCME Water Quality Guidelines in the receiving environment.

The Dyno mine property is located at Farrel Lake, about 30 kilometres southwest of Bancroft, Ontario. The mill circuit at Dyno operated between 1958 to 1960. The property consists of an abandoned sealed underground uranium mine, a mill which has been demolished, capped openings, a tailings area, one dam with a toe berm, and various roadways. The site is managed by EWL Management Limited. They hold a CNSC licence for Dyno which has been issued by a designated officer and the licence is valid until January 2019. For the foreseeable

future the site will remain under long-term monitoring and maintenance.

In 2015, CNSC staff found that the site was well managed and maintained. Water sampling of the site occurred during the 2015 field season. CNSC staff reviewed the results and concluded that all locations for uranium surface water samples met CCME Water Quality Guidelines.

Uranium mining occurred at Elliot Lake from 1956 to 1996. Decommissioning occurred from 1992 to 2002 when all mine structures were removed and tailings were managed in what's called tailings management areas. There are 12 mines and 10 tailings management areas at these sites. Two licensees manage the Elliot Lake sites, Rio Algom and Denison. There are three indefinite CNSC licences, one for Rio Algom and two for Denison for the sites for long-term monitoring and maintenance. Denison has requested that their two licences be combined into one. Rio Algom Limited and Denison conduct site-specific and regional environmental programs, operate effluent treatment plants, and inspect and maintain the sites in the Elliot Lake area. The long-term plan for the site, which is more than 200 years, is to reach a state where reliance on water treatment can be reduced.

There were no exceedances of CNSC licence

limits in 2015 for these sites and downstream water quality remained below CCME Water Quality Guidelines. CNSC staff verified upgrades to some local dam structures and water treatment facilities met regulatory requirements during the 2015 inspection.

Rio Algom and Denison mines jointly submit a state of the environment report, which is a compilation and assessment of all environmental monitoring data around the sites for a period of five years. The most recent SOE covers from 2010 to 2015 and this report was submitted to CNSC staff in early 2016. A status update to the Commission for the decommissioned Elliot Lake sites is due coincident with this five-year status of the environment report. Therefore, a status update for the Elliot Lake sites will be part of the 2016 regulatory oversight report for uranium mines and mills remediation projects and decommissioned uranium mine sites.

On May 24, 2016, Denison Mines Limited informed the CNSC staff that a small bush fire had occurred near its licensed area. The Elliot Lake Fire Department and Ontario Ministry of Natural Resources and Forestry responded and extinguished the fire. The fire had no radiological impact, nor did it cause any impact to the health and safety of workers or the public. However, there was some damage to the local trees.

CNSC staff updated the Commission at a public meeting about this matter in June of 2016. A final report was submitted in July of 2016 by the licensee to CNSC staff and confirmed that the response to the incident was well coordinated and that lessons learned have been implemented.

This slide shows the Commission the area where the fire occurred. The photo on the left was taken by CNSC staff on May 31, 2016, one week after the fire. The photo on the right shows the same area in November of 2016. CNSC staff confirm that the vegetation is recovering well. This update closes the Commission Action number 8576, which requested an update from CNSC staff on the Denison fire event.

This table presents CNSC staff's licensing and compliance effort for all of the decommissioned sites in 2015. CNSC staff performed a total of eight compliance inspections at these sites. Findings resulting from these inspections were provided to the licensees in detailed inspection reports.

All enforcement actions arising from the findings were recorded in the CNSC Regulatory Information Bank to ensure all enforcement actions are tracked to completion. CNSC staff reviewed and verified that the licensees' corrective actions taken were appropriate and

acceptable. All non-compliances or enforcement actions issued in 2015 are considered closed by CNSC staff.

For 2015, CNSC staff rated all applicable SCAs a satisfactory for decommissioned sites.

Uranium and mine and mill sites that have been decommissioned are, as mentioned, in the long-term monitoring and maintenance phase. In general, given the limited nature of onsite work, outdoor setting, low radiation levels following remediation activities, the potential for radiation exposure to workers and the public is very low.

Based on each site's risk assessments and CNSC monitoring data for all decommissioned sites, CNSC staff conclude that levels of exposure are much lower than regulatory limits. The doses for all NEWS performing monitoring, maintenance or visits to the site were well below CNSC regulatory dose limits in 2015. The SCA rating for radiation protection for all decommissioned sites was satisfactory in 2015.

This graph shows the maximum and average individual effective doses measured for nuclear energy workers at each of the sites during 2015. The maximum dose occurred at Madawaska in 2015 and this was due to some of those maintenance activities discussed earlier on the tailings cover.

The annual average individual effective doses and the maximum individual effective doses at the sites were all well below the annual limit of 50 mSv in 2015. CNSC staff's compliance activities verified radiation doses were kept ALARA at these sites and workers are being protected.

The safety and control area of environmental protection is a key indicator for the effectiveness of past remediation measures at the site and is highlighted for each site in this report.

All decommissioned sites have an environmental monitoring program to ensure the continued protection of the environment and ongoing performance of remediation works. Once the long-term environmental objectives for a site have been met, these sites may be released into institutional control or conditionally released from CNSC oversight.

The rating for environmental protection at all sites was satisfactory in 2015. All sites maintained an effective occupational health and safety program that protects workers, contractors and visitors to the sites in 2015. The rating for conventional health and safety at all sites was satisfactory in 2015.

I will now pass the presentation to Ms Haidy Tadros for the concluding remarks.

MS TADROS: Haidy Tadros for the record.

So for 2015, based on CNSC staff compliance activities, we conclude that all applicable safety and control areas are satisfactory given the activities being carried out at these sites. Radiation protection practices adequately control radiation exposures, keeping doses ALARA. Environmental protection programs were effective at protecting the environment and licensees' conventional health and safety programs continued to protect the workers that were there for the time.

So this concludes our presentation and we are available for any questions.

CMD 16-M49.4/16-M49.4A/16-M49.4B

Presentation by AREVA Resources Canada Inc.

THE PRESIDENT: Thank you.

We will now proceed with the presentation by AREVA Resources Canada Inc. regarding the Cluff Lake mid-term update, as outlined in CMD 16-M49.4, 49.4A and 49.4B.

Mr. Huffman, the floor is yours.

MR. HUFFMAN: Thank you, Dr. Binder.

Good evening again. My name is Dale

Huffman, I am the Vice-President for Health, Safety, Environment and Regulatory Relations at AREVA Resources.

Accompanying me today is Diane Martens, our Health, Safety and Environment Project Manager.

We are pleased to provide a brief presentation on the decommissioned Cluff Lake Project and respond to any questions that the Commission may have.

Appendix J of the staff report has provided a good synopsis of the current status of Cluff Lake.

I will provide a brief introduction before reviewing decommissioning objectives, milestones, status, environmental performance, engagement activities and providing some comments on our planned future activities.

The Cluff Lake Project is a former uranium mine and mill located in the Athabasca Basin of Northern Saskatchewan, approximately 900 kilometres north of Saskatoon. The Cluff Lake mine was in operation from 1980 to 2002 and during 22 years of operation five ore bodies were mined for a total production of 28 million kg of uranium concentrate.

Over this time, the Cluff Lake mine site was the largest industrial employer on the west side of Northern Saskatchewan, providing a stable base of employment for over 20 years, generating about 4,000

person-years of company staff employment.

The Cluff Lake site received a decommissioning licence issued by the Canadian Nuclear Safety Commission in 2004. Most of the physical works related to decommissioning were completed between 2004 and 2007, and the decommissioning licence was renewed in 2009 for a 10-year term.

Throughout the operation of the site, traditional land uses have been maintained.

Our decommissioning objectives for the Cluff Lake Project are to achieve a safe environment, with a stable, self-sustaining landscape that is unrestricted for traditional land uses such as hunting, fishing, gathering, and ultimately has minimal land use constraints or maintenance requirements. We believe we're achieving these objectives.

Since our licence renewal in 2009, AREVA has continued to conduct post-closure environmental performance and follow-up monitoring programs. In 2013, we ceased continuous site operation after conducting some site cleanup activities, removal of remaining buildings, some improvements to site drainage, and revisions to our monitoring programs to enable them to be conducted on a campaign basis.

In 2015, we updated the Cluff Lake

technical library of documents with approximately 10 years of post-closure monitoring data and follow-up program results to provide a comprehensive review of environmental performance updates to our ecological and human health risk assessments and updates to our groundwater modelling for both the mining areas and the tailings management area. We also submitted a final report on the follow-up program that was designed to address uncertainties related to the decommissioning environmental assessment.

The following slides show photos that illustrate the status of decommissioned areas of the former Cluff Lake mine site. In each of the next few slides, you'll see photos of each major project area taken in 1999 while the Cluff Lake Project was still in operation, in 2008, a couple years after the major physical decommissioning work was completed, and in 2014, which reflects the status today.

This is the D-Pit Mining Area, which was the first pit mine beginning in 1980. You can see the evolution of revegetation over the time period. This is a site that has been revegetated naturally over the course of our time at Cluff Lake. The small pit lake meets water quality objectives established for decommissioning.

The Claude Mining Area is seen here partially backfilled in 1999, fully backfilled in 2008, and

revegetated in 2014. The waste rock pile was safe and stable, and the cover is performing as designed. The neighbouring shallow Claude Lake is achieving water quality objectives, and is expected to do so over the long term.

At the DJ Mining Area, we cleaned up mining infrastructure, moved problematic waste rock from surface, and flooded the DJ pit. Water quality in the pit is meeting water quality objectives for decommissioning, and revegetation in the area is successful. The decline to the DJN mine adjacent to the DJ pit was backfilled starting at 180 metres from the portal and the portal was plugged with concrete before covering with glacial till.

