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Ottawa, Ontario / Ottawa (Ontario)

--- Upon commencing on Wednesday, August 16, 2017 at 9:03 a.m. / La réunion débute le mercredi 16 août 2017 à 9 h 03

Opening Remarks

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

Today we have simultaneous interpretation. 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 dans environ 10 jours.

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 close of the proceedings.

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...?

LE PRÉSIDENT : Merci, Marc.

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

Mon nom est Michael Binder. Je suis le président de la Commission canadienne de sûreté nucléaire. Je vous souhaite la bienvenue, and welcome to all of you joining us via webcast.

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

On my right is Dr. Soliman A. Soliman.

On my left are Dr. Sandor Demeter, Dr. Sandy McEwan and Mr. Rob Seeley.

We have heard from our Secretary Marc Leblanc and we also have with us here today at the podium 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 August 9th for the complete list of items to be presented today and tomorrow.

In addition to the written documents that have been reviewed by the Commission for this meeting, CNSC staff and other participants will have the opportunity to make presentations and Commission Members will be afforded an opportunity to ask questions on the items before us.

The minutes of the June 8, 2017 Commission Meeting that was held in La Ronge, Saskatchewan, were previously approved by the Commission and made available on the CNSC website on July 17th.

Mr. President...?

CMD 17-M32.A

Adoption of Agenda

THE PRESIDENT: So with this information I would like to call for the adoption of the agenda by the Commission Members, as outlined in Commission Member Document CMD 17-M32.A.

Do we have concurrence?

For the record, the agenda is adopted.

So the first item on the agenda for today is the Status Report on Power Reactors, which is under Commission Member Document CMD 17-M34.

We have representatives here from OPG, Bruce Power, NB Power and Hydro-Québec here in the room or via teleconference, so let me check the technology first.

Hydro-Québec, can you hear us?

M. OLIVIER : Oui. Bonjour. Donald Olivier, Hydro-Québec. On est en ligne sur le téléphone.

LE PRÉSIDENT : Merci beaucoup. Bienvenue.

I would like to give the floor to Mr. Frappier, Director General for the Directorate of Power Reactor Regulation.

Mr. Frappier, over to you.

CMD 17-M34

Submission from CNSC Staff

MR. FRAPPIER: Thank you and good morning, Mr. President, Members of the Commission. I'm here to present the Commission Member Document 17-M34, the power reactor status update.

As just mentioned, my name is Gerry

Frappier, I am the Director General of the Directorate of Power Reactor Regulation.

With me today are the Power Reactor Regulatory Program Division Directors and technical support staff, who are available to respond to questions on the report that we have submitted.

Also with us, as was mentioned, are several licensee representatives, so we should have good coverage for any questions the Commission might have.

As you will note, the Status Report covers the period up to August 11th, so I would like to present a couple of verbal updates to provide you with the most current information as of yesterday.

So starting with Pickering, Unit 1 returned to full power on August 15th.

For Bruce, Unit 4 was derated to 63 percent full power on August 14th due to an emergency stop valve failing closed. I would note that this is a valve on the turbine side and is not a nuclear safety-related valve.

Also for Bruce, Unit 8 returned to full power on August 13th.

And for Darlington, Unit 1 returned to full power on August 11th.

That concludes my update. So as I said at the opening, CNSC regulatory and technical staff as well as licensees' representatives are here to answer any questions you may have. Thank you.

THE PRESIDENT: Okay, thank you.

So I would like to jump into the question period, starting with Dr. McEwan.

MEMBER McEWAN: Thank you, Mr. President.

So I guess for Bruce, I understand that there is a little additional information on the heat pump?

MR. SAUNDERS: Yeah. Frank Saunders for the record. I have a short bit of -- just to give you some context on where this pump is and what it looks like, if you would like to do that. Can you bring up the presentation there? Yes.

So just a little background. It's in the report but just to emphasize. We were bringing the unit -- the unit was already offline and we were preparing to enter a maintenance outage. We were in the process of reducing heat transport, just some pressure and temperature. This is a stepwise process we go through normally to bring it down.

At the time of the event, at about 5:00 in the morning, 5:03, we were at around 7 megapascals and about 170 degrees, I think, something like that, Celsius in the system. The control room received the alarm that there was a seal passing and they went to have a look and that's when they discovered the leak.

So these three slides here, just to give you some context about where everything is, so if you look here in the middle on each unit is a reactivity deck and that sits immediately above the reactor core, separated by lots of concrete and other things, but this is above it and there are two heat transport pumps on each side of that. Behind those concrete walls are actually the steam generators, which is where the water is circulated by the pumps, and then the pumps themselves look like this. So this is further back. The reactivity deck is in the centre there. You see two of the pumps here, two of the primary heat transport pumps. And normally when you are walking in there from the unit you are up on these decks where the railings are, but the pumps extend below, as you can see. These are the motors you are looking at and that little platform on the bottom, we call that sort of the pump stool or whatever, that's what the pump actually sits on, the motor actually sits on.

And then to give you some context about where the water went, this area we call a diked area. So each set of two pumps has a diked area around it. It will hold something in the order of 30,000 litres of water. It will drain to a proper tank or it can be pumped out by drums. In this case we pumped out about 30 drums, so about 6,000 litres, so we were about 20 percent full in that -- of that diked area.

Now, this transient didn't last very long. We have a procedure. It's a pretty rare occurrence for three seals to fail in that way. However, we do have an Abnormal Incident Manual on this. The operators went into it right away. By about 5:30-5:38 the leak had stopped as they reduced pressure down towards 1 MPa.

So this is just to show -- I know we had a number of questions about, you know, how can you leak 30,000 litres of water and none of it gets in the environment and so forth. This is why, because even though it's a pretty rare occurrence it is designed to handle this. So if we get a leak it will be contained in here, unless it's a really large leak, and so none of this water actually made its way to the environment.

Some small amounts of tritium did go up the ventilation stack, so there was a slight increase in tritium, but it was well within our normal operating expectations. There is a fair variation in that every day and this did not go outside of the normal range, so very small amounts left the plant.

So at this point we have taken the motor off and we have done some diagnostics on the motor. We are preparing the repair plan and we will look for CNSC concurrence on that because we will be lifting off the top of the pump to go down into the pump itself and understand the problem.

We have done an extensive condition review of all the other pumps to see if there is any indication of problems anywhere else and haven't found any. Of course that will be informed by what we discover when we open the pump, which we expect to do next week. So we are moving as quickly as we can to get into the pump and understand the cause of the problem.

MEMBER McEWAN: Okay. So how long does it take to clean up the 30 drums?

MR. SAUNDERS: You mean in terms of taking them out of the sump and putting them into the 30 drums? It took us about a day and a half, I think, roughly. It's not particularly long. You know, you are handling it fairly carefully because it is contaminated water, so people are in protective kit and so forth, and then we pumped it across and then we began cleaning up. You know, when you have contaminated liquids, when it dries it leaves behind sort of dust like any other -- like you would see in your house if you drained your sink, right. You get some things left, so then you have to clean up any contamination that's left and make it a safe work area for people. So that process has been pretty much completed and, like I say, we are in there doing our work at this point in time.

MEMBER McEWAN: And staff, we will get a follow-up when it's all finished?

MR. FRAPPIER: The one thing I would mention is staff has been involved in the sense of we have had an inspector onsite and he is here today if we want to ask a bit more questions. We were primarily interested in making sure worker safety and releases to the environment and we can confirm that, as Bruce has just said, those were okay. We will continue our investigation and following with Bruce's investigation to make sure we understand what the root cause was and whether there is anything from a regulatory perspective we should do on that.

MEMBER McEWAN: Thank you.

THE PRESIDENT: Thank you.

Dr. Soliman...?

MEMBER SOLIMAN: Thank you.

Thank you very much for Bruce's

presentation. I have one question, a follow-up about Bruce Unit 4 accident. I understand that partial loss of Class IV power.

MR. SAUNDERS: Yes.

MEMBER SOLIMAN: Partial loss of Class IV power has been had in the station and there are some equipment connected to that and this equipment will affect the behaviour of the reactor. What equipment is connected to Class IV power on the circuit and how do we mitigate that accident in terms of putting this equipment back to work?

MR. SAUNDERS: Frank Saunders for the record.

Yes, a number of things there are driven by Class IV, quite a few things actually, with a backup to Class III in some cases. Probably the primary piece here would be the PHT pumps and in this case you lost two of those pumps when we lost that Class IV power. The plant is designed to survive that kind of event quite well, it will move eventually to thermo-siphoning and through.

So the pumps themselves didn't suffer any damage in this. We did those inspections of course. And there are a number of inspections when you put the unit -- even though it's designed for thermo-siphoning, you do need to look at a number of things because you have put it through a temperature cycle that you normally wouldn't put the unit through, and Bruce A for example has a common steam drum which all four steam generators feed into and when you create a Delta T quickly you put some stress on those components. They are all instrumented, we can see them all and we have an evaluation, an engineering evaluation process we go through. So that was all done.

Before we returned to service we looked at the steam drum and the steam generators. We also looked at the pre-heaters and we did a couple of pre-heater inspections to make sure that there wasn't any water hammer or stress. The other possibility of course is as pumps shut down you might experience some water hammer, so there are places we would look to make sure that that didn't occur and so we did inspect a couple of the pre-heaters. Mostly it's an engineering evaluation of the data, looking at the various stress data that we have and the temperature differentials that we know occurred off the instruments and doing the analysis to see if there is anywhere where we might need to probe more closely.

So there is a fairly exhaustive review anytime you do that kind of fast shutdown from full power before we start up. It's a little more exhaustive at

Bruce A because of that common steam drum.

MEMBER SOLIMAN: Okay. I understand also we used SDS-2 to shut down the reactor. Is that correct?

MR. SAUNDERS: In this case we would have had an SDS-1 trip. I'm not familiar. Mr. Newman is here and I'm not sure whether SDS-2 came in or not. We wouldn't have used it as the primary trip. There would be no reason for us to do that. Let me ask Mr. Newman if he --

MEMBER SOLIMAN: When I asked the question last time I think it has been confirmed that SDS-2 has been used.

MR. SAUNDERS: Okay. It so happens our Chief Engineer is here, so I will bring him up to the front.

--- Pause

MR. NEWMAN: Good morning. For the record, Gary Newman.

Yes. Just to confirm what was just communicated, yes, SDS-2 was fired as well.

MEMBER SOLIMAN: Okay. I understand in this case when you return the reactor back to service you have to do an inspection and also you have to clean the moderator from the poison. So how long will that take in order to inspect the equipment and to clean the moderator?

I understand also that it took only 10 days I think between the shutdown and the restart. So did we give enough time to inspect the equipment and find out if any of this equipment has any harm done to them?

MR. NEWMAN: Gary Newman for the record.

Yes, that's quite right. We did, as Frank already noted, extensive inspections. Keeping in mind we are doing this on a 24/7 basis, we have full crews doing those inspections. Probably the most time was spent on doing pre-heater inspections because of the potential for water hammer. When we did those inspections we were pleased there was no obvious damage created. Typically the divider plate would be the point where you would have some problems in those pre-heaters, but there was nothing that led us to believe there was anything. All the inspection works came out clean.

MEMBER SOLIMAN: How long does it take to clean the moderator from the poison?

MR. NEWMAN: That's typically -- you are pulling poison, it's probably a two-day, maybe three-day period at most.

MEMBER SOLIMAN: Okay. Thank you.

THE PRESIDENT: Thank you.

Mr. Seeley...?

MEMBER SEELEY: A question for Bruce Power on the Unit 8 derating, just maybe a confirmation. You stated that it was a combination of high lake temperature and equipment maintenance for the derating and so I was curious, would you confirm that this lake temperature actually was within the ambient design conditions for the facility such that, you know, really this wasn't affecting any of the other units in the plant?

MR. SAUNDERS: Yes, that's correct. It wasn't that the lake temperature was particularly high, it's about where it normally is in the summer. In fact, this year it is a little bit cooler than most summers. The issue here was we had part of the cooling circuit out of service for maintenance and so we couldn't control the moderator temperature without reducing power.

THE PRESIDENT: Okay. So I was curious about that statement from staff. Does the lake temperature really have any impact on operation normally?

MR. SAUNDERS: Yes, it really can. The biggest impact normally comes, though, on the condenser. We have a Delta T limit with the province about how much heat we can put back out into the lake and in a summer where the lake temperature gets very warm we can approach that limit at times, but that's not really the case much --

THE PRESIDENT: So is it automatically adjusting or does it require human intervention here to adjust something?

MR. SAUNDERS: Now, we would reduce power to stay within the Delta T or we would get permission from the province to exceed the Delta T. It's really generally only a case of one or two days in the summer. Like say this year the lake temperatures have not really got to a point where it has been a challenge for us significantly. It can be more of a challenge actually if we are doing load following because in load following you put more steam straight through the condenser and less through the turbine, so you have more energy to get rid of and that can increase the outlet temperature. So it is something we monitor. It's in the control room, we can see it and so we adjust in advance. In fact, this is something we watch, you know, weeks in advance, we don't wait for it just to pop up, we are always prepared.

THE PRESIDENT: So I just am curious, do you observe now that there's more and more high temperatures by talking about climate change now? Is that something that you are seeing becoming more often?

MR. SAUNDERS: To be honest, no, not really, not yet anyway. Like say this year is kind of the opposite, this year the lake is a little cooler than normal. It is really very dependent on the summer and lake levels are high this year. Temperatures haven't been particularly high so you've got more water, lower temperatures.

So although the lake is certainly warmer in the summer than it is in the winter by a considerable margin, it's not the -- it's not excessive this year.

THE PRESIDENT: Mr. Seeley, I interrupted.

MEMBER SEELEY: No, thanks for that. I just thought maybe the information about the lake temperature was misleading. It was really within the design conditions and it was more about the moderator temperature controller.

I did have one other question and it was for Darlington on the worker heat stress incidents in the 2 vault this summer. So two events over the course of the summer, similar events, and I’m just curious what corrective conditions you put into the work processes to manage through that and see that it didn't continue to occur?

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

So the two events you are speaking about were around heat stress. They were with our contract partners during the refurbishment outage. The individuals were in plastic suits and experienced heat stress while working in plastic suits while they were unplugged from the source of supply air.

So part of what we've done is clearly an awareness aspect for all of our workers going into those working conditions. The other aspect, of course, is we set up some cooling tents nearby so if individuals feel the need that they are experiencing heat stress symptoms they will go into those cooling tents to cool themselves off.

Mostly it's around an awareness of the symptoms of heat stress which we are focusing on, so people that have that inclination or start to feel that way know exactly what to do and where they can go.

MEMBER SEELEY: Thank you.

THE PRESIDENT: Thank you.

Dr. Demeter...?

MEMBER DEMETER: Thank you. This is more of a request for follow up because it's an issue in progress.

The worker injured due to electric shock at Bruce and the reference to a previous worker injury in

February 2016, the preface to the electrical shock was that the root cause analysis showed it to be inappropriate work for behaviour, inadequate work protection and a misunderstanding between work authorization and work protection. And I can't recall whether one or both of the individuals were Bruce employees or contractors, and it talked about continued follow up.

I would be very interested to hear because there is potential significance here. It's injury to -- the electrical injury anyway -- interested for continued follow up on this matter to ensure that it's not a more systemic issue, this concern with that one individual taking a number of human behaviour misappropriate actions resulting in a serious injury.

So I just wanted to make sure we had some follow up in the future on where this is going.

MR. FRAPPIER: Gerry Frappier for the record.

Certainly, we have been looking at this. And, as you mentioned, it was a root cause analysis that was done at Bruce that we have reviewed, did show a lot of what I would call procedural lapses, if you like, or perhaps training lapses. And so they have taken some lapses to look at improving that.

Perhaps, if you will, our inspector, Jeff Stevenson who is here, could explain a little bit more about what if any follow up we have been planning on so then we can see if that's sufficient for yourself.

So Jeff, if you could give us a bit of a heads up on that?

MR. STEVENSON: Thank you. Jeff Stevenson, Power Reactor Site Inspector for the record.

So as you noted, there were two separate events. Both had different root causes for the events. So really what CNSC staff is asking for is to look at the conventional safety program as a whole to see if there are any common -- any issues that may not be resulting in serious injuries but lower-level injuries that can prevent, so that they can take corrective actions to prevent these major incidents from happening.

MEMBER DEMETER: Just to confirm were both these injuries to Bruce Power employees or were they contractors?

MR. STEVENSON: Jeff Stevenson for the record.

Yes, both of those employees were -- sorry. Jeff Stevenson for the record.

MEMBER DEMETER: Okay. So it's a level of concern given the degree of injury that -- especially if they are not -- you have less controls for the amount of contractors. You have to train them. They still have to be -- meet all their requirements, but if they are onsite employees this is a bit of a concerning incident.

Thank you.

MR. SAUNDERS: Frank Saunders. I should actually correct that there was one of each there, one Bruce Power employee, one contractor. They were both working under our supervision, though. They weren't working on -- they weren't working on a construction project or anything were different supervision. So in effect, as far as we are concerned, we treat them like both Bruce Power employees,

THE PRESIDENT: Thank you.

Back to the top of the list, Dr. McEwan?

MEMBER McEWAN: Thank you, Mr. President.

This is a question for Pickering on the oil spill. It's really a very simple question. The oil leaked out through a drain that had been inadvertently left open. How easy is it to inadvertently leave that drain open and what procedures or processes do you have that that shouldn't happen?

MS SMITH: Good morning. I's Stephanie

Smith, Director of Operations and Maintenance for Pickering.

All the floor drains on that elevation are normally closed. This one should have been closed. It appears that somebody went and we're not sure why, and opened up the drain. So the people that were doing the draining of the heat exchanger did not immediately know that the drain was open. So we do have operators now that go daily and check and make sure that all the drains are sealed.

THE PRESIDENT: Just to add some follow up on this one, did any of the oil leak to the lake?

MS SMITH: Once again, Stephanie Smith for the record.

We did emit some oil from the lake. There was a little bit that could be seen on the surface. We did call the contractor in. All notifications were made to the Ministry of the Environment and it was low safety significance and low impact to the environment.

THE PRESIDENT: Dr. Solomon.

MEMBER SOLIMAN: I have a generic question that maybe it would be best answered by the staff.

I noticed lately that there is some accident or incident happened due to malfunction of electric equipment. And my question is if there is any in-service program to check during outage to check all of this equipment like fuses, circuit breakers and keep an active database in order to maybe repair them or change them so we can avoid in the future any malfunction of this equipment, and some of them leads to shutdown of the reactor?

MR. FRAPPIER: Gerry Frappier for the record.

So generally speaking, maintenance and certainly any equipment failures is something that we're interested in and we do have a program where we have some general oversight, I would say, but much more interested in it is the licensees themselves because as you mentioned, it can trip the reactors. So there is quite an operational thing.

We ensure that each one of the licensees has a program that we feel is adequate. Certainly that can differentiate between maintenance issues that would start looking like something that would be of a safety concern to us, so critical maintenance versus others.

As far as the specifics of databases and keeping the databases, we do not. We have a very simple one, if you like. We do get reports on a regular basis that's required from industry. The actual database on failure rates and reliability of equipment and that is -- industry maintains those.

And if you want more I'm sure that Bruce or OPG or any of them could answer as to how they are doing that.

MEMBER SOLIMAN: I would like to -- maybe it is better to understand for each utility if there is in-service program to check the electric equipment and the database and active database in order to change this equipment. So maybe we will start with Bruce.

MR. SAUNDERS: Yeah, there is of course significant monitoring programs that are in place, always have been in place to monitor equipment performance.

We also have initiated over the last several years now what we call asset management program given that the plants are at that age where you are starting to see equipment nearing the end of its original intended life. So you need to have a replacement program. So at Bruce we use the asset management Program to actually plan out all those replacements over the next 10 years or so, and we are continually monitoring to make sure that when our assessment of when the equipment needs to be replaced is accurate.

So there is a very healthy program there. That whole program was actually part of our licence submission for the licence, come next year, and it's been reviewed by CNSC. We are finding it very effective. That's not to say that every estimate you make is going to be exactly correct, but you don't rely on your prediction entirely. You make your prediction based on what you know and then you continue to monitor and if you see deterioration then you change your plans to deal with the equipment.

Our electrical equipment we have been replacing significantly over the last while, including the switchyards. So you know at Bruce A most of the large transformers will already have been replaced. Much of the switch gear has been replaced and these things continue to go. Like I say, there is a very detailed schedule about when we are going to do it all.

We needed to do that for a variety of reasons but, you know, we needed to make sure that we had the resources and the money lined up to do all this work and the equipment sorted in advance and we can get it in when we need it.

So yes, for sure, electrical is kind of our life blood at the end of the day so, yeah, we're paying attention, absolutely.

MEMBER SOLIMAN: Darlington, the same?

MR. KHANSAHEB: Yeah. So Zar Khansaheb for the record.

And very much the same from Bruce Power, we have our -- of course our safety-related system testing program which is that very comprehensive program for all our safety-related systems which test the functionality at various intervals, as demanded by the probabilistic safety evaluations and analysis.

Second, of course, is our preventative maintenance program where we do again check at various frequencies a number of the components as part of that and do the replacements as necessary.

And very much like Bruce Power, the aging management and life cycle programs that we have. So it's a very comprehensive policy, a three-pronged approach that we have.

MEMBER SOLIMAN: This is the same applicable for Pickering, yeah?

MR. KHANSAHEB: I'm sorry?

MS SMITH: Stephanie Smith. Yes, it is very -- the program that exists at Darlington is the same program that exists at Pickering.

MEMBER SOLIMAN: And we keep active database in order to change this faulty equipment or whatever during the outage.

MR. KHANSAHEB: It's Zar Khansaheb, for the record.

Yes, that is correct. So it's various databases that are kept, but the program is comprehensive to tie them all together.

MEMBER SOLIMAN: Thank you.

THE PRESIDENT: I assume, Staff, by the way, that you -- all those equipment have a shelf life. They have maintenance protocol and you're keeping track of this and you will start giving us more and more of these data indicators in the future; right?

MR. FRAPPIER: Gerry Frappier, for the record.

That's correct. As I mentioned, we're certainly interested in some of the overall maintenance and certainly ones that have safety significance.

Those have some requirements with respect to reliability, so (a) they're always redundant, and there's reliability requirements on them -- on the components themselves, if you like.

So as Darlington was explaining, those are a special group of maintenance that we pay more attention to that we can -- we have our own OpEx on, but most importantly, as the President's alluding to, there's a reporting requirement for industry to report on the reliability of that equipment to make sure it fits within what the design has said was required to ensure that we have the risks captured in the proper way.

If those numbers were to change, then we would see that fairly quickly and we would take action to ensure industry looked at it and fixed it.

With respect to reporting it, it's always a difficult thing to report. There's a lot of data.

The annual report is the place that we report it to the Commission, so we're going to be doing that after this session. And if we've got it right, great. If there's information that we should be adding to make sure that on an annual basis you're brought up to date, then we can make those adjustments.

THE PRESIDENT: Okay. NB Power, do you want to add anything to this? I assume you have the same kind of protocols in place.

MR. HARE: Yeah, that's correct.

It's Michael Hare, for the record. I'm station director at Point Lepreau.

We follow the same process and concepts as both Bruce and OPG for our PIM system. Nothing more to add to what they already said.

THE PRESIDENT: Thank you.

Mr. Seeley.

Dr. Demeter.

MEMBER DEMETER: Just a question related to Pickering being at one trip. So the cause of the failure's been identified to be a problem with the fuses, plural, for the control circuits for these three valves.

Is there more systems, or maybe to Staff, a more systems issue with these fuses? Did we have to go back and check different fuses beyond these -- this particular component as more than one went?

MR. FRAPPIER: Gerry Frappier.

I think from a staff's perspective, we don't have anything that's showing a trending data, but it is something we're talking a little bit about. But I think perhaps Pickering -- OPG Pickering will be in a better place to answer whether they're seeing some kind of a trend here, if that's what your question was, around as to having more and more of these kind of failures.

MEMBER DEMETER: Yeah, I was more concerned about the particular component. If this particular fuse went and they replaced the fuses and I think that would solve the problem, as I understand the text, so are these fuses used elsewhere and has there been a system to check whether they're in compliance with this -- with the performance?