The 1999 photo shows the operating mill. The mill was demolished and demolition debris was placed in the Claude pit. The two warehouse buildings shown in the 2008 photo were removed in 2013, and this area and all impacted areas met the criteria for radiological clearance in 2007, and this was confirmed by the CNSC in 2009.

The Tailings Management Area was covered and graded during the decommissioning work between 2004 and 2006. The secondary water treatment system in the foreground of these photos was unused post-2006 and was removed in 2013. The diversion ditches were also regraded in 2013 and some small locations on the Tailings Management Area were filled in where temporary surface ponding had

been observed due to settling. The tailings dam was buttressed and resloped during decommissioning to be stable for the long term.

As noted, a comprehensive review of environmental performance updates to our ecological and human health risk assessments and our groundwater modelling was submitted in 2015. The 2015 documents update was complete with inputs from over a decade of monitoring and research. Uncertainties in the decommissioning environmental assessment have been resolved through research, post-decommissioning data collection, and refinement of model inputs. This resolution of uncertainty provides confidence in the site's current and long-term environmental performance.

The 2015 documents confirm the decommissioning environmental assessment conclusions, namely that the decommissioning activities have delivered a positive outcome with potential remaining effects being moderate, localized, temporary, with no downstream impacts. The human health risk assessment evaluated the potential risks associated with consuming country food harvested at the former mine site including from the primary impact areas, Snake and Island Lakes. The land use is safe and will continue to be safe over the long term as the site continues to recover.

We conclude that the decommissioning objectives established for the Cluff Lake Project are being met and will continue to be met over the long term.

The Cluff Lake public engagement program is focussed on communicating timely, relevant information with a focus on health, safety, and security of people who may use the former mine site. Key engagement activities and efforts have been associated with the milestones of the transition from a full-time presence at Cluff Lake to periodic visits for environmental monitoring in 2013 and communication of project performance in 2015. These recent milestones demonstrate the continued advancement towards the end of a successful and important resource development project in the north. Since 2005, there have been five site tours, 11 community meetings, 28 additional in-person meetings regarding Cluff Lake decommissioning, and the intervenors on the agenda today were each encouraged by AREVA to participate in the CNSC processes pertaining to Cluff Lake. AREVA anticipates that the intensity of engagement will increase over the coming years to coincide with final works and the transition to the Province of Saskatchewan's Institutional Control Program.

In AREVA's view, the Cluff Lake Project has been successful in contributing to economic development in Saskatchewan, including the training of numerous

employees for subsequent employment without undue compromise to ecosystem integrity, health, or safety.

Looking toward the end of our current licence term with environmental monitoring results and risk assessments continuing to demonstrate the achievement of decommissioning objectives, AREVA anticipates transitioning from the current environmental monitoring program to a long-term monitoring program that reflects the needs of the low-risk site.

Some final minor works will be required before pursuing entry of the Cluff Lake site into the Institutional Control Program, established under the *Reclaimed Industrial Sites Act* in Saskatchewan. Engagement with regulators, community members, and local land users will be required to ensure our environmental commitments are met and communicated.

Thank you for your time. We'll be available to answer any questions.

THE PRESIDENT: Thank you. And by the way, I like those before and after pictures.

MR. HUFFMAN: Thanks.

THE PRESIDENT: Put some reality to it. Before we go into the written submission, does any other licensee wish to make a comment right now?

MR. LEBLANC: If I may, Mr. President --

MR. DAGILIS: Hello, yes, this is Trevor Dagilis from the Ministry of Environment and Climate Change for Ontario.

THE PRESIDENT: Please go ahead.

MR. DAGILIS: Great, thank you.

President Binder, members of the Commission. For the record my name is Trevor Dagilis. I'm the acting assistant director for Eastern Region Operations division of the Ontario Ministry of the Environment and Climate Change.

Thank you for the opportunity to provide remarks regarding the CNSC regulatory oversight of the Deloro sites for 2015.

We're pleased to hear the CNSC staff opinion of satisfaction with our performance on radiation protection, environmental protection, conventional health and safety, emergency management, and fire protection among other topics. We're proud of the remediation work that we're undertaking to protect the public and the environment from this legacy contaminated site.

We acknowledge that in 2015 our management systems were rated by CNSC staff as below expectations, which led to the 2015 order in relation to non-radioactive discharges of construction-related waste water and stormwater from the Young's Creek area of the Deloro mine

sites on April 29th and May 1st, 2015. I can assure you that the Ontario Ministry of the Environment and Climate Change acted quickly and thoroughly to enhance our management systems at the Deloro sites. We are pleased that the CNSC staff agreed that the Ministry met all conditions of the order and that the order was closed by the Commission in March 2016.

We are pleased that our enhanced management systems were inspected and reviewed by the CNSC staff during seven inspections since June 2015. I am happy to report that with our -- that our important remediation work at Deloro has continued successfully in 2016.

We have now completed the base of the containment cell that will receive and safely store the contaminated sediment from Young's Creek. Regarding potential environmental impacts in 2015 due to Young's Creek discharge of construction-related waste water and stormwater, we are pleased that the CNSC staff reviewed and confirmed the Ministry's sampling results which found that there was "no increase in offsite contamination resulted from the releases that took place from April 29th to May 5th, 2015."

Regarding the radiological safety of the site in 2015, I can tell you that the Ministry undertook detailed radiological reviews in 2016. Based on expert

analysis, we submitted an application for conditional release of the Deloro site from CNSC's regulatory oversights.

In summary, the expert radiological sampling, assessments, and analysis have confirmed that nuclear substances at the Deloro site have been effectively remediated such that they no longer pose an unreasonable risk to workers, the public, or the environment. Nuclear substances in the Young's Creek area pose an insignificant radiological risk in situ without crediting planned remediation. Concentrations of nuclear substances in the contaminated sediments are greater than but comparable to the unconditional clearance levels specified in the Nuclear Substances and Radiation Devices Regulations. A robust series of controls are in place at the site for the management of non-radiological hazards, and those controls will effectively mitigate the very low risks associated with the nuclear substances. This set of controls assures that the site meets the criteria for conditional clearance under the Nuclear Substances and Radiation Devices Regulations. Remediation will continue to completion as a result of the need to address the other non-radiological contaminants at the site. It is important to note that our detailed work in support of clearance has shown that there is not and therefore was not in 2015 an unreasonable risk

to workers, the public, or the environment based on the existing quantities of low-level radioactive materials at Young's Creek.

I would also like to confirm to the Commission the commitment of the Ontario Ministry of the Environment and Climate Change to the remediation work at Deloro to protect the health of members of the public and to protect the environment. I can confirm that since we last presented to the Commission, the Ministry undertook a number of enhancements to go above and beyond the regulatory expectations. We installed a geosynthetic clay liner, or GCL, and sand cushion layer in the base of the containment cell at Young's Creek. This was an enhancement to our original and improved design to further improve long-term landfill performance. We installed new sludge lagoons at the arsenic treatment plants. This allowed us to decommission and fully remediate the area of the original sludge lagoons. Again, this was not a regulatory requirement, but an enhancement to our original and CNSC-approved scope of work for the Deloro sites. We enhanced our Moira River cleanup and revegetation to ensure rapid and effective cleanup and stabilization of the riverbank. The investments we made to rapidly and effectively revegetate the riverbank areas were once again enhancements to our CNSC-approved scope of work. And

finally, we have installed secondary containment around the temporary slurry tanks at Young's Creek, so that when creek remediation activities begin, we will have additional environmental protection measures in place. Again, this was not a requirement of our CNSC-approved scope of work, but an enhancement we implemented for further environmental protection.

I would like to thank the Commission for their efforts over the years and I emphasize that we look forward to the upcoming formal decision on our application to seek clearance or conditional release of the Deloro site from the CNSC's regulatory oversights. The Ministry is confident that the aforementioned enhancements to our management systems, physical design, and construction practices will continue to provide outstanding protection to the public and the environment through our remaining remediation work at the sites and well into the future.

Thank you.

THE PRESIDENT: Thank you. Anybody else? Marc? You want to check?

MR. LEBLANC: Yeah, why don't I go through that list again of at least those that have confirmed they were there. So I don't know if Ms Bertolo(ph) is still with us. Do you have any comments?

MS BERTOLO: Yes, I am still with you, and

no, I do not have a formal statement.

MR. LEBLANC: Thank you. How about Mr. Andy Poole(ph) from EWL Management? No, was not with us.

So Mr. Wilson from SRC?

MR. WILSON: Yeah, still with you.

MR. LEBLANC: Do you have any comments or statements?

MR. WILSON: Not at this time.

MR. LEBLANC: Thank you.
Mr. Breadmore(ph)?

MR. BREADMORE: No comment at this time.

Thank you.

MR. LEBLANC: Thank you very much.

Ms Lowe? Okay. Anybody else that we may have missed?

MR. NAGY: It's Cameco. We'd like to make a brief statement.

Good evening Dr. Binder, members of the Commission. For the record my name is Kevin Nagy, director of Compliance and Licensing for Cameco Saskatchewan operations.

With me in Saskatoon is Michael Webster, our reclamation coordinator who directly oversees activities and programs related to the decommissioned Beaverlodge Properties for Cameco.

Decommissioning of Beaverlodge was

completed more than 30 years ago, and the properties were left in a physically stable and safe condition. Cameco has been a committed and capable manager of the decommissioned properties since 1988, conducting environmental monitoring and periodic maintenance to ensure that Beaverlodge remains safe, secure, and stable.

As staff detailed in their report, Cameco continues to implement and monitor the additional remedial actions that were identified in our approved path-forward plan. These remedial actions are expected to support the natural recovery of the decommissioned properties as well as to ensure their long-term safety and security.