MS SMITH: So it's Stephanie Smith, for the record.

Yes, these fuses are used throughout the power plant. We did go and look at other fuses of a similar type in similar panels. The only issues that we found were within this panel.

The panel itself has two sides, and so part of our investigation is trying to determine was there some sort of a bump or something that happened in that area to cause these fuse failures in that location only.

MEMBER DEMETER: Thank you.

THE PRESIDENT: Thank you.

Dr. McEwan.

MEMBER McEWAN: So this is really just to confirm that staff are happy with Gentilly-2, the process that's been made, and that we can really close as requested?

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

Yes, the -- the short answer is yes. I think at the -- at a previous meeting, there was some discussion around whether, as they've now closed the plant, the workforce that they had, whether the training and the ability to operate the minimal operations that they did have to continue doing, whether they were appropriately trained because they were bringing in maintenance folks for that.

There's been several discussions with Hydro Quebec, and they can certainly provide more information. But from a Staff perspective, we think they have a good program that they have now switched back to taking in some folks who were previously operators and give them a bit more maintenance training instead of maintenance trying to give them operating training, so we think they have the balance right and we certainly have not seen any events of any kind that would suggest, you know, that there's -- there's a problem there.

LE PRÉSIDENT : Hydro-Québec, avez-vous des commentaires?

Hydro-Québec?

M. OLIVIER : Donald Olivier pour le verbatim.

Le seul commentaire, c'est que tout va

bien. On suit le plan; donc, les travaux se déroulent bien. L'autonomie de l'équipe de maintenance a été atteinte. On a effectivement ajouté certains postes pour compléter l'équipe, et puis le plan se déroule comme prévu. Merci.

LE PRÉSIDENT : Merci.

Dr. Soliman? No.

Mr. Seeley? Dr. Demeter?

Point Lepreau, I notice Staff are talking about that the units were shut down August the 4th, but I didn't get any feel as to the why, or root cause.

Any comment?

MR. HARE: Micheal Hare, for the record.

The unit did shut down. We had a gas relay issue on a unit transformer, so it was an equipment issue. We safely shut the plant down without any human performance issues. We've replaced the faulty piece of equipment.

We're currently doing an extent of condition. We did do checks while we were down on the other phases of that unit transformer to make sure those gas relays were operating effectively. We are following up with our corrective action program to see if there were any other issues with the gas relay.

The unit was returned to service approximately 65 hours later, with no issues at all, both human or equipment related.

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

MR. FRAPPIER: Yeah. I think as was mentioned, that's what occurred.

I think what I would add is, again, just for clarity to make sure everybody understands that transformer gas protection is not a nuclear safety system as such. It's in the electrical side of the house in the power, so we're talking about protect -- the protecting that it's doing is more about the transformer and some of the electrical equipment, not necessarily the -- or not at all the nuclear core.

So we're quite satisfied that they've done the investigation they need and there's nothing more they need from us.

THE PRESIDENT: Thank you.

My last question is for Darlington on the moderator spill in Unit 4.

Any time you talk to me, at least, on shutdown system, I get concerned. Just -- and particularly where there's a procedural step was missed. That sounds ominous.

Just tell me that there's no relation with your procedural misstep to the shutdown system.

MR. KHANSAHEB: It's Zar Khansaheb, for the record.

The procedure that they were doing was doing a sampling for the shutdown system to -- liquid injection shutdown system, the dousing tanks, so they were doing a sampling of that tank. And the procedural step that was missed was, as part of that sampling procedure, a vent valve was left open in advertently. And during the recirculation of that tank to sample it is when the water was released from that vent valve.

So it wasn't specifically to do with SDS 2. It was specific to a sampling tank within that particular part of the system.

So SDS 2 remained fully available during that time, as it does at all times when we do that.

THE PRESIDENT: Thank you.

Any further comment, observation?

Okay, thank you. Thank you very much.

So we'll move on to the next item on the agenda is the 2016 Regulatory Oversight Report for the Canadian Nuclear Power Plants as outlined in CMD 17-M15, 17-M15.A and 17-M15.B.

Again, we have a representative from the licensees, OPG, NB Power, Bruce Power, and Health Canada also in attendance, and also I understand Mr. Morton of the Office of the Fire Marshal and Emergency Management is here.

So thank you all for attending. And I will turn now the floor to CNSC staff.

Mr. Frappier, you still have the floor.

CMD 17-M15/17-M15.A/17-M15.B

Presentation from CNSC staff

MR. FRAPPIER: Thank you very much. And again, good morning, Mr. President and Members of the Commission.

For the record, my name is Gerry Frappier, and I'm the Director-General of the Directorate of Power Reactor Regulation.

Today I have the pleasure to present for information the 2016 edition of the Regulatory Oversight Report for Canadian Nuclear Power Plants. The report, which hereafter we'll refer to as the NPP Report, summarizes the regulatory oversight and safety performance of Canadian nuclear power plants.

Also, a supplemental CMD, 17-M15.A, has been submitted by Staff providing status of actions from the Commission which have been addressed. That's something a bit new that was requested that, over the year, the Commission has asked us to do different things that we keep referring we'll come back to the -- will be part of the annual report, and so this supplemental CMD tries to put that all into table format for easy -- ease of reference.

The Nuclear Power Plant Report will be presented by management team and staff from the Directorate of Power Reactor Regulation. They are assisted by directors from the technical support branch and staff from that branch who are available to answer any technical questions the Commission may have.

In addition, we have representatives from the licensees who are also present to participate in the meeting and provide additional information, but we would need the presentation on there.

Great.

Following an introduction that includes important background information, today's presentation will provide safety performance highlights of the nuclear power industry as a whole in 2016 and describe major regulatory developments.

The presentation will continue with details regarding the safety performance and regulatory developments of individual NPPs, and I will then conclude with some general remarks.

The Regulatory Oversight Report for Canadian Nuclear Power Plants: 2016 is the first in a suite of regulatory oversight reports that the Commission will receive, and they will be presented to the Commission in the coming months. In the past, this suite of reports has included a regulatory oversight report on waste management, storage, and processing. The most recent report was for the year 2015 and was presented to the Commission in December of 2016.

There will be no regulatory oversight report for that area this year; however, waste management facilities associated with the NPPs will be covered in the regulatory oversight report for NPPs starting next year and 2017.

Moving to an introduction. In this introduction we'll provide you with some background information that is relevant to the NPP report as well as some context for the industry and station-specific highlights that follow in the rest of the presentation.

There are four operating NPPs in Canada. These include three multiple-unit plants in Ontario and one single-unit plant in New Brunswick. These four NPPs have operating licences for a total of 21 reactors, and 19 of these reactors were operating during most of 2016. Units 2 and 3 at Pickering have been defueled since 2008 and continue to be in the safe storage state. Darlington unit 2 was shut down in October of 2016 and is the first unit at Darlington that will be refurbished, and that work is ongoing.

I will now pass the presentation over to Ms Kim Campbell.

MS CAMPBELL: Thank you, Mr. Frappier. And good morning Mr. President and Members of the Commission.

For the record, my name is Kim Campbell. I am the director of the Power Reactor Licensing and Compliance Integration Division.

I will provide a background on the Compliance Verification Program for NPPs and the public comment process conducted earlier this summer.

CNSC Compliance Verification Program uses a risk-informed and performance-based approach to verify that each NPP maintains compliance with all regulatory requirements in the Regulations and the operating licences. The program generates the results that form the basis of the safety performance ratings presented in the 2016 NPP report.

The Compliance Verification Program is composed of many activities that include surveillance and monitoring, inspections, and desktop reviews. CNSC inspectors track all licensee corrective actions until closure and verify closure through follow-up activities. In 2016, CNSC staff conducted a wide variety of inspections and submitted the results to licensees in a total of 90 inspection reports. These inspection reports are listed for the first time in the NPP report in Appendix H.

NPP licensees reported to CNSC staff on 248 events in 2016, and CNSC staff followed up on licensee corrective actions related to these events. The licensees also submitted 78 scheduled reports or periodic operating performance reports to the CNSC. In all, 1,079 findings were derived from CNSC's document reviews and inspections and each of these were assessed by CNSC specialists for the purpose of the 2016 NPP report.

This slide indicates the amount of effort in person-days required from CNSC inspectors and specialists to deliver compliance verification activities in 2016. These activities represent over 16,400 person-days of effort by over 200 CNSC staff. The largest category of work, Other Compliance Activities, includes station walk-downs, surveillance, desktop reviews of licensee submissions.

In 2016 under the *Auditor General Act*, the Commissioner of the Environment and Sustainable Development conducted an audit of the CNSC site inspection of NPPs. The objective of the audit was to determine whether the CNSC had adequately managed its site inspections of nuclear power plants to verify that the environment and the health, safety, and security of Canadians were protected.

The audit found that when CNSC inspectors identified issues during an NPP site inspection, they followed up with the licensee a hundred percent of the time to ensure compliance. However, the report made five recommendations for improving the documentation of the NPP site inspection program. As you can see, all the recommendations have been addressed and the CNSC considers the audit closed.

This slide highlights the elements that addressed the audit findings and are now integrated in the CNSC's approved management system. The management system now stipulates that all compliance verification activities are to be completed using only formally approved procedures and tools.

There are now established, clear criteria for staff to use when determining when to conduct specific types of compliance verification activities.

The management system now includes clear guidance for retention of records collected during compliance verification activities. It also establishes a clear process to develop our annual compliance verification plan for the risk-informed power reactor regulatory program.

And finally, the management system sets out how CNSC determines the number and level of site inspectors required to carry out our scheduled compliance verification activities using a resource allocation model in combination with risk analysis.

A summary of the NPP report was posted on the CNSC website with an invitation for comments on the report from the public and indigenous groups. The posting was announced on the CNSC website through social media and through the CNSC email distribution list.

In February of this year, the CNSC issued a notice of participant funding to three applications for participant funding which were approved by the Funding

Review Committee. Independent Funding Review Committee awarded $33,362 through the Participant Funding Program to three recipients for participation in today's meeting. As a result of the posting, seven interventions were received in total, three from the funded participants and four from other intervenors.

This slide details some of the CNSC responses to intervenor comments that were received through the public comment process. The CNSC has decided to make alterations to this year's ROR based on some intervenor comments regarding more inclusive wording to include all Indigenous peoples when referencing the public throughout the document. In addition, there were many thoughtful and well-informed recommendations in some interventions that the CNSC would like to explore further for possible inclusion future regulatory oversight reports, with several examples listed on this slide.

At the end of this presentation, CNSC staff have provided a table that summarizes the main points raised in these interventions and CNSC staff's responses to the comments and suggestions provided by the intervenors.

I will now pass the presentation over to Mr. Gracie.

MR. GRACIE: Thank you, Ms Campbell. And good morning Mr. President and Members of the Commission.

For the record, my name is Brian Gracie and I'm a regulatory program officer in the Power Reactor Licensing and Compliance Integration Division.

As summarized on this slide, CNSC staff have made the following general observations with respect to the safety performance of NPPs in 2016. There were no process failures of operating systems at any NPP that could have potentially challenged protective barriers. There were no events at NPPs that would have necessitated reporting to the IAEA and none were classified as being above the International Nuclear Event Scale, or INES, level zero.

No member of the Canadian public received a radiation dose above the regulatory limit of 1 millisievert per year. There were no exposures of nuclear energy workers at Canadian NPPs above the regulatory dose limit of 50 millisieverts per year. There were no radiological releases from NPPs to the environment above the annual regulatory limits.

In the area of conventional health and safety, the frequency and severity of injuries and accidents involving workers were very low.

And finally, all licensees complied with their licence conditions that address their nuclear security programs as well as Canada's international obligations regarding the peaceful use of nuclear energy.

Next we have a tabulation of all of the ratings for the safety and control areas, or SCAs, and the integrated plant ratings, or IPRs, for the NPPs and the industry as a whole. Regarding overall NPP safety performance, the integrated plant ratings were fully satisfactory for Bruce A, Darlington, and Pickering, and satisfactory for Bruce B and Point Lepreau.

At the SCA level, there were no ratings of below expectations or unacceptable, which was also the case for 2015. There were 19 SCA ratings of fully satisfactory which was also the same as in the 2015 NPP report.

The NPP report provides safety performance comparisons between the Canadian NPPs, and some of these involve comparisons with international organizations. This slide shows the number of unplanned reactor trips, which are undesirable and unplanned power transients that cause automatic reactor shutdown by special safety systems. This parameter can be an indicator of how well an NPP is operated and maintained. The number of unplanned reactor trips for the Canadian NPPs is shown in purple on comparison to values published by the World Association of

Nuclear Operators, or WANO, in blue.

Also shown as a red line is WANO's target of 0.5 unplanned reactor trips per 7,000 hours of reactor operation. Seven thousand hours is the number of hours that a reactor would typically operate in an average year. The target of 0.5 applies to boiling water reactors, pressurized water reactors and light water cooled graphite-moderated reactors.

For pressurized heavy water reactors, or PHWRs, of which the CANDU reactors and Canadian NPPs are subset, the WANO target is actually larger at one unplanned reactor trip per 7,000 hours. Canadian NPPs compare very well with both those targets.

Note that WANO no longer publishes its data for unplanned reactor trips in the same format as in previous years. For 2016 it only published percentages of reactors that met targets instead of publishing actual data. Therefore, a comparison with actual WANO data for 2016 is not shown.

We would also like to report that the data related to unplanned reactor trips in the NPP report contained an error. The number of hours of operation for 2016 for Point Lepreau in Table 5 in the report should have been 7,241 and not 26,339. Because Point Lepreau is only one of 19 operating reactors in Canada, it did not make a very large difference in the results. However, the graph on this slide that you see is noticeably different from the one in Figure 3 of the CMD itself. Table 5 and Figure 3 will be corrected when the NPP report is published.

This slide shows the annual dose to the public resulting from airborne emissions and liquid releases. Because the doses are very low, we have used a logarithmic scale. The five-year trend at each NPP continues to be consistently very low. Overall, the radioactive releases from Canadian NPPs results in a public dose that is about 1,000 times lower than the 1 millisievert public dose limit, which is shown by the red line.

This data confirms that Canadian licensees programs continue to be effective in protecting the public and the environment from radiological releases.

NPP licensees monitor the occupational doses received by workers. This graph shows the five-year trend in multicoloured bars for annual dose distribution among all workers at Canadian NPPs. More than three-quarters of Canadian NPP workers received an occupational radiation dose below the minimum reportable level.

The bars on the graph at this lowest of dose levels indicates that the number of workers in this category continue to rise during 2016. A total of 86 per cent of the workers received less than 1 millisievert, which is actually the limit for members of the general public.

In addition, during 2016 no worker among the approximately 29,000 monitored received a dose exceeding the occupational dose limit of 50 millisieverts indicated in red.

This data indicates the continued overall effectiveness of the licensees' radiation protection programs in protecting workers in general and limiting the number of workers in the higher allowable dose ranges.

Industrial safety accident rate is the number of lost time injuries per 200,000 person hours worked at the NPP, excluding contractors. The purple data in the graph shows that the rate has remained steady at Canadian NPPs in recent years. It also shows how the rate was significantly lower than average values published by WANO, indicating that Canadian NPPs have a good overall safety record in this area.

Note that WANO no longer publishes its data for industrial safety accident rate in the same format, providing percentages of reactors that met targets instead of publishing actual data.

Also in 2016 WANO started publishing data that includes contractors. Therefore, a comparison with WANO data for 2016 is not shown.

WANO's collective target for industry in 2016 was 0.2 and its target for individual NPPs was 0.5. The 2016 data for Canadian NPPs, individually and collectively, are well both below those WANO targets.

The final graph for this section is for accident frequency, which is the number of disabling injuries per 200,000 person hours worked at an NPP. A disabling injury is one that prevents an employee from reporting for work or from effectively performing all the duties connected with employees' regular work.

In 2016 the overall accident frequency for Canadian NPPs remained significantly lower than that of many other industries in Ontario and New Brunswick, and lower than that for the CNSC itself.

The data for WorkSafe BC is not yet available. A comparison with other parts of the energy sector for 2016 was not possible because the Canadian Electricity Association stopped publishing comparable data for occupational safety in 2014.

The next few slides describe the major regulatory developments that are applicable to the NPPs as a whole. I'll begin with a few highlights related to periodic safety review, or PSR, which is being integrated with licence renewal of NPPs.

Periodic safety review is a systematic safety assessment of the design, condition, and operation of an NPP against modern codes, standards and practices. It results in the identification of practicable safety improvements that can be executed over the course of a licence period.

Periodic safety review has now been effectively introduced at all NPPs in Canada and the CNSC is using its updated requirements in REGDOC-2.3.3, Periodic Safety Reviews.

In brief, CNSC Staff is reviewing Bruce Power's PSR submissions which are linked to its next licence renewal. Although the current operating licence for Bruce expires in 2020, Bruce Power recently submitted its application for its next licence to commence in 2018 to better coincide with reactor refurbishment at Bruce.

OPG conducted an integrated safety review, which is an initial periodic safety review, in support of the refurbishment of Darlington and prior to renewal of its operating licence in 2015.

OPG is conducting a periodic safety review to support the extended operation of Pickering Units 1, 4, and 5 to 8 beyond 2020 in conjunction with preparations for its next licence period expected to take effect in 2018.

The Commission renewed the power reactor operating licence for Point Lepreau for a period from July 1st, 2017 to June 30th, 2022. NB Power has already begun work on a periodic safety review which would support the renewal of its next licence expected to take effect in 2022.

Licence renewal establishes which particular set of regulatory documents and standards will be included in the licensing basis for an NPP. The NPP report describes the implementation of numerous updated and new regulatory documents and standards at each of the NPPs. Two examples are shown on the slide.

Although many of these implementation plans are initiated in conjunction with licence renewal, licensees also develop implementation plans for new and updated regulatory documents and standards during the licence periods, that is between renewals.

Licence condition handbooks, or LCHs, are maintained for all NPPs. They describe, among other things, the compliance verification criteria that CNSC Staff use to assess licensee compliance with each condition in the operating licence. These criteria include details of implementation plans for new and updated regulatory documents and standards. These licence condition handbooks are regularly updated during the course of the licence period as requirements, circumstances, and knowledge evolve.

For example, NPP licence condition handbooks have been augmented by the inclusion of compliance verification criteria related to the topic of cyber security.

In addition to various projects that involved updates to licensee programs to meet the latest updates of requirements the licensees have other specific projects including those to address issues related to the extended operation of their NPPs.

As an example, Bruce Power and OPG cooperate on the fuel channel life management project, which comprises research activities to study and quantify key areas of fuel channel behaviour that may impact ongoing reactor operation beyond the originally predicated operational life. Both licensees are making use of new understanding of pressure tube fracture resistance that demonstrate their safe operation.

Licensees are now examining tight-fitting spacers which separate the pressure tube from the calandria tube in each fuel channel to demonstrate future fitness for service.

CNSC Staff are satisfied with recent progress and will continue to monitor additional work that will be necessary to confirm safe pressure tube performance for later life conditions.

The licensees conduct various assessments of the safety aspects and performance of their plants. Among them is probabilistic safety assessment, or PSA, which is the comprehensive integrated assessment of NPP safety. It considers the probability, progression, and consequences of equipment failures or transient conditions to derive numerical estimates that provide a consistent measure of safety.

All NPPs previously developed probabilistic safety assessments to address the requirements in CNSC Regulatory Document S-294. CNSC has published updated probabilistic safety assessment requirements for NPPs in REGDOC-2.4.2.

NB Power is already compliant with REGDOC-2.4.2 and the other licensees are in the process of transitioning to it. Licensees are required to update their PSAs on a regular basis.

CNSC staff was satisfied with the updates it reviewed during 2016 and is also satisfied with the overall progress towards compliance with REGDOC-2.4.2.

The area of emergency management saw several noteworthy developments during 2016. At the provincial level, provinces continue to update plans for nuclear and radiological emergencies that integrate with municipal and federal emergency plans as well as the licensee's on-site emergency plans at each NPP.

In Ontario, the Office of the Fire Marshal and Emergency Management is working with stakeholders on a review of the planning basis for the Provincial Nuclear Emergency Response Plan referred to as the PNERP. The objective is to update the plan to reflect best practices, including new international recommended practices.

The province solicited stakeholder input on a planning basis discussion paper from May 15th to July 14th of this year. It is expected that the revised plan will be submitted for approval in December.

The New Brunswick Emergency Measures Organization is updating the New Brunswick Provincial Nuclear Emergency Response Off-site Plan to align with CSA standard N1600 titled: General Requirements for Nuclear Emergency Programs.

This update, expected to be completed in August, will also incorporate other national and international recommended best practices. The plan will be posted for the public.

NB Power is also updating the documentation of the technical planning basis that is used for the off-site plan.

Improvements at the emergency planning level are being complemented by technological enhancements that will also improve emergency management and response. For example, CNSC staff has conveyed its expectations to licensees related to systems that can share plant data with CNSC on a near real-time basis during emergencies.

CNSC staff accepted OPG's proposal to implement a new system by September, 2017 and NB Power's proposal to implement its system by April, 2018.

Bruce Power currently shares data

manually. Bruce Power committed to begin implementation of its dLAN data-sharing application in 2017. This is discussed more in the Bruce part of the presentation.

In another development, OPG is upgrading emergency radio communication systems at Darlington and Pickering to ensure interoperability with those used by firefighters and police in the Regional Municipality of Durham who support OPG's on-site fire response and security teams.

Commissioning of the new radio system is planned for the end of 2017 and CNSC staff is satisfied with the progress to date.

In addition to the improvements that have been noted, the licensees and CNSC continue to conduct and evaluate emergency drills and exercises. Exercise Huron Challenge was conducted in 2016 and will be described in the Bruce part of the presentation.

Future emergency exercises include one for Pickering in December, 2017 and one for Point Lepreau in 2018.

The NPP Report provides information on the efforts of both the CNSC and NPP licensees to engage Indigenous groups on matters related to their activities. The NPP licensees have dedicated engagement programs to sustain and enhance relations with Indigenous groups.

Some of the licensees' information-sharing events that occurred during the reporting period are listed on this slide.

For its part, the CNSC regularly communicates with First Nations and Métis groups and organizations. A key area is to share results and raise awareness of CNSC's independent environmental monitoring program. CNSC staff also set up an information booth at the General Assembly of the Métis Nation of Ontario in 2016.

This concludes the industry safety performance section. We'll now present a summary for each NPP consisting of safety performance ratings and safety performance highlights and regulatory developments.

The safety performance highlights include both good practices and areas of regulatory focus. The regulatory developments include some details on major projects and initiatives.

I'll now pass the presentation to Dr.

Sanja Simic to begin with the NPP at Bruce.

DR. SIMIC: Thank you, Mr. Gracie. And good morning Mr. President and Members of the Commission.

For the record, my name is Sanja Simic and I'm the Acting Director of the Bruce Regulatory Program Division.

Bruce Power is licensed to operate the Bruce A and B nuclear power plants, each located on the shores of Lake Huron. Both plants consist of four CANDU units each. The Bruce site is the world's largest operating nuclear power facility in terms of output.

In 2016 all eight units were operational at Bruce A and B. In May, 2015 the Commission renewed the Bruce A and Bruce B licences as a single operating licence. The new licence is for a five-year period and will expire in 2020 but, as mentioned already, Bruce Power is planning for an earlier application for licence renewal.

To support the major component replacement outages that will be part of the refurbishment project, Bruce Power has submitted an application to renew its operating licence in 2018 for a period of 10 years.

There was an event at Bruce in 2016 that was reported to the Commission in the form of an event initial report. At Unit 8, in February, 2016 a worker doing maintenance on the generator rotor was drilling a hole when a flash occurred due to hydrogen interaction. The worker suffered burns to his arms, chest and face and was promptly transported to hospital. The Ontario Ministry of Labour investigated the event and filed charges against Bruce Power.

CNSC staff conducted its own reactive inspection and followed up to confirm the added perceived corrective action. This event and the findings from CNSC follow-up activities are described further on a subsequent slide under the discussion of the SCA Conventional Health and Safety.

The safety performance ratings in the NPP Report took into consideration events and non-compliant findings from compliance verification activities, but also considered follow up to them and the compliant findings that were identified during 2016. This table shows the 2016 safety performance ratings for the safety and control areas for both Bruce A and Bruce B. Any change in ratings for the

SCAs will be discussed in the relevant sections over the next few slides.