In accordance with our schedule, we have made application for 14 of the decommissioned Beaverlodge properties to be exempted from further licensing requirements and accepted into the Province of Saskatchewan's Institutional Control Program. Detailed inspections of these properties were completed in 2015. Remaining debris was disposed of and, as a precautionary measure, any identified drill holes on these properties have been sealed prior to their transfer to institutional control.

Based on our meetings with residents of Uranium City and the Environmental Quality Committee, who are our targeted northern stakeholders, the path forward to

having these properties accepted into institutional control has been communicated and is generally supported. Through site visits, they see that the work being done to remediate and monitor the decommissioned properties ensures the health and safety of the public and the environment is protected. Looking forward, we will continue to implement the approved path-forward plan and monitor the effectiveness of our additional remedial actions.

Thank you.

THE PRESIDENT: Thank you.

Nobody else wants to raise any issue?

Okay, so we're back to the written material. And just to remind you that we already started to review the written intervention from Saskatchewan Environmental Society and Athabasca Chipewyan First Nation as outlined in CMD 16-M49.1.

CMD 16-M49.1

Submission from the

**Saskatchewan Environmental Society and the Athabasca
Chipewyan First Nation**

THE PRESIDENT: Who wants to start? Ms
Velshi.

MEMBER VELSHI: It's a question for staff.

An area of concern that the intervenor raises a number of times is that of institutional control and the CNSC's role both about the transfer into institutional control and what happens after it has been transferred, and what if the Province doesn't meet its obligations. So can you comment on what the intervenor is questioning. I think that there's also a question on whatever assessment is done by either party that they should be publicly available for them to see how that decision was made to accept something for institutional control.

MR. LOJK: Bob Lojk for the record. Thank you for the question.

I'll make a short comment and then I would ask Mr. Keith Cunningham from the Province of Saskatchewan, who's in Saskatoon, to provide the provincial view on this.

The CNSC, the *Nuclear Safety and Control Act* requires that risk be controlled to a reasonable, not absolute, levels. Once a licensed facility meets the conditions for release for licensing, doesn't mean that other land use restrictions do not continue to apply. This applies to other occupancies and licensing regimes. In the case of Saskatchewan uranium mines, the CNSC works with the Province, who is the owner of the land, to ensure that the lands are remediated to a safe state and to ensure sufficient financial guarantees are in place to maintain

the sites in a safe condition for as long as required. Nevertheless, licensees and ex-licensees continue to be responsible and don't simply walk away or abrogate their responsibilities.

The point is that there are certain points and requirements in our -- under Section 7 of the *Nuclear Safety Control Act* that requires work to be done and then it's done. Now, that doesn't mean that the facility can be used for all uses, but the owner of the land then has -- will establish land use restrictions on a particular land. So land does not become -- back to virgin -- a virgin state. It requires -- there is certain occupancies that cannot be allowed. But that is not part of the requirements under the Act for us to maintain; those are requirements that nuclear safety be ensured and that things be controlled and put in the right places.

Again, the Province then takes over the facilities when we -- when there is no longer reason for us to license them, and they control the occupancy of the land as in the other facility, let's say if one is contaminated with oil or it would have severe problems with geotechnical issues or water or flood zones and the like. So the precedents are already there. And I believe Mr. Cunningham could provide more clarity on that. Thank you.

MR. CUNNINGHAM: This is Keith Cunningham

with the Ministry of the Economy, Province of Saskatchewan, for the record.

And I can confirm some of the statements made that both the CNSC and the Saskatchewan Environment set the guidelines and conditions for a site to be accepted into the Institutional Control Program. The program itself does not set the environmental guidelines and requirements. And once that site is accepted and has moved into the Institutional Control Program, all the monitoring and maintenance done on that site by the program itself then still has to meet both requirements by Saskatchewan Environment and the Canadian Nuclear Safety Commission. So either Environment and the CNSC having regulatory jurisdiction can still step in if the site no longer meets the requirements and/or any of the subsequent maintenance and monitoring work that is done for the site. So there is still regulatory authority after a site goes into the program.

THE PRESIDENT: So you know every year we -- somebody asks us to describe the Institutional Control. I thought there was a document to describe the Institutional Control, all the parameters and the process. Is that document either on the CNSC website or on the Saskatchewan Ministry of Environment website or both?

MR. CUNNINGHAM: Keith Cunningham for the

record.

It is certainly on the Government of Saskatchewan's web site through the Ministry of the Economy, and it can be found on there as well as our Act and Regulations.

We do have a report done on all the sites in the program every five years, and that is posted on the site. And we also post annual reports on the status of our funds, and they are also available through the Government of Saskatchewan web site.

THE PRESIDENT: Well, what about CNSC? Do you describe how you would go about analyzing all the -- we've heard that there is already a couple application in to you to decide whether you will approve an application for transfer.

You had one even in Ontario, too, right from (indiscernible). So what's the answer?

MS GLENN: Karine Glenn, for the record.

So I'll start off by explaining the application that's submitted by the MOACC is very different than the one that is being proposed for institutional control.

The Province of Ontario doesn't have a formal institutional control program in the same way that the Province of Saskatchewan has its set up.

So CNSC doesn't have a specific document that speaks to the conditions required to move to institutional control because it is not a federal level program and it is not a program that is found in every province throughout the country. It is very specific to the -- to Saskatchewan, and the Government of Saskatchewan has documented what is required for that to take place.

When a program is released into institutional control, it is not an -- as Mr. Lojk mentioned, an unconditional release. It would still be subject to CNSC licensing base if there was no other institution or program to take over that oversight.

So when we're talking about institutional control, it's being released from CNSC oversight into the care of another institution. It could be a province, it could be a municipal government. It -- however, only the Province of Saskatchewan has this provincial program set up.

If, in the case of somebody like the Deloro site or many of the mines that are found in Ontario, there's no provincial program that is formally established for this institutional control program equivalent to that of Saskatchewan.

What is being proposed by the MOACC which will be the subject of a public hearing in June 2017 with

an opportunity for the public to participate, MPFP funding being offered, is a conditional release, which is -- has a very specific definition under the Nuclear Substance Irradiation Device Regulations and is based on radiological criteria.

It is not the same as an institutional control.

MEMBER VELSHI: Yes, thank you.

So what's not clear to me still is what would be the role of the CNSC once it's been released for institutional control and no longer under the CNSC's licensing purview?

I meant that for Saskatchewan projects.

MR. CUNNINGHAM: Keith Cunningham, for the record.

With the institutional control program, like all the site monitoring and site maintenance is still available for audit and review by the CNSC inspectors responsible for Saskatchewan as well as for Saskatchewan and environmental project officers for inspection, and we do make all our monitoring and maintenance data from each site available for inspection to the public and to any regulator that chooses to audit us.

MEMBER VELSHI: Fair that you make it available.

I'd like to hear from the CNSC what their role -- they see their role as, and is this something that they do on an ongoing basis.

MR. LOJK: Bob Lojk, for the record.

For instance, in certain -- in certain areas when it's no longer -- if we're talking strictly institutional control in Saskatchewan, we'll talk -- we'll talk about that. And I believe Mr. Ramzi Jammal would like to add some words in it.

But right now, the ideal case would be that a site that's completely released from CNSC licensing no longer needs a CNSC licence. It would be transferred to the hands of the Province of Saskatchewan, and CNSC would be available to provide assistance and help in carrying out work, much like Saskatchewan provides -- assists us in some of our work because of their specific expertise in the area.

So that's a -- that can be done through Memorandum of Understanding.

Ideally -- ideally, the reason that the institutional control in Saskatchewan operates the way it does is that where we have a co-regulation, one can say, is because Saskatchewan keeps the funds under their Act for decommissioning each individual facility. There's a very -- there's a very detailed Act requirement for

financial guarantees.

Saskatchewan keeps the financial guarantees, and it's those monies that are released, then, to maintain the facility for as long as it needs to be maintained under their Act.

And then we would -- we would help -- we would maintain a role in that particular area, a formal role, until such time as it can be decommissioned to a level, then the role no longer requires licensing.

THE PRESIDENT: Mr. Jammal.

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

You're asking two questions; what happens after the institutional control, and what's the role of the CNSC.

We review the annual report with respect to the institutional control, and we are taking oversight -- sorry. We're ensuring that there's an oversight taking place at any time that we feel that the environment has changed, monitoring has changed or changes in the environment itself, then we will come back and we relicense it and we take it under the care of the CNSC.

So once you, the Commission, approve the release from licensing to an institutional control in Saskatchewan or to another regulatory authority in other

parts of -- any province, for example, Ontario, which will be the Ministry of Environment, we maintain our engagement through the review of the annual report to ensure that the environment and the radiological elements or any other element that you approved is maintained to be not licensed by the CNSC< but will engage the whole time.

However, one thing you -- you asked the question with respect to the assessment.

The release from licensing is done by the Commission, so in other words, we will come before you in the public proceedings under the rule of procedure so the intervenor is saying can this information be publicly. Yes, there will be a CMD, and most likely there will be a PFP and the rule of procedure being applied.

So we -- nothing can be released without your permission as a Commission approval, and we monitor it and we report -- whether we work with Saskatchewan or any other regulatory body to ensure that the environment and the release conditions from the licensing by the Commission is maintained at all times.

THE PRESIDENT: It seems to me that you need to do some work on describing these processes. It's not that complicated.

There are two parties here, government and us, and you determine when you are ready to release or

pass. And the government -- the Saskatchewan government were not going to be stupid to accept something that'll cost them more whether or not -- if it's more cleaning is required.

So it's two parties that agree when it is good to pass from one to another, and all the financial guarantees that goes with it.

So I don't differentiate between Saskatchewan and the Ministry of Ontario as long as we satisfy the Ministry of Ontario's capable and able to be exactly like Saskatchewan government.