The net result in terms of the integrated plant ratings were fully satisfactory for Bruce A, but a decline from fully satisfactory to satisfactory in 2016 for Bruce B. For a detailed example of how these ratings are calculated and how even a small change in the underlying numbers can affect the plant rating, refer Appendix B.

A number of positive highlights are described in the NPP Report for Bruce. First, the SCA operating performance was again a highlight as Bruce Power continued to operate the site in a manner that met or exceeded the CNSC's requirements. There were no unplanned trips at either Bruce A or B in 2016 and the management of station outages was safe and effective.

As just noted, the SCA rating for safety analysis increased to fully satisfactory in 2016. CNSC staff concluded that Bruce A and B met or exceeded the relevant regulatory requirements while transitioning to updated requirements. Bruce Power has an effective, well managed deterministic safety analysis program in the outputs. For example, calculations of safety margins and predictions of the consequences of postulated accidents give confidence that the overall design is robust in terms of safety.

Bruce Power has implemented REGDOC-2.4.1, deterministic safety analysis in a phased manner using the graded approach. While current probabilistic safety assessments meet existing requirements in Regulatory Document S-294, Probabilistic Safety Assessment for Nuclear Power Plants, Bruce Power is also transitioning to REGDOC-2.4.2 which has the same title by June 30th, 2019.

Finally, Bruce Power updated its criticality safety program in 2016 and CNSC staff found the program was compliant with CNSC Regulatory Document RD-327, Nuclear Criticality Safety.

The results of CNSC's assessment of radiation protection at Bruce was also positive. Bruce Power has implemented a highly effective ALARA program, where ALARA means as low as reasonably achievable. CNSC staff observed that Bruce sets and achieves planned radiation protection goals and that the trends in results tended to be positive. There were no safety significant unplanned exposures to workers.

Although the average and maximum individual dose for workers was higher in 2016, this was attributed to the type and scope of work being conducted rather than program performance. It was also noted that the estimated dose to the public from operations at Bruce was significantly lower than in 2015.

The Bruce Power Nuclear Waste Management Program met or exceeded regulatory requirements at both Bruce A and B in 2016. All radioactive waste was disposed of properly and in accordance with regulatory requirements.

Bruce Power continued to exceed regulatory requirements for conventional health and safety at Bruce A as the rating remained at fully satisfactory in 2016. However, CNSC staff did have a specific focus on this SCA at Bruce B where the rating decreased to satisfactory.

CNSC staff conducted a reactive inspection related to the event involving the worker who received burns. CNSC staff found Bruce Power to be non-compliant with the requirement in CSA standard N286-05, Management System Requirements for Nuclear

Power Plants, that requires the licensee to ensure that workplace hazards are evaluated, controlled and the consequences of exposure to personnel are minimized.

CNSC's follow-up determined that Bruce Power's corrective actions designed to prevent recurrence of such an event were appropriate and properly implemented.

In the bigger picture, the accident severity rate and accident frequency at Bruce A and B were both acceptable and similar to the other NPPs. As suggested earlier, the accident frequency rate at Bruce in 2016 compared favourably with similar industries.

The ratings for security changed from fully satisfactory to satisfactory from 2015 to 2016. CNSC staff determined the licensee continues to meet regulatory requirements but did not demonstrate exceedance of regulatory expectations as in previous years, leading to the change.

I will now switch to the topic of major projects and regulatory initiatives for Bruce A and B.

As noted briefly already, Bruce Power conducted various activities for its periodic safety review that will support the major component replacement outages and the next licence renewal for Bruce A and Bruce B. The main PSR outputs are the safety factor reports, the global assessment report and the integrated implementation plan. CNSC staff are currently reviewing these results and will present them to the Commission during proceedings for licence renewal of Bruce A and B.

Bruce Power completed the implementation of the Environmental Assessment Follow-up Program related to the earlier refurbishment project for Units 1 and 2. While there is still a question about the threshold use for a deepwater sculpin, the program has shown that there were no significant adverse environmental effects as a result of the refurbishment.

A review of the Final Monitoring Program Report by CNSC and Environment and Climate Change Canada concluded that the refurbishment had no significant adverse environmental effects. However, discussions, including face-to-face meetings, have continued with indigenous groups on fish impingement and entrainment-related matters.

A technical workshop was conducted in May 2017 with Saugeen Ojibway Nation. As a result of this workshop, a report outlining a proposed path forward for resolving each of the outstanding categories of issues is being prepared by an independent facilitator. Also, the

CNSC hosted the Lake Huron/Saugeen Watershed Workshop in June 2017 for the exchange of information on aquatic and fish-related matters. Participants included industry, government regulators, including CNSC, indigenous groups, researchers and other interested parties. Going forward, CNSC staff will continue to engage with local indigenous groups regarding their concerns on a one-on-one basis.

This last slide on major projects and regulatory initiatives for Bruce is related to developments in environmental protection and emergency preparedness. In 2015 Bruce Power assessed the need for an authorization from the Department of Fisheries and Oceans for impingement and entrainment of fish. Bruce Power submitted a draft authorization under section 35 of the *Fisheries Act* to CNSC in September 2016 and a revised and completed application in May 2017.

CNSC staff are reviewing the application and in June 2017 requested additional information from Bruce Power. CNSC staff have shared the application with interested indigenous groups. If CNSC determines that the application is complete, it will advise Bruce Power to submit it to Fisheries and Oceans Canada, with a copy provided to CNSC.

The emergency exercise Huron Resolve was conducted in 2016 over a five-day period. It tested Bruce Power's emergency response organization in a multi-unit accident scenario and involved over 30 organizations from all levels of government. It was an excellent test of measures that address a nuclear emergency that involved interactions among almost 500 participants.

During its inspection of the exercise, CNSC staff identified some opportunities for procedural improvements in the Emergency Operations Centre and identified expectations for an automatic data sharing system. In response to the inspection, Bruce Power committed to begin the implementation of its Disaster LAN system for incident management in 2017, as described earlier. However, CNSC staff have determined that this system may not meet their expectations for the level of data sharing during an accident scenario. CNSC is following up with Bruce Power to ensure the data sharing meets CNSC expectations, in particular data collected and posted without human intervention and at a 15-minute interval or less.

This concludes the summary for Bruce A and B and I will now pass the presentation over to Dr. Miguel Santini.

DR. SANTINI: Thank you, Dr. Simic, and good morning, Mr. President and Members of the Commission.

For the record, my name is Miguel Santini and I am the Director of the Darlington Regulatory Program Division.

The Darlington NPP operated by OPG is located in Clarington, Ontario, and consists of four units. All four units at Darlington were operational during 2016, but Unit 2 was shut down in October to begin a long outage for refurbishment. In December 2015 the Commission renewed the Darlington operating licence. With a new licence, the Commission authorized OPG to undertake the refurbishment and life extension of the four units. The Commission also authorized OPG to operate the four units beyond the 210,000 equivalent full power hours, up to a maximum of 235,000 equivalent full power hours, prior to a proposed refurbishment outage.

Besides the event at Bruce previously described by my colleague, only one other event that is relevant to NPP Reports was reported to the Commission as an Event Initial Report. It occurred at Darlington in 2017 but within the reporting timeframe for the part of the NPP Report where events are described.

In February, OPG surveyed four motors that were to be shipped to a vendor for repair and detected no external contamination. Upon arrival at the vendor's facility, one motor was disassembled without incident. However, tritiated water was spilled when the second motor was taken apart. OPG provided equipment and personnel to the contaminated facility. A qualified shipper sent the contaminated material and motors back to Darlington in accordance with packaging and transport requirements. OPG completed its investigation into the causes and used the results to confirm the corrective action that they had identified. CNSC staff is satisfied with the actions taken to date.

This table shows the 2016 safety performance ratings for the Safety and Control Areas for Darlington. Any changes in rating for the SCAs will be discussed in the relevant sections over the next few slides.

Overall, Darlington received an integrated planned rating of fully satisfactory in 2016. Darlington has received this rating consistently for the past nine years since the integrated plan rating was introduced.

A number of positive highlights are described in the NPP Report for Darlington.

First, the SCA's operating performance was again a highlight in 2016. OPG continued to operate

Darlington very safely and conduct the licensee's activities in a manner that made or exceeded CNSC requirements. The management of station outages was safe and effective.

Under SCA Safety Analysis, CNSC staff concluded that Darlington again met or exceeded the relevant regulatory requirements, while transitioning to updated requirements. Darlington has an effective, well-managed deterministic safety analysis program, and the outputs, such as predicted safety margin and consequences of postulated accidents, give confidence that the overall design is robust.

OPG is implementing REGDOC-2.4.1, Deterministic Safety Analysis, in a phased manner using a graded approach. While current PSAs meet existing requirements in regulatory document S-294, Probabilistic Safety Assessment (PSA) for Nuclear Power Plants, OPG is also transitioning to REGDOC-2.4.2, which has the same title, by 2020.

Under the SCA Radiation Protection, CNSC staff found that OPG has implemented a highly effective, well-documented and mature ALARA program. There were no safety-significant unplanned exposures to workers and the overall trend was positive. Doses to workers were below regulatory limits and below OPG's action levels. CNSC staff also noted that the estimated dose to the public from operations at Darlington was low, with no negative trends observed.

The results of CNSC's assessment of waste management at Darlington were also very positive. The Nuclear Waste Management Program continued to meet or exceed regulatory requirements in 2016. CNSC staff is satisfied -- is currently assessing OPG's latest submission of the preliminary decommissioning plan and financial guarantee for Darlington.

One area of CNSC staff focus at Darlington is that of conventional health and safety, where the rating decreased from fully satisfactory to satisfactory from 2015 to 2016. For example, CNSC staff observed non-compliances related to control and minimization of hazard related to confined space entry. Staff later confirmed that OPG's corrective actions were acceptable. CNSC staff identified other findings, such as those related to improperly stored equipment, transient material, personal protective equipment and scaffolding, and is monitoring OPG's corrective actions.

Another area of regulatory focus for CNSC staff is the interface between OPG's operating organization and the separate refurbishment organization as it relates to the safe operation of Darlington. These separate organizations require close coordination as they interface at various levels and share some common goals. For example, some deliverables in OPG's integrated implementation plan are managed by the operating organization and tracked by the refurbishment organization. Transfers of licensee staff from one organization to the other can help the receiving side, but transfers of experienced staff members to the refurbishment organization can impact the operational side. CNSC staff oversee these interactions in order to confirm that OPG's responsibility for safety is effectively discharged.

I will now switch to the topic of major projects and regulatory initiatives for Darlington.

The operating licence for Darlington includes licence conditions related to the refurbishment project. One of these conditions requires OPG to complete the Integrated Implementation Plan for the refurbishment which was approved by the Commission during the licence renewal proceedings in 2015. An important component of the plan is the follow-up program to the 2012 environmental assessment. This includes safety improvements that address potential conditions during beyond design basis accidents.

Other follow-up activities include aquatic sampling and a thermal monitoring plan for long-term operations.

A separate licence condition requires OPG to implement its return to service plan which details its control of the steps to confirm completion of the planned work. Another licence condition establishes regulatory hold points that must be satisfied before the CNSC can approve return to service of each unit. These hold points apply at distinct phases of the commissioning of the units as they prepare to return to operation and allow for verification that each unit meets regulatory requirements at each stage.

OPG began the refurbishment project with work beginning on Unit 2 in October 2016. CNSC's oversight, which includes specific compliance verification activity appropriate to the work being done, is progressing simultaneously.

This graph illustrates how CNSC's compliance verification effort will ramp up as the refurbishment project proceeds, reaching a maximum when as many as three reactors could be undergoing work simultaneously, according to the current plans. The maximum number of refurbishment-related inspections is anticipated to be greater than 30 per year. To put this in perspective, Appendix H of the NPP Report lists 29 CNSC inspections that were carried out at Darlington in 2016.

This concludes the summary for Darlington. I will now pass the presentation over to Dr. Viktorov.

DR. VIKTOROV: Thank you, Mr. Santini, and good morning, Mr. President, Members of the Commission.

For the record, my name is Alex Viktorov and I am the Director of Pickering Regulatory Program Division.

The Pickering Nuclear Power Plant is operated by Ontario Power Generation and is located in Pickering in the Province of Ontario. The Pickering site consists of eight units, six of which were operating during the year and two were in safe storage. The current operating licence for Pickering is in effect from September 2016 and will last until August 31st, 2018. It is expected that OPG will submit the application for the next renewal of the operating licence by the end of this month.

This slide shows that Units 2 and 3 are in safe storage and that Unit 1 and 4 have been refurbished in early 2000.

This table shows the 2016 safety performance ratings for all of the Safety and Control Areas for Pickering Nuclear Power Plant. A change in ratings for

SCAs will be discussed later on in the presentation. Overall, the integrated plant rating for Pickering remained unchanged at fully satisfactory in 2016.

A number of positive highlights are described in the NPP report for Pickering Station waste on the conclusions of CNSC compliance work.

As it was for Darlington, the SCA Operating Performance was an example of strong performance. OPG continued to operate the Pickering Plant safely and conducted licensed activities in a manner that met or exceeded CNSC requirements. CNSC continued to maintain a robust program to manage accidents, including severe accidents.

Under SCA Safety Analysis, CNSC staff concluded that the Pickering facility continued to conduct activities in a manner that met or exceeded the relevant requirements. Like Darlington, Pickering has a well-managed safety analysis program. Its outputs give confidence that overall plant design and operations are robust.

Currently OPG is implementing REGDOC-2.4.1, Deterministic Safety Analysis, in a phased manner and using a graded approach. While the current Probabilistic Safety Analysis meets requirements set in regulatory document S-294, OPG is implementing a newer regulatory document, REGDOC-2.4.2, just like Darlington. Of note, the work on the whole-site Probabilistic Safety Analysis for Pickering facility, piloted by OPG, is considered a leading-edge development in the Canadian industry and indeed worldwide.

Under SCA Conventional Health and Safety, OPG Pickering met or exceeded CNSC requirements and provides effective personnel safety and a safe working environment as demonstrated by multiple positive findings from CNSC staff verifications. One example of improvements in this safety control area in the past year was the installation of new monitors for hydrazine. These monitors improve response time and detection limits. CNSC staff observed that safety improvements are facilitated by OPG's daily Pickering Station Alignment Meetings, where key and emerging safety, human performance and operational issues are discussed, documented and communicated. We find that these meetings have contributed to improved safety awareness at Pickering.

In terms of overall results for conventional health and safety, CNSC staff noted that accident severity and accident frequency were very low for Pickering in 2016. CNSC staff also reaffirmed that the waste management program for radioactive and hazardous waste met or exceeded CNSC requirements. We find the program is highly effective in promoting waste minimization, segregation, storage and handling.

I will now highlight several areas where CNSC staff maintains an increased oversight focus.

For SCA Radiation Protection, the rating decreased from fully satisfactory to satisfactory. This decrease is due to a finding from CNSC inspections in the specific area of radiological hazard control. As was identified in a CNSC inspection, fixed area gamma monitors were not calibrated on the annual basis as required by the *Nuclear Substance and Radiation Devices Regulations*. Moreover, OPG had not implemented timely compensatory measures in accordance with the radiation protection program when the non-compliance was initially identified. However, following the CNSC inspection and initiation of regulatory actions, OPG promptly took measures to remove the non-calibrated monitors from service.

I would point out that this finding only pertained to a deficiency with a specific kind of equipment. Despite this deficiency, CNSC staff confirms through inspection that OPG continued to implement a highly effective and well-documented program to maintain radiation doses to workers as low as reasonably practicable. This program meets regulatory requirements and is based on industry best practices.

In 2014 the Commission removed the regulatory hold point for continued operation from the Pickering licence. At that time a requirement was put on OPG to submit an annual update on, first, the aging management program demonstrating fitness for service of major components and the detailed risk improvement plan.

The aging management program comprises scheduled inspection of fuel channels, feeders and steam generators. In 2016 OPG continued to inspect major components. These inspections determined that such components were fit for service and in particular the mean diameter of the pressure tubes was within acceptable values; the highest hydrogen concentration in pressure tubes was within acceptable limits; the inspected feeders had wall thickness greater than the minimum allowable; and no steam generators exceeded the limits of tube plugging.

Overall, CNSC staff are satisfied with the results of major component inspections and confirm that the equipment conditions met regulatory requirements.

CNSC staff are also satisfied with the current status of implementation of the risk improvement plan and note that the changes result in further reduction of the risk by facility operations.

All Phase 1 equipment and the modifications are implemented. Such activities stemmed from the Fukushima Action Plan and primarily aim to further reduce the risk of severe accidents. Some additional enhancements to equipment or plant modifications are still ongoing, for example, installation of additional quick connect points for the mobile equipment to provide water to various plant systems as well as a second storage facility for such mobile equipment. The completion date for these activities is later this year.

Phase 2 of the risk improvement plan includes additional emergency mitigating equipment and plant modifications, primarily to provide further defence in depth by securing power supply to key systems. Procurement and installation are ongoing according to the schedule and will be completed in 2017.

During the last year, CNSC staff reviewed Probabilistic Safety Analysis updates as provided by OPG and are satisfied with the results. As already mentioned, OPG Pickering is leading the industry effort to develop and apply the methodology for multi-unit Probabilistic Safety Analysis.

Now, I will briefly describe three noteworthy developments related to the Pickering facility.

First, OPG submitted its application to Fisheries and Oceans on July 5, 2017 for an authorization under the *Fisheries Act*. The decision on this application is expected by the end of this year.

Second, to support the continued operation of the plant, OPG is conducting a Periodic Safety Review. The results will also be used in the licence renewal application. Overall, CNSC staff is satisfied with the progress of the Periodic Safety Review and anticipates completion of this activity in spring 2018.

Finally, an Operational Safety Review Team, or OSART, mission was conducted at Pickering in September and October 2016. OSART reviews are organized by the IAEA and are conducted by international teams of experts. OPG made OSART available to the public on May 21st, 2017. The OSART mission at Pickering identified 10 recommendations, 11 suggestions and eight good practices. OPG management expressed a commitment to address the recommendations and develop a corrective action plan. CNSC staff will monitor implementation of any changes in the plant in its operation as arising from OSART recommendations. There will be a follow-up mission in

2018.

This concludes the summary for Pickering Nuclear Power Plant and I will now pass the presentation to Mr. Khouaja.

MR. KHOUAJA: Thank you, Dr. Viktorov.

Good morning, Mr. President and Members of the Commission. For the record, my name is Hatem Khouaja and I am the Acting Director for Gentilly-2 and Point Lepreau Regulatory Program Division.

In the interest of consistency with the other presentations today, I will present the highlights of the CNSC safety assessment results for Point Lepreau.

The Commission has already considered the safety performance of Point Lepreau in detail during Part 1 and Part 2 of the licence renewal hearings in January and May of this year. At that time, the Commission received a detailed presentation on Point Lepreau Generating Station, so I will go through the slides 57 to 63 very quickly. These highlight the CNSC safety assessment results for Point Lepreau.

I and other CNSC staff members are available to respond to all questions on the presentation or the NPP Report during the Q&A period.

So Point Lepreau was operational

throughout 2016. The licence renewal hearings held in 2017 consisted of Part 1 in January and Part 2 in May. The operating licence was renewed in June 2017 for a period of five years. It will expire in 2022.

This table shows the 2016 safety performance ratings for the Safety and Control Areas, or SCAs, for Point Lepreau. Any changes in ratings of SCAs are discussed in the next few slides.

Overall, the integrated plant rating for Point Lepreau remained unchanged at satisfactory in 2016.

A number of positive highlights are described in the NPP Report for Point Lepreau and a few are detailed on this slide.

Two examples of areas where CNSC staff conduct enhanced regulatory oversight are described here. So this slide and the next provide details on some key regulatory developments. In particular, NB Power expects to submit its application for a *Fisheries Act* authorization by fall 2017.

During the course of the current five-year licence NB Power will conduct a Periodic Safety Review, or PSR, in accordance with REGDOC-2.3.3. NB Power has already submitted PSR basis documentation which is being reviewed by CNSC staff.

So this concludes the summary for Point Lepreau and closes the part of the presentation highlighting CNSC safety assessment results and regulatory developments for each operating nuclear power plant in Canada.

I would now turn the presentation back to Monsieur Frappier.

MR. FRAPPIER: Thank you, Mr. Khouaja.

For the record, Gerry Frappier.

In closing, I would like to provide brief concluding remarks on CNSC staff's work and its assessment of the safety performance of operating NPPs in Canada, highlighting some key and ongoing safety improvements.

The NPP Report provides numerous examples of compliance verification activities that identify compliant programs and activities and good practices, as well as identify non-compliant situations and practices and ensures that they are followed up by appropriate and effective corrective measures. CNSC staff maintains close observation and oversight of operations at Canada's NPPs and intervenes as needed to ensure compliance with requirements and ongoing safe operations.

CNSC staff observed that all NPPs in Canada operated safely in 2016. CNSC has established numerous and comprehensive requirements across all SCAs and the licensees were in general compliant with them. CNSC compliance verification activities were successful in confirming overall compliance and identifying specific non-compliances in various SCAs and at each NPP. The licensees conducted corrective actions in 2016 to address them, largely to the satisfaction of CNSC staff. Those that were not completely addressed at the time of writing the NPP Report are being pursued by the licensees, with ongoing oversight by CNSC staff.

The net results of the licensees' programs and CNSC's oversight of the 14 SCAs was a strong safety record in 2016. Some obvious safety highlights include low doses to workers and the public, minimal releases to the environment and few events that necessitated discussions in front of the Commission. Also, generally positive results were observed in other important areas such as security, safeguards, public information and disclosure, and indigenous relations.

In terms of CNSC staff's summary safety performance ratings, I note that all NPPs had at least an integrated plant rating of satisfactory, with three of them attaining an integrated plant rating of fully satisfactory. All licensees received either satisfactory or fully satisfactory ratings in all safety and control areas.

Thank you for your attention and staff is available to respond to any questions, as well as licensee representatives.

THE PRESIDENT: Thank you.

Before we start getting into the questions I would like to ask the licensees if you have any additional comments to make. Let me start with NB Power. Any particular comments you would like to add?

MR. HARE: Michael Hare for the record. No additional comments.

THE PRESIDENT: OPG...?

MR. LOCKWOOD: Thank you.

Good morning. Randy Lockwood for the record. My mistake. Apologies. Randy Lockwood, Senior Vice President, Pickering. I do have a few comments that I would like to share with the Commission.

I am joined today by Zar Khansaheb, on my right, Director of Operations and Maintenance, Darlington, and on my left, Director of Operations from Pickering, Stephanie Smith.

It's a pleasure to be here this morning and be part of this meeting with the oversight report. On a personal note I would like to share from working overseas for many years in this industry that I have come to very much appreciate the Canadian regulatory framework, the openness, the transparency and the opportunities for public input. We as licensees are accountable and hold ourselves accountable to not only meet the requirements from the regulatory requirements, but we must strive to exceed them. We also know that it is important the CNSC oversight to make sure that we uphold the high standards and that we are meeting our commitments around public safety, worker safety and protection of the environment.

OPG is very pleased with its performance last year and we are very pleased with the recognition from the CNSC with a fully satisfactory rating for both our stations at Pickering and Darlington, but, nevertheless, we are not satisfied. I have already challenged the team to put a comprehensive plan in place where we systematically go at each safety and control area and move our performance from satisfactory to fully satisfactory.

I also would like to share with you. Given the upcoming hearings for Pickering and our intention to run the station to 2024, I thought it would be appropriate to share with the Commission some of our significant improvements.

I would point to 2016. We are focused

around three areas: teamwork, human performance and fix the plant.

Teamwork, we are well ahead of our generation targets.

From a human performance perspective, the entire year of 2016 we had one site of entry day reset, and to date, 2017, zero. From an industry measure site of entry day resets rate, that puts us on par with industry best.

Fix the plant. We have cut our corrective backlog in more than half already this year and are on track to meet our target. This results in a much safer and reliable Pickering Station. I would point to some examples for the Commission.

Unit 1, our oldest unit, ran 622 days continuously safely and reliably. Unit 5, two back-to-back breaker runs between maintenance outages. Again, the last one 632 days, a record run for that unit. Our forced loss rate, percentage measure of how reliable the plant is or unplanned reductions, the last three years it's the best in station history.