So somewhere along the line -- you know, it's been the last five years, at least I can remember, we're having this conversation and we're going around and we're not very clear about the process.

I think it'll be worthwhile to document it somewhere in a very high level as to how the -- how this work, who does what to whom and what is required so we don't have to pursue this every time we meet.

MS GLENN: Karine Glenn, for the record.

We are in the process of revising our regulatory framework documentation with respect to waste and decommissioning, and we have put out, as the intervenor pointed out, questions surrounding release from licensing in there. And we will take the opportunity in the

intervenor's comments into consideration and provide greater clarity through the revision of our Regulatory Documents.

THE PRESIDENT: Okay. We're back to the intervention.

Dr. McEwan?

MEMBER MCEWAN: Thank you.

So in fact, this is an intervention that is also raised by Mr. Gardiner, and that is the comments by the -- specifically at the end, the ACFN, related to the tailings management area and concerns expressed by both that the cover is insufficient and that there are issues that may lead to problems in implication is the nearer rather than longer term.

MR. LOJK: I'd like to commence and more detailed information to be provided by AREVA.

But we have staff performing regulatory inspections of the area, and some of the discussions that are made in that particular -- in that particular CMD are not -- are -- don't seem to -- (a), the information appears to be dated and, second of all, from our most recent information of the site, would not support the observations by Mr. Gardiner, in particular in the effect of the moose going through the cover. It's a very, very deep cover, and you would have to go through -- the moose would have to

have a four or five-foot -- I mean four or five-metre long legs in order to reach through to the underlying tailings and waste rock that could cause the problem.

So from the opinion of CNSC staff that have carried out the inspections, this was not seen to be -- to be an issue at the site.

MR. HUFFMAN: Dale Huffman with AREVA.

So the cover on the tailings management area was placed as designed according to the approved design, and over the course of time has been revegetated. And we've been monitoring that vegetation, we've been monitoring the performance of the cover. And it was an important element within the follow-up program that came out of the decommissioning EA that we demonstrate that the cover was performing as designed.

So we put that forward in our follow-up program report to demonstrate that it's achieving what it set out to achieve.

That being said, we have, in the past, observed that there had been some subsidence of the cover, some settling of the cover, and there were being ponds created which we remediated in 2013. We filled in those ponds so that there wouldn't be standing water, so it was a repair to the cover. And subsequently, we continue to monitor the performance of the cover.

We do see that, especially in wetter years -- infrequently, but it does occur -- that we have standing water in the -- what used to be the lower -- the liquids pond area. It's an area that didn't receive tailings. It received the liquid that overflowed from the tailings. So we occasionally see liquid there at the low end of the pond, so we have taken -- we see the intervenor comments that there have been concerns about the tailings cover in the past. We think it's performing well.

We've repaired that. If there's improvements that -- to drainage that are needed before we enter into institutional controls, we'll take a look at that and we'll take a look at the -- whatever residual risks are at the TMA.

Thanks.

MEMBER VELSHI: Another concern that -- another concern Mr. Gardiner raises in his supplementary submission is around the core storage area and people accessing that and removing material.

Any comments on that?

MR. LOJK: Bob Lojk, for the record. Again I will ask AREVA to follow up.

The cores that are there are not the cores that were associated with the licence activities. These were cores left over from exploratory activities. So the

area has been used or will be used, perhaps, in the future for exploration activities that are not -- that -- because there is -- because they could be and, of course, a shelter was built for the cores, and parts of the shelter were demolished or taken apart to build other shelters elsewhere. And those areas now will require attention because, of course, you know, you cannot -- you cannot have that material sitting out in the open and unprotected.

And I believe that AREVA can probably outline the proposals in place.

Thank you.

MR. HUFFMAN: Dale Huffman with AREVA.

So like Mr. Ljok has said, the core that's there is related to our exploration program, which is something that's permitted by the Province of Saskatchewan.

We have these core storages there at Cluff Lake because we occupied Cluff Lake. These core storage areas could be anywhere, but they happen to be there.

In Saskatchewan, we've worked to develop best management practices for core storage and regarding the stacking and storage of those cores, we comply with those. We actually exceed those requirements because we have taken it on ourselves to fence core and to put on signage, which is -- which is beyond the best management practice.

The core is safe. It complies with our provincial permits.

Requirements include ensuring that the core is stored a certain distance from lakes so that it -- to protect against runoff, and it also requires that you organize the core such that you wouldn't see an exposure level greater than one microsievert per hour at a metre, so it's -- there's a radiation protection aspect to core storage as well.

We comply with all those requirements. We don't see that there's anything more that needs to be done with our core for risk management.

Thank you.

MEMBER VELSHI: So having read the submission doesn't cause you any concern about, I don't know, contaminated plywood being taken away or pails that were used to hold water that may have radioactive contamination or -- there's a whole slew of concerns identified here.

MR. HUFFMAN: Dale Huffman with AREVA.

No, it doesn't, really. We are concerned because we have fenced off an area to protect the core and things that we store in there, and so removal of that wood or removal of those buckets or removal of whatever is theft, and we are concerned about theft on our site.

But as far as the risk associated with removing those materials, I have very little concern about that. And there are hundreds of exploration sites in northern Saskatchewan storing core. There are very, very few that are fenced, and our area, we have areas that are fenced.

Thanks.

THE PRESIDENT: So a couple of questions about the Cluff Lake.

Obviously, this intervenor together with -- this is the Athabasca Chippewan First Nation.

Did staff ever go and talk to this community and try to explain the Cluff Lake? Because you now -- if I understand correctly, you're in process now of submitting -- by 2019, you're planning to go and ask for an application -- you're going to submit an application for institutional transfer.

And you know, you have, I guess, a neighbouring community that claims it don't have trust in the whole process. So I'm just wondering whether you -- has anybody got in there and spoken, tried to explain what's going on?

MR. HUFFMAN: Dale Huffman with AREVA.

We've had a long relationship with the Athabasca Chippewan First Nations. We had one of their

members occupied a trapper's cabin on the site for decades. He was there before we got there, he was there after we stopped -- after we stopped producing.

We included the Athabasca Chippewan First Nations in the early development of the decommissioning plan. We got feedback from them on the traditional uses of the land.

Most recently, I visited ACFN and the Flett family -- or members of the Flett family on -- I think it's about a year ago November 2nd or 3rd last year, presented the results of our -- the various documents we had updated. I presented results of our ecological human health risk assessment, our follow-up program. We discussed the monitoring program we're doing.

We had put together a presentation and went through the communities last fall, and one of the specific trips was to go to Fort McMurray where ACFN has offices and make presentations to the folks there.

They were very -- we were encouraging them that if they had concerns to bring them to us or -- explained also the process with the CNSC and that there would be opportunity for -- future opportunity for intervention.

We encouraged them to participate, and we provided copies of all of our technical documents to them

as well as the Saskatchewan Environment Society. And we met with member of the SES and answered their questions on our documents as well.

THE PRESIDENT: Staff.

MR. LOJK: Thank you, Dr. Binder. Bob Lojk, for the record.

As recently as this afternoon, one of UMND staff talked to Mr. Gardiner on a separate issue, so there is constant contact. And I believe -- and Mr. Adam Levine is in constant contact with the people.

And you may be able to see from one of the interventions from Mr. Gardiner where he -- when -- where he claims that if Dr. James Irvine says that the moose is good to eat, he'll eat it. And so there is constant communications with --

THE PRESIDENT: Well, we'll get into a couple of other -- I want to get -- we're doing them one at a time. Maybe we should have done them all together. Maybe we should bring them all together here.

But before that, Mr. Levine, you wanted to say something?

MR. LEVINE: Sure. Thank you. Adam Levine, for the record, Aboriginal Consultation Advisor and Participant Funding Manager at the CNSC.

So we do actually have regular

communications with ACFN. We have a good relationship with Jack Flett, who is the consultation coordinator for the ACFN Government Relations Unit there. And we are kept apprised of the communications going back between AREVA and ACFN regarding Cluff Lake.

And we're happy to see that AREVA is very responsive to their requests for information, and we're very happy that Jack and ACFN has taken the time to work with the Saskatchewan Environmental Society to better understand the mid-term update of Cluff Lake and be involved in the regulatory oversight report. And we're going to be following up with Jack Flett and the ACFN after this regulatory oversight report update to the Commission to continue to make sure that they get the information they need about our regulatory oversight of the Cluff Lake site and the environmental monitoring going on because there's lots of good work going on.

THE PRESIDENT: So if -- Commission, if you agree, why don't we consider all the written material together?

So the next one would have been CMD M-49.2 and 49.2A from Mr. Rodney Gardiner. And let me see if we have another one.

Let me find it. I just want to go on the record here from CMD 16-M49.6 from Mr. Edward Flett.

Is that it? Okay, so that's it, so let's direct any questions to anyone of those interventions.

Whose turn is it? Dr. McEwan.

MEMBER MCEWAN: So we sort of moved into this reference with the tailings cover. The moose tissue analysis, how significant are the findings of the elements that he has bolded, Mr. Gardiner has bolded? If you took a moose from some other part of the country, what would the distribution of these elements look like?

MR. LOJK: Bob Lojk, for the record.

I would ask Dr. James Irvine to answer, and then Staff can follow-up with any information they may have.

DR. IRVINE: Thank you very much. It's James Irvine, for the record.

So we've had connection with Mr. Gardiner and we thank him for his being involved as an intervenor here and providing some more information as it relates to the moose.

We were able to get further information from him in terms of providing the direct laboratory results in wet weight, and when we're able to compare it with other data. We've been involved with moose monitoring since the 1990s and so we're able to compare with 40 different moose from various areas of Northern Saskatchewan

from some work that we had been involved with with Dr. Pat Thomas some years ago.