Also, I am proud to say we now have four units in a second quartile amongst other CANDUs from an NPI, or Nuclear Performance Index, perspective. The workers, they are engaged. Our collective radiation exposure is well below target, with no unplanned internal uptakes this year to date. And one that I am most proud of is our all injury rate, halfway through the year, after two major outages, is zero. Zero.

Our plan or our goal for Pickering, quite simple, we strive to be the best team in the industry. Our mission, run the plant with improved performance year-over-year until our last day is our very best.

Thank you for the opportunity to provide some comments to the Commission and we look forward to any questions or any insights that we can provide. Thank you.

THE PRESIDENT: Thank you.

Bruce Power...?

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

I think, first, I certainly commend staff on the effort they put into this. I know this is not easy to put this report together and they have done overall I think a very good job and so I think our opportunity to discuss this in the public is always a good thing. So my congratulations on that.

The only area that I have any concern with in this report is our rating on security. We are still not in agreement with that. I haven't been convinced yet that that was justified. I'm not sure I will ever be convinced, but we are still in discussion. Thanks.

THE PRESIDENT: Okay, thank you.

This is a good time for us to have a break for about -- until 11:20, okay, on this clock. Thank you.

MR. LEBLANC: And when we return we will address the interventions one by one. Thank you.

--- Upon recessing at 11:03 a.m. /
Suspension à 11 h 03

--- Upon resuming at 11:21 /
Reprise à 11 h 21

MR. LEBLANC: Please take your seats, we are ready to continue. Merci.

THE PRESIDENT: I understand that Point Lepreau felt left out, so by all means, sir, if you have anything to add, now is your time.

MR. HARE: Okay. Thank you. Michael Hare, Station Director for Point Lepreau. We will take the opportunity now to say a few words too.

I want to introduce myself and I want to introduce the team that is here with me just to make sure that everybody is clear about that. My name is Michael Hare and I am the Station Director at NB Power's Point Lepreau Nuclear Generating Station.

With me today at the table are Jason Nouwens to my left, he is the Director of Performance Improvement and Regulatory Affairs; Kathleen Duguay, who is the Manager of Community Affairs as well as Nuclear Regulatory Protocol is behind me to my left; Glenn Round is our Director of Engineering and Chief Nuclear Engineer, to my right.

I appreciate this opportunity to address the annual report with the Commission. I want to state that I do receive the findings as an important objective and informed input for our station's continuous improvement process. Our team concurs with the 2016 Regulatory Oversight Report findings and we are pleased that our latest assessment sustains our 2015 overall satisfactory rating and continues to demonstrate that the plan has operated safely and effectively within the rigorous CNSC requirements.

It is also noted in the report that we now have a second concurrent fully satisfactory rating for conventional health and safety and a new fully satisfactory finding in safety analysis. This has been the focus of substantial work for us in the recent past.

The entire station team persists in driving our business improvement plan by monitoring five key indicators. They include safety, leadership, operations, process and equipment excellence.

In May, NB Power completed hearings for its licence renewal. At that time we demonstrated our commitment to excellence in the protection of the environment as well as the health and security of the station, the community and our employees. We continue to operate the plant with Canada's commitments and our corporate values always in mind.

We appreciate the high level of engagement from our surrounding communities, First Nations, employees and stakeholders during this process. We see them as partners in our operations.

We also appreciate the due diligence of the Commission in its evidence-based and thorough approach to licensing. Through the efforts of the regulator, our employees and partners Point Lepreau is a valuable contributor to a safe reliable and environmentally-responsible electricity generation for the province of New Brunswick.

We would also be pleased to take any

questions at this time.

THE PRESIDENT: Thank you. So we will now start going through the written interventions. Marc...?

MR. LEBLANC: Yes. So please note that the Commission will change the order of the interventions to accommodate some of the participants and to put the focus on some of the matters before us.

CMD 17-M15.3

Submission from the

Canadian Environmental Law Association

MR. LEBLANC: So the first submission for consideration is from the Canadian Environmental Law Association, as outlined in CMD 17-M15.3. And the Commission has decided that this would be a good time to address in general the matter of emergency preparedness, recognizing that in addition to CELA representatives we have also a representative from Health Canada, the Office of the Fire Marshal and Emergency Management and a representative from NPPs available to answer questions.

So Mr. President, if you want to coordinate the --

THE PRESIDENT: Okay, so who wants to start questioning?

Dr. McEwan...?

MEMBER McEWAN: Thank you, Mr. President.

First of all, I'd like to congratulate staff on the report. I think it is a nice evolution from the report last year and I think we really are beginning to get some meat that is helpful. So congratulations.

I am going to start, I think, with one of your responses to one of CELA's comments, and that is the provision of documents to the public in a timely fashion. This is something that has come up at a number of meetings and hearings in the past.

And I think whilst it's accurate to say you have a well -- we have a well-established program for public access to documents, I do think that there have been some timeliness issues over the last couple of years that perhaps need addressing and it might be helpful to start with that as a Board overview on how documents are made available and what you consider appropriate timeframes to be for review and response.

MR. FRAPPIER: Gerry Frappier for the record.

I think there has been a couple of areas of discussion along those. I think what you're making reference to is documents associated with Commission matters. I'm not sure but perhaps the Secretary or the Commission will also want to comment on it.

I would like to say it in a little bit broader format. I think that what we are seeing with the level of transparency and the level of engagement we are getting from the public is more interest in more detailed information, more technical things than we had in the past. So there is -- there is certainly an increase.

So when staff is asked for information, I must admit sometimes we're surprised that people would want to have the information which might be in the thousands of pages of very technical information, so some of that has made it a bit of a challenge. We just didn't have perhaps the attention to the response that the public deserves.

We have made some changes to our -- both how we -- how we are organized and how we respond to requests so that now it's been made very, very clear that any information that is referenced in CMDs will be made available that I's a very limited number of information that should be kept protected from the public.

So, some of it is a bit of a philosophical change. I think we'll still have a bit of a challenge.

Some of that is the process associated with the Commission, though. So I would appreciate Mr. Leblanc's views on some of the timelines or timelines that are set. And, again, if some of the documentation that is being asked for is very technical and people want to get a technical expert to help them with the review, I think we are going to have ongoing challenges with those based on the timeliness that it might take for somebody to review something in depth.

Part of what I see as a solution to some of that is the regular engagement like what we are doing right here, if you like, so that we know that we are going to be in front of you ono an annual basis. There is an opportunity for people to ask for things along the year, such that they can be as ready as they want to be or expect themselves to be for this report.

The other aspect, of course, is the link from a communications outreach perspective in helping people be as ready as they can. And for that I might ask Mr. Saul if he wants to comment on that.

But first I don't know, M. Leblanc -- you'll take that offline; okay. So then I would ask if anybody from our -- yeah, okay, over to you.

MR. SAUL: Thank you, Gerry. Dawolu Saul, Director of the Strategic, Regulatory and e-Communications

Division here at CNSC.

One thing that we try and do is to break down the technical information for the members of the public. We are quite prolific in our social media offerings as well. We would take different things out of the annual report and put them in layman's terms. While keeping the integrity of the content itself, we do see a lot of interest from the public and we try and accommodate as much as we can within the parameters that are allotted to us.

MEMBER McEWAN: Do you have any formal communications with intervenors in advance giving frameworks for informational availability, giving updates or giving insights on how data can be accessed?

MR. FRAPPIER: Gerry Frappier for the record.

Not specifically with intervenors. We are moving forward with respect to the Indigenous groups to have a regular relationship with them.

I think that we should also point out that -- and Dawolu would have a better number but we have a lot of people who subscribe to our information, not just the website but the actual emails that we send out. Within there is information about things coming up.

We haven't -- we could perhaps look more at what kind of information intervenors might want but it's very hard for us to predict what an intervenor would want to be and they are not an intervenor until we sort of have the process started. That's why I am saying that then you get caught up in some of the timing of the actual process that makes it difficult to give much more time than what the Commission is expecting for the whole process to achieve. We don't want to end up adding significant amounts of time to the hearing process.

MEMBER McEWAN: Thank you.

THE PRESIDENT: Thank you. Move on? Dr. Demeter?

I think we should take advantage of the Office of the Fire Marshal to actually deal with emergency management now because they are not available late in this afternoon.

MEMBER DEMETER: So that's actually one of my questions here so it leads well.

So on page 15 of CELA's submission they have a quote from -- a reference to the Darlington decision saying that:

> "the Commission noted that evaluating off-site emergency planning in the

areas surrounding the Darlington NGS
is not a responsibility of the CNSC."

So for clarification of the Commissioner and for the process, I wanted to clarify that there is issues of jurisdiction. There is issues of accountability and my understanding is that the licensee, irrespective of jurisdiction, is responsible for safety of the environment and individuals on and off site.

And I wanted to confirm or understand from CNSC's point of view what formal process they have to evaluate, although I understand there is jurisdictional issues, but to evaluate off site emergency planning relative to resources adequate and whether it meets standards, because at the end of the day irrespective of the jurisdiction, if the off-site emergency plan doesn't meet a safety standard that still falls, as I understand it, on the licensee to try to manoeuver it so it does meet it.

So I don't think this statement is correct as it's quoted, and I'm not sure of the context but I need validation that we are evaluating off-site emergency plans and they do meet a certain standard that staff is comfortable with, and that is part of the process.

MR. FRAPPIER: Gerry Frappier for the record, and then I'll ask Mr. Sigouin to add to this.

But in general, we are licensing licensees and their activities and we do accept that we have a responsibility for ensuring that, as we would call level 5 of our defence in-depth, which is emergency planning, is in place and is capable of doing what is expected of it.

Some of that -- a big part of that is within the licensee's responsibilities and we have programs to evaluate their programs, if you like, that. But a very important part of it is outside of the plant fences and we have a requirement for licensees to be interacting with the authorities outside the -- in the broader community, both provincial, municipal, regional, the police force, fire departments, all of those, and that's appropriate for us to have those requirements on licensees.

Whether the actual jurisdiction, if you like, being let's say provincial, we are not -- we do not view ourselves as being responsible for evaluating the Province's capability, but we do expect that there is a process by which they are included in evaluations of overall response. So that we do make it a requirement on our licensees to run exercises for instance that will include a broader group, that will include the provincial authorities and also for their plans to reflect how the provincial plans and theirs interact.

THE PRESIDENT: I think it's now a good time and a good segue to hear from the Office of the Fire Marshal and Emergency Management about what they consider to be their mandate, how it relates to the licensee's mandate, and after that I would like to hear from Health Canada how it all fits together into the national mandate.

MR. MORTON: Well, thank you very much. Good morning. For the record, my name is Mike Morton. I am the Director of Emergency Management for the Office of the Fire Marshal and Emergency Management which is a part of Ontario's Ministry of Community Safety and Correctional Services.

Under Ontario's *Emergency Management and Civil Protection Act* our ministry is responsible for planning for nuclear accidents and the off-site consequences, and we have a broader responsibility for nuclear radiological emergency management within Ontario.

I would like to take this opportunity just to briefly update on some of our enhancements that we are carrying out to the Provincial Nuclear Emergency Response Plan and some of the evaluations that have been conducted over the last years.

Just for context of those in the room, as

record.

So as you know, the INES level is an IAEA convention with respect to how to classify an event or an accident such that it allows communication basically around the world, but to people with respect to the level of severity of the accident.

We have had many exercises that have different source terms if you like, different levels of accidents and different INES levels that would have been associated with them. And we have done studies that have different INES levels, including INES level 7.

And we have emergency plans in place that take account of what would be done no matter what the INES level would have been prescribed to it, because of course what we're really interested in is the various dose levels. So I'm not sure of the Office of the Fire Marshal wants to add to that.

MR. MORTON: Mike Morton, Office of the Fire Marshal for the record.

All that I'll add is that our public posted PNERP planning basis discussion paper does speak fairly extensively to the scenarios that the 2018 PNERP would be prepared for. That does involve multi-unit accidents and multi-unit accidents that could be considered worst-case scenario have been the subject of the major exercises that have been held since the Fukushima disaster. And those exercises and lessons learned are informing this new iteration of the PNERP.