So it included moose that were from areas quite far from uranium mine areas, in some of the parts of northern Saskatchewan, just south of that Northern Administrative District line, a place called Hudson Bay area, as well as Meadow Lake. So those were sort of closer to farming areas where the moose were gathered there.

We also had some data as it relates to cattle, so beef that you could buy in a grocery store in Saskatoon.

We also looked at some of the Eastern Athabasca Region Monitoring Program moose data as well.

In looking at the intervenor report from Mr. Gardiner, the highlighted areas there is really just indicating which tissue was the highest level found. So, for instance, led to 10, it just sort of indicates which of the tissues that had the highest levels. So every one of those chemicals will have had one of those tissues having a highest level.

But when we compared it with a lot of the other information we had on moose, whether it be moose meat in terms of muscle, the best data we had was in moose liver in terms of a complete analysis from all our different sites.

The levels of the various constituents in the moose that was caught at Cluff Lake was very comparable in sort of that mid-range of many of the different chemicals, radiological as well as non-radiological levels. In fact, there were some things that some of the elements were higher in some of the beef that had been monitored, even some of the radiological levels there.

When we compare it with the others, we did do -- with a lot of our other data, we did do both a peer reviewed article about that so that it would be peer reviewed in health physics. We also provided it broadly to communities as it relates to the use of the Opportunity North magazine and some workshops in communities. So it was sort of looked at from a peer review.

In that article we said that moose were healthy, they were healthy to eat. Since that time, Mr. Gardiner's moose sort of fits right within those ranges. So it's not an area we're particularly concerned about at all.

The one thing that he does mention in his intervention was the concern about the discolouration or paleness of the liver. I think often it's prudent or wise, as many hunters will do, is if there is something that is not looking healthy, and even though the chemical tests may show that the elements, metals, and radionuclides are safe, if that meat is not looking healthy it's best to be

discarded anyways.

The other thing we've done over the years is through the Eastern Athabasca Regional Monitoring Program we've looked at not only the chemicals of concern in animals, but some of the positive nutrients in things like moose and caribou and fish. Certainly country foods have been found to be nutritionally dense, they have a good range of healthy fats, and low levels of saturated fats, quite a bit lower than we'd see in something like ground beef.

So we haven't been able to connect with Rodney the last few days, but he was helpful in providing us the information. We'll be getting back to him and making sure he doesn't have anymore questions about his moose.

MEMBER MCEWAN: Thank you. Just the other thing which struck me is the high levels of thallium and beryllium in bone. Is that related to the local environment or is that bone metabolism?

DR. IRVINE: Those would often be bone metabolism, in terms of that would be the location in which you'd get more uptake in those areas.

THE PRESIDENT: This is one moose. How often are you testing different moose in northern Saskatchewan to get kind of a feel of the whole herd, the health of the whole herd? Maybe do you do something, any

other animal, like caribou, fish and all that? How rigorous are the tests and how often?

DR. IRVINE: The testing done specifically around the Cluff Lake site is more historical, and then this was through Mr. Gardiner. The Eastern Athabasca Regional Monitoring Program does do moose testing and caribou testing on a yearly basis, or depending on when they're doing their monitoring, and it's limited in terms of the community which are involved with the Eastern Athabasca Regional Monitoring Program.

So they do continually do moose and caribou for those specific communities, close to those communities, so that continues to occur there.

THE PRESIDENT: This data is posted, shared with the community? Because I was kind of surprised that he didn't -- Mr. Gardiner didn't look for any other data, compare his moose with all the other data that supposedly now you're telling us is available.

DR. IRVINE: The data that the Eastern Athabasca Regional Monitoring Program does, they do share it with communities during community meetings. It's on the website that you've seen in the document. They also produce for the Athabasca communities community-specific brochures and little magazines that are quite graphic, so they're easy to read and to look at.

I think that might not be seen quite so much in some of the communities further south in the Athabasca area, and so Mr. Gardiner may not have been aware of some of those moose studies and caribou information that's available.

THE PRESIDENT: That's why the Athabasca study or something like that should really be explained in outreach to those communities. I don't know how many of those hunters go on the website and try to look for some data. Rather than, you know, reaching and explaining in more oral tradition what the findings are.

DR. IRVINE: Yes, I think that's good and I think that's why the Athabasca community meetings are so valuable.

THE PRESIDENT: Okay, thank you.

MR. HUFFMAN: If I could just comment?
Dale Huffman with AREVA.

When we saw this intervention come in we looked at it. There's a great opportunity here, a couple great opportunities in this intervention, but there was an urgent concern for us.

So, first, the opportunity was that Mr. Gardiner's gone and sampled a local moose and we can compare that to what we've put into ecological risk assessment, we can compare it to other population. It

validates the work that we've done. So we don't have sampled moose, we have modelled moose, now we have a sampled moose, and this fits into our validation of our ecological risk assessment very well, and the conclusion that there aren't risks to moose and there aren't risks to people that eat the moose. So that's great.

But the interpretation that Dr. Irvine just provided, Mr. Gardiner didn't have sufficient support. So he's received some information, some sample results, and not had proper interpretation of that information. So we had AREVA put something together to get out to Mr. Gardiner to put it into context and put something, a comparison, in place to compare contaminants to the data that Dr. Irvine provided us.

But I think what was an opportunity to become more confident in the decommissioning of our site, to become more confident in our predictions, has turned into something where we've lost the trust of Mr. Gardiner. He's concerned about his moose, he didn't have proper interpretation, and now he's alarmed by the results, even though the results are just normal, they look like any other moose in the north.

THE PRESIDENT: Thank you. Any further...? No other comments?

Okay, I have one. On page 12, still on

Cluff Lake. I'd like again on uranium, this is acceptability of uranium levels. This is all from the Saskatchewan Environmental...

So I'm coming back to my favourite topic about uranium in water, and you can see that they're arguing about -- you see acceptability of uranium level, the second paragraph, talks about 15 milligrams per litre is now the accepted standard. The reading of some of the material, surface runoff is 152, and this was in Cluff Lake, but it was also in Rabbit Lake, et cetera, and you're also mentioning the .1 milligrams per litre as the...

So how do we explain all of this? They read what our targets are, and then we accept that kind of reading? Staff.

MR. RINKER: Mike Rinker, for the record.

So I certainly do understand that there isn't clarity by having always one number for one scenario that we're looking at. There is a difference from something that is released directly to say a sewer in Port Hope to an effluent limit for a mine that was under that CEPA-toxic scenario of .1 milligrams per litre and now, in this case, a loading that is runoff from, you know, surface -- like a waste rock pile that's leading into a lake.

The particular complexity here is that the facility underwent a comprehensive study review about 13-14

years ago where there was environmental risk assessments being done to say is the facility going to be decommissioned and is the decommissioning design going to be protective of people and animals that will be in and around the site?

That was based on an environmental risk assessment of what would be safe based on those types of scenarios that we would expect. A person arrives, doesn't live there, but visits, uses the lake to make tea for a week, then moves on somewhere else. So what is the actual risk associated with that as opposed to limits that would not require an environmental risk assessment because if you meet the limit you're okay.

So the levels that were discussed here are really based on the results of those studies. I have my specialist behind me that can talk about the details of that.

MR. McALLISTER: Andrew McAllister,
Director of the Environmental Risk Assessment Division.

So just to build upon what Mr. Rinker mentioned, and it gets back to sort of the tenets of the risk assessment process. We look back at the comprehensive study report, and the conclusions around it were that there were going to be some effects in the immediate site and then downstream the effects were going to be not adverse or

negligible. This, to date, is bearing out in the monitoring information.

The values cited in the paragraphs here refer to values in things like Island Lake. When one's looking at a risk assessment, you know, you use things such as surface water quality objectives, that sort of screening criteria. We have values that are greater than that and those are the kinds of information that feeds both the human health risk assessment and the ecological risk assessment.

When we move off site and into downstream areas such as Sandy Lake and that, we're finding water levels below the surface water quality objectives of 15 micrograms per litre.

So that gives a bit more I guess flavour to some of the concerns raised in this particular aspect of this submission.

THE PRESIDENT: I think that you need to do some more kind of work on explaining the various units that we use, the various limits, where they belong, compare contaminants, and the situation, when do you use the surface water, the groundwater, the lake water, the Minister's...

You know, all those different limits applied differently really do not add to clarity in my

view. So this is something that I think that needs to be done.

While I got this, it will be nice to see also a list of all of those -- by the way, this is the first time we see some of those mines and legacy mines, it will be nice to see the target institutional transfer. I'm now afraid to say what it is. When the institutional or exemption from licence is the target, what is the target for those facilities? Because each one of them is a financial guarantee associated with this and an end game. It will be nice to have seen --you know, you have a financial guarantee table here, it would be nice to see the end game, kind of a date beside it somewhere along the line.

The kind of last little quickie is on page 122 of the CMD. You remember we talked about reference level for radon? On the page it says, Health Canada guidance, guidelines for radon of 200 Bq/m³. What happened to the reference level? Am I looking at two different things? What am I looking at?

MS SAUVE: Kiza Sauve, for the record.

I'm going to give it a shot. The 200 Bq/m³ is the Health Canada guideline for your basement. So if it was inside a building -- and we're using that as a guideline in this case.

The 60 that was spoken about for the operational facility was derive, as Dr. Nana-Owusua Kwamen mentioned earlier, based on the 1 milliSievert for the effluent. So it's just two different things that we're talking about.

When we're looking at the Deloro, you're seeing -- we're talking about temporary contactor trailers on site, so we're talking about inside a building, so that's why we've got different limits.

THE PRESIDENT: So the Canadian guidelines for inside the home are more liberal than the reference level for the outside? I'm not getting something here. Something's not computing here. For another conversation.

Anybody want...?

MEMBER MCEWAN: Actually, I did have one. Sorry.

THE PRESIDENT: Please go ahead.

MEMBER MCEWAN: So for Rayrock, I was interested there have been exceedances in the environmental protection of uranium, aluminum, copper, and selenium. Is therefore water quality monitoring every three years and gamma monitoring every five years appropriate, or should it be more frequent to assess change in exceedances?

MS TADROS: Haidy Tadros, for the record. If we can, can we just get the reference

of what page you're referring to?

MEMBER MCEWAN: I'm sorry, it's been a long day, 134. I apologize.

DR. LANGE: Dr. Karina Lange, for the record.

So the site to Rayrock has been under CNSC licence for quite some time. This site was decommissioned in the 1950s and it was monitored for a number of years. So at the last relicensing the licensee proposed a monitoring program that was reflective of the risk and the nature of the site, as well as the ability to get out there and carryout this type of monitoring program.

So the licensee has recently completed what's called Phase 1 of this monitoring program. If he's still on the line, I would take this opportunity to ask Ron Breadmore to comment on their licence renewal and their intentions to revisit their long-term monitoring program and perhaps increase this monitoring reflective of the conditions of the site.

So can we check if he's still on the line?

MR. BREADMORE: Yes, Ron Breadmore, here for the record.

Mr. President, that's correct, the monitoring that was conducted here recently at Rayrock has confirmed some elevations, as the individual had mentioned.

We're currently assessing those exceedances and revising our human health risk assessments here in 2017. Depending on the results of that risk assessment, that will determine our next phase of monitoring and the frequency that may be required.

THE PRESIDENT: Okay, I think that wraps it up. But I think you have the last word. Anybody who wants to add any particular last-minute thoughts, comments, now is the time. Go ahead.

MR. McALLISTER: It's Andrew McAllister, for the record.

Since we are wrapping this up, I just want to take the occasion, you saw a few people come up when we started talking about the moose. One of them was Dr. Steve Mihok who has been a friend of you for a number of years. Dr. Mihok will be retiring in early 2017. So he'll be greatly missed, but he has had a long history on the Cluff Lake file and has been with the CNSC for 16 years previous to that, with AECL for eight years, and has been a valued member of CNSC Staff in the years, environmental protection such as tritium research and radioecology, and we just want to wish him all the best.

THE PRESIDENT: I thought he was going to make you talk about the moose.

--- Laughter / Rires

MR. McALLISTER: We were, but when I leaned over to Dr. Mihok and asked if there's anything else to add, he said, Dr. Irvine had it all covered, and we agreed with everything he said.

DR. MIHOK: But again, just a quick thank you, and this is probably your last chance to ask me a question in public.

THE PRESIDENT: Sure, I'll get us a CMD about that.

All the best.

Okay, thank you, we're going to take a five-minute biological break.

MR. LEBLANC: We're going to proceed with the two EIRs that we have to deal with. So thank you very much.

--- Upon recessing at 8:13 p.m. /

Suspension à 20 h 13

--- Upon resuming at 8:22 p.m. /

Reprise à 20 h 22

CMD 16-M69

Submission from CNSC staff

THE PRESIDENT: Okay. The next item on

the agenda is an information item providing us with an update on the development, deployment and regulatory environment --

MR. LEBLANC: Wait, wait, wait.

--- Laughter / Rires

THE PRESIDENT: Oops. Let me start again.

The next item on the agenda is an information item to report on a potential overexposure to members of the public during transport of packages containing nuclear substances, as outlined in CMD 16-M69.

I understand that, Mr. Moses, you will make the presentation. Go ahead, please.

MR. MOSES: Thank you, Mr. President, 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 Monsieur Sylvain Faille, Director of the Transport Licensing and Strategic Support Division, and Monsieur Martin Thériault, Transport Officer with the same Division.

We are here today to report on the CNSC staff assessment and findings related to a situation that was reported to the CNSC through our whistleblower process by a member of the public on October 19, 2016, where two members of the public had been exposed to a dose of

radiation in excess of the regulatory annual limit of 1 mSv during transport.

I will turn it over to Mr. Sylvain Faille to provide the details of this event.

MR. FAILLE: Thank you.

On October 19, 2016, the CNSC was notified that on September 24, 2016, a driver was taking passengers while carrying packages that contained nuclear substances. The driver was advertising on a travel share website and was offering his services to drive passengers at the same time as he was carrying packages on board. This practice is not authorized under the *Packaging and Transport of Nuclear Substances Regulations, 2015* and involves a number of non-compliances with the *Transport of Dangerous Goods Regulations* as well.

CNSC staff contacted the consignee and carrier to obtain further information on the packages transported. Upon verification, the vehicle was carrying two packages, including a molybdenum-99 generator which was categorized as a III-Yellow label. With this new information, and due to the duration of the trip, approximately 10 hours, there was a risk that a member of the public may receive an exposure in excess of the regulatory limit for members of the public.

The carrier suspended the driver upon

being notified of the situation by the CNSC, conducted an internal investigation into the matter and provided their investigation report to the CNSC.

The CNSC also met with the driver involved to obtain further information on the number of trips made where passengers were on board and if he had contact information for those passengers. The driver has indicated that while he did carry passengers on two or three previous occasions, the transit in question was the only time when passengers were in the back seat.

In addition, CNSC staff performed a dose reconstruction and determined that a member of the public sitting in the back row of the vehicle would have received an effective whole body dose of approximately 1.62 mSv, which is above the limit for members of the public. Any passengers in the middle row would have received a dose below the public dose limit.

CNSC staff informed the member of the public verbally and by letter that they had received a dose above the limit for members of the public but well below the limit for nuclear energy workers and below levels that would have any health effects.

The CNSC is assessing the available information and will determine the regulatory actions to be taken as a result of this situation.

In addition, CNSC staff will prepare a communication to carriers to inform them of this event and remind them of the importance of periodic verifications to ensure that drivers are complying with the transport requirements.

CNSC staff are available to answer any questions you may have.

THE PRESIDENT: Thank you.

I have just been told that we also have a representative from the company. So Mr. Tuggle I guess from Dynamex, do you want to make any comment?

MR. TUGGLE: Sir, thank you very much. For the record, Randy Tuggle.

We were unaware of this individual's actions in this respect and we have taken actions beyond just with this individual, reaching out to all the drivers that are carrying any kind of nuclear medicine and ensuring that they have -- we are going through a retraining process. We have had them re-sign the SOP which very specifically outlines that under no circumstances are they to be either passing on their nuclear material or to be carrying passengers.

When this whole thing began, we started out with the individual with a different name, same first name, different last name. Well, as it turns out, he had

given a false name in the initial stages.

So just to make sure there wasn't any confusion by our general population of drivers, under no circumstances once you receive a load are you to pass that on to anyone. So we have taken additional steps with increased inspections as well as ongoing and additional training to ensure that this does not happen again. It's completely unacceptable and sincerest apologies on this.

THE PRESIDENT: Thank you.

Dr. McEwan...?

MEMBER MCEWAN: So I mean there is no actually accounting for stupidity, but if I just look on page 3 of the report, the last paragraph, I'm not sure, I think the phrasing of the last sentence is particularly helpful, that:

"With the increased distance from the packages, exposure to persons in the middle row is greatly reduced and would be below dose limits..."

The sort of follow-on implication of that is that's okay and I think you really need to rephrase that because it's not. I think you need to be clear that the middle row -- any dose from a generator to the middle row or the front row in a passenger is not acceptable for any reason. So I don't think that conveys the seriousness of

what happened. Just a thought.

MR. MOSES: Colin Moses for the record.

I completely agree. I think in this instance there was a number of non-compliances, not just the carrying of packages. Also, there was non-compliance with packaging requirements. All the requirements that we establish are designed and in place to ensure the safety during the transport. In this case, there was a clear violation of those transport requirements and those are not acceptable to us.

That was not intended to convey that, only that in this instance we have, as a regulator, a certain obligation to reach out to members of the public who we are aware that were exposed, particularly if they were above the regulatory annual limits, and so that's the only reason we included that statement.

MEMBER MCEWAN: I agree. I mean I think it's important that it's there, I just think you need to rephrase it to avoid the potential reading or implication that it doesn't matter. It matters.

THE PRESIDENT: Out of curiosity, this entrepreneur presumably kind of wanted to make a few bucks and if you get a passenger, why did he dump the passenger into the third -- into the back? I thought that you would want a passenger to sit right beside you, wouldn't you?

MR. TUGGLE: Well, sir, I honestly can't explain the ridesharing economy we seem to have grown into today. I mean I don't know how many of you have gone on Uber, or in New York last week I went on something called Via and there's Lyft and everybody else, so it seems like everybody is trying to make an extra buck and this gentleman was like way outside of where he should have been. There should have been no need for being concerned with the passenger in the middle as opposed to the back because there shouldn't have been a passenger in there in the first place.

THE PRESIDENT: But was there more than one passenger?

MR. TUGGLE: Apparently there were two.

THE PRESIDENT: Ah! Well, that might explain why one is in the middle, one in the back.

MR. TUGGLE: Yes.

MR. THÉRIAULT: Martin Thériault for the record, Transport Officer with CNSC.

On that occasion they had five passengers in the vehicle.

MR. TUGGLE: Five.

MR. THÉRIAULT: So that's why there were two in the back, two in the middle row and one on the passenger --

THE PRESIDENT: You don't say this anywhere here and that would be kind of a little bit of additional colour to this silliness really, or stupidity as Dr. McEwan called this guy.

And one other thing, I didn't see, maybe it's there, but for 10 hours from where to where is this going on?

MR. FAILLE: Sylvain Faille for the record.

The passengers were picked up in Montreal and they were going to Chandler in Eastern Quebec. And the packages were delivered in the Gaspé region.

THE PRESIDENT: Okay, thank you.

Ms Velshi...?

MEMBER VELSHI: So this CNSC whistleblower process, like how would these passengers have known to call the CNSC?

MR. MOSES: Colin Moses for the record.

First of all, just to speak to the whistleblower process in general. Whenever we receive a report of a non-compliance from a third party, be it another licensee or a member of the public, we treat it in accordance with our whistleblower process just to ensure that we are appropriately protecting the identity of the individual.

In this particular case, the passenger in the vehicle contacted the hospital where the packages were destined and they referred that call to us. They also contacted the Sécurité de transport du Québec as well.

So in this case the inquiry came in through here, but we do have on our website clearly, we have a "Contact us" section which includes a direct line to the internal disclosure protocol, which is managed in the Secretariat as the organization just to ensure independence from the CNSC.

MEMBER VELSHI: So what got them concerned enough to call? I mean did they recognize a radiation symbol or what was it?

MR. MOSES: Colin Moses for the record.

Yes, that's exactly the case. They noticed packages in the back. They noticed that they were somewhat covered by a blanket. They inquired to the driver who wasn't forthcoming with a response of what those packages contained and then they noticed over the course of the ride that that blanket slipped and they did see a radiation warning label on the package.

There were two packages in the vehicle. One which is of particular concern was the category III-Yellow label with the technetium-99 generator. There was a second package that is a slightly lower level

category II-Yellow label and that package, the passenger actually took a picture of that.

But Monsieur Thériault also spoke with the individual in question, so I don't know if you wanted to add anything.

MR. THÉRIAULT: Martin Thériault for the record.

The individual saw that there was already packages when they embarked on board the vehicle, asked a question to the driver, the driver was evasive, as Mr. Moses just said, so it raised a concern to them why wouldn't an individual come forward with what's already loaded in the vehicle. And throughout the voyage they asked questions about what's in there and when they saw the II-Yellow label on the package, then the driver mentioned it was destined to the local hospital in Chandler. The individual contacted the responsible person in Chandler to obtain further information about the package and that's how they were directed to us and to the CNSC whistleblower process.

THE PRESIDENT: Did you find out if this is a repeat business? If I understood correctly, this fellow published on Kijiji. Did I get it right or am I missing something here? I don't know why I'm saying that.

MR. THÉRIAULT: Martin Thériault for the

record.

The driver was advertising on a website from a local radio station that had a webpage for ridesharing. So he was offering --

THE PRESIDENT: On the radio?

MR. THÉRIAULT: On the website of the radio station. That's how they -- he advertised his services for transporting passengers.

THE PRESIDENT: So was he aware that he's doing something he shouldn't be?

MR. THÉRIAULT: Martin Thériault for the record.

Yes, he was aware that he was illegally transporting passengers while carrying radioactive material, and also transporting a passenger in Quebec is an illegal -- for a fee is illegal also in Quebec. So he was aware of some wrongdoing.

MEMBER VELSHI: Was he aware that he was exposing them to a radiation risk?

MR. MOSES: Colin Moses for the record.

I will let Monsieur Thériault, who interviewed the driver directly, add details, but to give you an example, he did indicate that he had placed the lead blanket over the packages, which is a good indicator that he was aware that there was a radiation risk and took

measures, however effective they were, to mitigate that risk to some extent. So I think that's a very good indicator that he was aware of that risk.

MR. THÉRIAULT: Martin Thériault for the record.

To add to Mr. Moses' comment, he was aware that also he didn't affix a placard on his vehicle so not to scare passengers who might take his services. So the individual would have seen the required placards on the vehicle and would have probably not accepted the ride. So we think he was aware of the wrongdoing.

MEMBER MCEWAN: Any evidence he had done it before?

MR. THÉRIAULT: Martin Thériault for the record.

He admitted having transported other passengers before while transporting nuclear substances on one or two other occasions. He mentioned that there were only one or two passengers in those instances. So with the distance from the packages, it would not have resulted in an exposure to those individuals, but it remained a non-compliance with the regulations for those -- for a roadway vehicle, you are not allowed to carry any passengers when you have II-Yellow or III-Yellow label. To come back to your previous comment, it's not allowed even

in the front seat or other seats of the vehicle. Only drivers and assistants are allowed in vehicles while carrying II-Yellow and III-Yellow labels.

THE PRESIDENT: So you interviewed him on December the 12th, is that right? That's two days ago.

MR. THÉRIAULT: That's correct. I met him on Monday. I had a phone conversation with him the previous week and we arranged for a meeting on Monday.

THE PRESIDENT: So what's happening to him now, is he still employed?

MR. TUGGLE: Not by us. He was immediately suspended and then terminated shortly -- while we were in the process of the investigation.

MR. THÉRIAULT: Martin Thériault for the record.

During our Monday meeting, he mentioned that he was currently unemployed and his intention was not to come back to a position to carry radioactive material in the near future or in the future.

THE PRESIDENT: Maybe he will take up Uber driving.

Any other questions?

Okay, thank you. Thank you very much.

--- Pause

MR. LEBLANC: And, Mr. Tuggle, please

don't forget to drop your badge and get your driver's licence downstairs.

MR. TUGGLE: Absolutely.

MR. LEBLANC: Thank you. Bye-bye.

CMD 16-M72

Written submission from CNSC staff

THE PRESIDENT: The next item on the agenda is an Event Initial Report on exceedance of a regulatory dose limit by a nuclear energy worker during a therapeutic nuclear medicine procedure at the Lions Gate Hospital in North Vancouver, British Columbia, as outlined in CMD 16-M72.

Mr. Moses, the floor is still yours.

MR. MOSES: Thank you, Mr. President and Members of the Commission. Again, my name is Colin Moses and I am the Director General of Nuclear Substances Regulation.

With me as well is Mr. Peter Fundarek, Director of the Nuclear Substances and Radiation Devices Licensing Division, as well as Ms Caroline Purvis, Director of the Radiation Protection Division, and Mr. Diego Estan, Radiation Protection Specialist.

We are here to present an Event Initial

Report concerning an extremity exposure to a therapeutic nuclear medicine nuclear energy worker that was above regulatory limits.

I will turn it over to Mr. Fundarek to provide the details of this event.

MR. FUNDAREK: Good evening, Mr. President and Members of the Commission. My name is Peter Fundarek.

The situation involved the injection of Yttrium-90, which is a strong beta emitter which has a half-life of 64 hours, which is injected into the synovial space of a joint for certain conditions such as rheumatoid arthritis to reduce inflammation and irritation. Following the injection, the joint must be immobilized to prevent removal of the radiopharmaceutical from the joint space by the patient's lymphatic system.

On the afternoon of Friday, October 28, a nuclear energy worker was conducting administrations to five patients to treat four knees and one wrist, with the latter administration being the last one. Each administration consisted of the injection of approximately 250 MBq of Yttrium-90 for the knee or 74 MBq of Yttrium-90 for the wrist into the joint cavity. After each administration, a splint is applied to keep the joint immobile. Gloves are a requirement for the activities involved in the administration of the radioisotope to the

patient, with changes of gloves and hand sanitization between patients.

The last administration, to the wrist of a patient, was completed and the patient supplied their own splint device. This particular splint was reportedly a very tight fit and the nuclear energy worker removed her gloves to assist in the application. It is expected that during this process the nuclear energy worker's hands came into contact with the area around the injection which had been covered with a bandage.

The worker did not immediately wash her hands, nor immediately monitor them. The worker returned to the hospital hot laboratory where then she monitored her hands, approximately 30 minutes following the last administration. Immediate efforts were undertaken to decontaminate the skin and these continued for approximately 90 minutes. Most of the contamination was found in small areas near the fingertips on the left ring and little fingers. Diffuse areas were also noted on the right hand.

Contamination measurements on the hands decreased from an initial reading of 1800 counts per second down to about 440 counts per second following completion of the washing when no further decreases were being noted. The worker was instructed to continue washing and to wear

gloves over the following four days to remove any remaining contamination. The counts reached background levels by November 1st.

There was no exposure to any other person and there was no contamination located in the nuclear medicine room used for the administration of the radioisotope.

The CNSC was properly notified of this incident on October 28th and the full report to the CNSC was submitted on December 2nd. The licensee calculated a maximum exposure of 1098.8 mSv to the ventral skin of the left hand and 368.2 mSv to the ventral skin of the right hand. The licensee has reported that no physical effects have been noted following the exposure and none are expected.

The licensee has submitted a plan for the eventual return to work of the nuclear energy worker. The licensee has removed this person from most work involved in the handling of radioactive material or patients injected with radioactive material, with a gradual resumption of full duties over the next six months.

The licensee will strengthen their internal procedures to require double gloves and the washing and monitoring of hands following each injection and application of the splints. The licensee will be

presenting information on this event at the next staff meeting and will also present the results of the investigation to the licensee's own Radiation Safety Committee.

CNSC staff have reviewed and accepted the investigation report submitted by the licensee and considers that the actions taken were appropriate and reasonable. CNSC staff agree with the calculated exposure and will support the dose change request submitted by the licensee to the National Dose Registry.

CNSC staff will also prepare a short notice to be sent to all licensees administering radioisotopes to remind them of the importance of wearing gloves and the regular monitoring and washing of hands following administration.

CNSC staff do not plan to provide any further updates to the Commission on this event and we remain available for any questions that you or the Members may have. Thank you.

THE PRESIDENT: Dr. McEwan, I think this is up your alley.

MEMBER MCEWAN: So this was after a wrist injection?

MR. FUNDAREK: Peter Fundarek for the record. Yes, that is correct.

MEMBER MCEWAN: So by definition, the patient's skin must have been heavily contaminated if that is how you believe the nuclear energy worker got their hands contaminated?

MR. FUNDAREK: Peter Fundarek for the record.

It is believed that the nuclear energy worker had removed her gloves to apply the splint and during that process touched on or near the bandage that was applied to the puncture site and this is where the contamination had come through the bandage.

MEMBER MCEWAN: So did you actually go back and monitor the patient's skin? Because that would be a lot of contamination and a lot of leakage, and if there was that much leakage, the bandage should not have gone with the patient.

MR. FUNDAREK: Peter Fundarek for the record.

The injections were done on Friday afternoon and by the time that the contamination on the nuclear energy worker's hands was noted, the licensee was unable to recall the patient to conduct further monitoring. But they did monitor the area where the injection had taken place in the hospital and noted that there was no contamination in those other areas. So the contamination

would have been contained underneath the splint that the patient had supplied.

MEMBER MCEWAN: So we have a patient wandering around with a contaminated splint or a contaminated bandage or contaminated skin and nobody bothered to check it?

MR. FUNDAREK: Peter Fundarek for the record.

That would be difficult at the time of the injection because you would have the material just below the skin surface that would confound any monitoring results that you would take.

MEMBER MCEWAN: But you just said that you thought the contamination was actually in the bandage. You could have measured the bandage quite easily, or the splint. I mean I'm guessing my question really is why was every effort not made to bring the patient back to make sure there was no significant contamination of the splint?

MR. FUNDAREK: Peter Fundarek for the record.

The dose -- sorry, the half-life for the Yttrium-90 is 64 hours, so much of the contamination that would have existed would have decreased over the course of the weekend that the patient was absent from the hospital.

MEMBER MCEWAN: Yes, but the patient

presumably would have been at home, she would have used towels. This is a very energetic beta, it's not a particularly, you know, good isotope to have hanging around. I would have thought that ALARA would have required that we at least ask that.

MR. FUNDAREK: Peter Fundarek for the record.

We can follow up with the licensee to find out if any other further measures were taken.

THE PRESIDENT: As a layman, when you inject somebody with such a thing, surely we should know what the reading would be at the surface after the injection. Somebody should know. Somebody in the hospital, some of the nurses, some of the people, wouldn't they know if you inject it what the remnants on the bandage would be?

MR. FUNDAREK: Peter Fundarek for the record.

That would depend upon the depth of the injection and the nature of the distribution after it was injected, whether it was injected into a joint space or if it was injected into muscle or other tissues.

THE PRESIDENT: Well, a joint injection is pretty deep, isn't it, you get right into the joint? It's not on the surface, it's not on the skin. So I'm just

trying to understand. I'm just fascinated by the amount of inquiry Dr. McEwan got here because if she got such a high dose from just touching a bandage, then the patient has skin which is radioactive.

MR. FUNDAREK: Peter Fundarek for the record.

There was -- the amount of material that was injected was 74 MBq and it wasn't a very large volume of injection. So it was a very small quantity because it has a very high specific activity. There's many becquerels per unit volume, so it wouldn't take very much of the material to generate the contamination results that we saw.
--- Pause

MR. FUNDAREK: Peter Fundarek for the record.

The other point is that the intention was to deliver a radiation dose to the patient so there wouldn't be a necessary need to be monitoring the patient afterwards.

MEMBER MCEWAN: So it's actually not the delivery, it's the fact that there must have been significant leakage from the injection site for that to happen. So the injection wasn't done right or -- I don't know, but it would be unusual to have that much sitting in -- and if we don't know what was actually in the splint,

we don't even know if the patient received a therapeutic dose to the joint. It could all be sitting in the bandage.

MR. FUNDAREK: Peter Fundarek for the record.

As noted, it was a high specific activity material, so it wouldn't require very much volume to result in the contamination that was noted. The contamination was 18,000 counts per second, whereas the injection was 74 million counts. So the activity injected was mostly into the joint itself.

THE PRESIDENT: I think we're missing some data. I think you should find out when you do a normal injection, what kind of leakage do you expect in something like that. It may be that all injections results in such leakage and just the nuclear worker did not -- just took precautions to protect herself, but it means that practically every patient gets similar kind of contamination in the bandage. I don't know, that may be something that everybody is aware of.

MR. MOSES: Colin Moses for the record.

I absolutely can follow up with the hospital to see. Certainly within our area of regulatory oversight, our preoccupation is with the dose to the workers, but I think it is a very fair point that there is a potential for the spread of that contamination. The

receivers of the medical isotope are provided with caregiver instructions and precautions to take following the administration of a dose, but I do take Dr. McEwan's point, so we will follow up with the licensee in that regard.

THE PRESIDENT: And of course now that you have scared the hell out of me, I'm going to ask -- every time we go to the hospital and get an MRI, I'm going to ask the -- after they do the injection, I want somebody to measure the contamination that possibly could leak.

MEMBER MCEWAN: If there is contamination, it will hurt like hell.

--- Laughter / Rires

THE PRESIDENT: But I mean if you do some MRI with contrast?

MEMBER MCEWAN: It will hurt like hell.

THE PRESIDENT: Yes.

MEMBER MCEWAN: Can I just ask one other question? So the nuclear energy worker who did the injection, what was his or her profession?

MR. FUNDAREK: Peter Fundarek for the record.

The person was a nuclear medicine technician.

MEMBER MCEWAN: Doing a joint injection?

MR. FUNDAREK: Peter Fundarek for the record.

Yes, that is my understanding.

MEMBER VELSHI: I have a question around the use of gloves or not gloves and the corrective action of double gloves, given the high specific activity. I don't know, do you think that's adequate precautions? I mean if you are handling a really serious virus, you know, I mean people should really be, as Dr. Binder said, really scared as hell of handling this material so that even absentmindedly you don't not wear your gloves. I'm thinking more of how much has that been instilled in these workers, that you are handling some really dangerous stuff, guys?

MEMBER MCEWAN: It's a beta emitter, so --

MEMBER VELSHI: Even still.

MEMBER MCEWAN: -- the gloves will protect.

MEMBER VELSHI: But that's what I mean, knowing that you absolutely have to have the gloves, otherwise --

MR. MOSES: Colin Moses for the record. Absolutely I think there are basic precautions that workers need to take when dealing with this material and when administering doses. And in this

case they did use that protection initially. However, the inconvenience of dealing with this snug splint caused them not only to take off the gloves, but on top of that, after the administration there is an expectation that they survey to ensure that there is no residual contamination, and again that didn't happen here. Hence, as Mr. Fundarek noted, we will be sharing this operating experience with other licensees to ensure that they do have a look at their procedures and ensure that they do have a good safety culture in the hospital.

The other thing I would note is hospitals is one of those areas where we are looking at piloting the application of our safety culture assessment methodology just to ensure that in the hospital, not only in their nuclear business, but in general that they have a good and healthy safety culture. And we do that assessment ourselves as part of the inspection and feed that back to the hospital administration so that they have an awareness of where they sit on the scale of maturity in that area.

THE PRESIDENT: From your description, it seems to me that the nuclear energy worker -- and I think you mentioned her, so I think it's a she -- fully realized that there was something wrong because it was her who went back and, if I understand correctly, measured and started taking some precautions, washed her hands. And she is the

one that raised the alarm; is that correct?

MR. FUNDAREK: Peter Fundarek for the record.

Yes. She went back to the hot lab where they prepare the radioisotopes and at that point is when she monitored her hands. Prior to this, she had been monitoring her hands after each administration and application of the splint, but in this case, since it was the last injection, she hadn't done that step until she got back to the hot lab, then monitored her hands, found that they were contaminated. She was aware enough to start the washing. She notified the Radiation Safety Officer who came and conducted monitoring as they were doing the washing.

THE PRESIDENT: So I think she was fully aware that something --

MEMBER MCEWAN: It would be normal practice. If she hadn't done it, it would be not the right practice.

THE PRESIDENT: And then she raised the alarm up the line; is that the way it worked?

MR. FUNDAREK: Peter Fundarek for the record.

Yes, that is correct. She did advise the Radiation Safety Officer, and the Radiation Safety Officer

was there to provide information and advice and then also notified the CNSC.

THE PRESIDENT: Just sort of a final question here. So how serious is this kind of a dose? How harmful can it be?

MR. MOSES: I will refer to Ms Caroline Purvis to provide details on that.

MS PURVIS: Caroline Purvis, the Director of the Radiation Protection Division.

So I guess there are two parts to this. Obviously, the dose to the left hand was above a regulatory dose limit, so from a regulatory point of view it's treated very seriously. And the licensee followed all the requirements in the regulations to remove the worker from further work that could add to the dose received, conducted the investigation and submitted the information to the CNSC for validation. Upon review of that, certainly we felt that the calculations were acceptable and we have recommended a return to work or an authorization of a return to work for that technologist.

As detailed in the EIR, the hospital themselves have returned a work plan that they have put in place for the individual to phase them back into work.

From a health point of view, the dose again is large and it does look large, but keep in mind

that the dose limits are set well below a threshold where we would expect health effects. For a skin dose, the primary health effects occur above a threshold value. So below that threshold value, we would not expect to see any health effects.

The primary health effect would start with skin reddening and that happens at a range of doses received to the skin between 2 Sv and 5 Sv, so reddening of the skin. And with increasing dose, you may observe effects such as blistering, skin peeling, necrosis, and as you can imagine, that is a very, very high dose that's received and that didn't occur in this case. We don't expect any health effects. No health effects have been observed and fortunately the technologist is fine.

THE PRESIDENT: Thank you.

Anything else?

Okay, thank you. Thank you very much.

This concludes the meeting of the Commission. Thank you for your participation. Bonne fin de soirée.

Thank you.

--- Whereupon the hearing concluded at 9:02 p.m. /

L'audience se termine à 21 h 02