So there's certainly considerably more information within the paper. Our advisory committee will be looking at the scenarios and we'll be ensuring that our plan is comprehensive enough to assess what we would consider worst-case credible scenario.

THE PRESIDENT: Thank you.

Couple of other quickies here. Did -- the intervenor talked about sirens. The requirement for the sirens as per the plan, have they all been fulfilled? Staff or whoever wants to answer that.

MR. LOCKWOOD: Randy Lockwood for the record.

I'll call Steve Lesiuta, Scott Burns, and perhaps Steve Gregoris. They could speak to this question, Mr. Chair, and as well any questions you have around preparations for the upcoming drill this fall as well.

MR. LEBLANC: We have a little logistic issue, so if somebody can just free up a chair for a few minutes, please, thank you.

MR. FRAPPER: Mr. President, maybe as they're setting up we could ask Mr. Morton from the Office of the Fire Marshal to give us an oversight of where they see public alerting.

MR. MORTON: Mike Morton, Office of the Fire Marshal.

At this time, we feel that all public alerting requirements under the current plan are met. We have sirens in place in the contiguous zones surrounding the sites. Those sirens are regularly tested. We're confident that public alerting can be activated within the required 15-minute notification period. And we're comfortable with the facility and municipality's ability to demonstrate timely public alerting out to 10 kilometres.

I know that both the OPG and Bruce Power have invested significantly in these and participate in the regular testing and upkeep of these systems, and they may wish to comment further as well.

MR. LESIUTA: Steve Lesiuta for the record. I'm the director for Emergency Management and Emergency Preparedness for Ontario Power Generation.

I agree with Mike Morton's comments on the public alerting via the sirens around Pickering and Darlington.

I would like to speak a few moments about the -- we did talk about the large-scale exercises planned for Pickering. I would like to speak for a few moments about that if I may.

We're having large interoperability exercises scheduled for December 6th and 7th. We have confirmed participation from over 34 federal, provincial, and regional agencies. This includes the CNSC, the Federal Coordinating Group, Health Canada, Office of the Fire Marshal and Emergency Management, Region of Durham, and the City of Toronto.

In order to develop an exercise and scenario that meets all of the objectives of all the stakeholders, we have established numerous oversight committees to ensure that all the objectives are met. So with just by naming a few, we have a Joint Exercise Planning Team, which has all of the external partners participating so that we can validate the scenario. We have a Scenario Development Working Group, we have various steering committees.

Planning -- we held a planning conference in July -- sorry at the end of June, and we have another planning conference in October to ensure there's alignment across all the participants. And we also have a Senior Alignment Steering Committee.

Also what we -- as Frank Saunders pointed out, we do invite other utilities to observe our exercise and to share experiences. We will be issuing an after-action report. There will be an industry after-action report as well as one for the site. So we do share our experiences with all the other utilities as well.

THE PRESIDENT: Okay. So any other -- Dr. McEwan?

MEMBER McEWAN: Thank you, Mr. President. I just got a couple of little ones as well.

On page 12 of the CELA report, there's a comment here CELA makes that:

> "despite the Commission members' encouragement to start 'to ensure adequate public involvement,' there was limited outreach to CELA to review the CSA standard."

Is that CNSC's responsibility or would you not expect CELA to have been actively engaged themselves?

MR. FRAPPIER: Gerry Frappier for the record.

And so the standard that they're talking about is the National Emergency Standard. It's been referenced a couple of times, or CSA N1600, that the

Commission and the CNSC were heavily involved in requiring updates and creating.

But the CSA standard is developed by the Canadian Standards Association. They have a process. Their process provides for public involvement, certainly involvement of stakeholders. And in the development of this standard, their process does cause for the standard to be written and then to be sent out for comments. At that point in time, certainly, CELA is -- had the opportunity, and I think they make reference to that, that they had the opportunity to make comments and then -- and add to it.

If you want more, I'd have to ask perhaps Mr. Sigouin to explain how that particular standard got developed.

THE PRESIDENT: Just another piggybacking on this question, the intervenor says on page 24 that they -- the standard is not available. I thought that those standards are now publicly available? So somebody can clue me in on that, please.

DR. VIKTOROV: Alex Viktorov for the record.

I have some experience with CSA work. So the members of the committees developing any standard are selected from recognized experts in the field. They are not really picked -- the names are not picked by any predistribution from organizations. If CELA has a recognized expert in the field, they would be considered, but they have to be really expert in the field, not just interested parties.

Any interested party is invited to participate through public consultation. It's usually 60 days and the comments are solicited and dispositioned one by one on their merit.

Also the standards are revised every five years, so open for updating every five years. So in few years the standards will be open again for public input.

With regards to availability, generally they are not. It's a commercial product from CSA and they are available but for a price from the CSA. Of course if CELA asks CNSC to provide a free copy, we could arrange that.

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

I need to correct that. That's not true. They are available on the Communities of Interest website. Anybody can sign in. You just log in. You can see the standards any time you like, any CSA standard. What you can't do is print a certified copy of it. But if you want to read the standard, see the concept, you can do that through the Communities of Interest. And that was done intentionally to make sure the standards were widely available to people.

But if you're a company like us or someone else, then you want to use the standard as part of your QA program or whatever, then you need to buy it.

THE PRESIDENT: Well, that's what I thought. I thought that every reference material that the CNSC uses become publicly available somehow.

MR. FRAPPIER: Gerry Frappier for the record.

That's correct.

I'd also like to point out that the CSA isn't just a company out there. It is -- the production of standards is something that the Government of Canada does control, if you like. And so there's the -- I forget exactly there what it stands for, but the SCC has accredited them as a standards organization, and that involves making sure there's a process that has appropriate opportunity for public input while at the same time making sure that the standards are developed to the highest possible quality.

THE PRESIDENT: Go ahead.

MEMBER McEWAN: Can I just follow up in that same paragraph, because I had a question around that.

CELA requests that CNSC cease reliance on CSA standards. Does anybody want to comment on that? It seems an impractical and unlikely suggestion.

MR. FRAPPIER: So Gerry Frappier for the record.

I'll certainly comment on that. The CSA standards and other standard-making bodies are absolutely essential to the CNSC and to ensuring that there's safety within the industry. Having appropriate standards that people can be held accountable to is very important in both quality assurance, as was just mentioned, but also in oversight so that we can both specify that as our expectations that a certain standard is being met.

I think the intervenor is suggesting perhaps we would make all of these standards through REGDOCs, and that's just not practical from the perspective of both the purpose of this -- CNSC and its REGDOCs, but much more importantly just on the expertise. As Mr. Viktorov had mentioned, these require people to be really experts in their field. It's not just the CSA standards. There's, you know, international electronic and electrical engineering standards. I mean, the engineering world is --

has a need for sound standards, and I don't think that's going to change. And we certainly could not produce them all. It's just not practical.

THE PRESIDENT: Thank you. Any questions?

MEMBER DEMETER: Maybe just one last question. It was one of a practical matter that CELA had made reference to a description around self-decontamination in the emergency response plans that are available to the public -- so in the key zones, maybe primary or secondary -- and having that information available to the public. I think they were noting that there was no description of what that was or what the process was. So can anyone comment on that?

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

Yeah, we deliberately don't tell people how to self-decontaminate. We tell them to go to a place where we can check them. We don't really want people who aren't knowledgeable trying to decontaminate themselves and then assuming they've done a good job. They don't have the instruments to do that. I mean, around our site maybe some of them do, actually. But by and large we don't want the public to self-diagnose on this. We want them to go to the centre and get checked properly. And we -- and that's set up already, right.

MEMBER DEMETER: So then there shouldn't be a reference to self-decontamination. It should be a reference to do not self-decontaminate, and go to the appropriate locations to do that.

MR. SAUNDERS: Yeah, yes. I can't remember, actually, a reference to self-decontamination. The reference clearly states go to the centre, right. That's what we tell people. That's what's on the website. So I'd have to check that. If it talks about self-decontamination, we probably should take that out of there, yeah.

THE PRESIDENT: Dr. McEwan.

MEMBER McEWAN: Sorry, I've just got one final question on page 28. The last full paragraph on that page. Maybe a comment from the Office of the Fire Marshal as well as from industry and CNSC on this: "Minimalist approach pervading key CNSC documents and their discussion of emergency planning."

Does anybody want to comment on how accurate that is as a statement and whether or not there is any risk to that suggestion?

MR. FRAPPIER: Gerry Frappier for the record.

I think there's a series of documents that have to be considered here. So certainly the CNSC documents are not the entire picture. And in fact, they're not even most of the picture with respect to emergency planning. We're a regulator. We put in place requirements that people have this.

I would certainly get comments both from the Fire Marshals and perhaps industry as to what other documents there are that are actually providing for the emergency planning. We just heard from Health Canada as well, that has the sort of responsibility from the federal perspective. But certainly there is -- I don't think there's a shortage of documents associated with emergency planning. The trick usually is more to make sure they all interact properly, because you have many, many organizations.

But I don't know if you're looking for a comment on, like, how many documents there actually is that Health Canada could comment on or Fire Marshals.

MEMBER McEWAN: I think it would be helpful to understand just the degree to which this planning is in place.

MR. MORTON: Mike Morton again, Office of the Fire Marshal and Emergency Management.

I think my earlier comments spoke fairly extensively to the planning documentation that's in place. My read on the intervention comment isn't specific to those plans as much as it is some of the CNSC documentation and commentary.

But the PNERP itself is hundreds of pages long and quite extensive. And all departments and ministries then have plans in support of that. Our municipalities have extensive implementing plans. We have functional implementing plans. And then those are supported by hundreds of pages of procedures that outline literally every action that would take place under every scenario that's contemplated within the plan right down to the sequencing in which those would take place during the initial response.

So from a provincial perspective there is extensive documentation, and we are in the process of reviewing and updating that. And now for the first time having the open public commentary on that documentation as well as the independent advisory who will review the changes to the 2018 PNERP.

MR. LESIUTA: If I can add to that as well. It's Steve Lesiuta for the record. I'm the director for Emergency Management for Ontario Power Generation.

We also have very robust emergency planning at Ontario Power Generation on the nuclear side as well as the non-nuclear side. On the nuclear side we have a programmatic document. It's called our Consolidated Nuclear Emergency Plan, which takes direction from the -- it complies with the PNERP as well as our licensing conditions.

And from there, similar to what Mike Morton described, we have a whole series of procedures, instructions, and guidelines that fall under that programmatic document.

We also have at OPG -- we also have an All-Hazards Emergency Management Program for the conventional emergencies as well.

THE PRESIDENT: Okay, I think it's a good time now to maybe acknowledge CELA and maybe be -- allow CELA to share with us some final comments.

MS McCLENAGHAN: Thank you very much, Mr. Binder. It's Theresa McClenaghan, executive director for the Canadian Environmental Law Association and with me is Ms Kerrie Blaise, counsel with the Canadian Environmental Law Association.

And we appreciated the grant of funding for today's intervention. This is new for us to apply for funding for the August regulatory oversight report.

And this is something that was discussed. Mr. Jammal made comments, you might remember, during the Darlington hearing. But with the onset of the 10-year licences granted to some of the plants, that these summer oversight meetings might be an opportunity for the public to engage, to retain capacity, and to bring matters of concern to the public forward to the Commission.

So in that vein, we thought it would be appropriate to look at the emergency planning issue, now that we had looked at every single operating nuclear power plant in Canada, along with Chalk River, as was mentioned, over the last number of years with the help of the funding program in the recent licensing hearings.

So the report was intended to put all in one place what we had found in each of those hearings. And then to examine the traceability and Commission role and enforcement and accountability over the topic of emergency planning. That was the purpose.

And what I'd like to do is just respond to a couple of things.

First of all, as Dr. Demeter queried, we have said at all of those hearings and said again today that we think that the Commission has an important jurisdictional role under its statute to ensure that the fifth defence in the defence in depth approach, the last barrier, is robust and adequate to protect the public. This is not to say that the province doesn't have a role and responsibility as well in operating its emergency response plan. But the Commission's role is to ensure that the plans are robust enough, and that includes practical questions like sufficiency of the planning zones, sufficiency of the resourcing, other things that have been discussed today.

So in that vein, one of the things that was mentioned today is that there are not in place specific standards or requirements around specific zones, that rather, for example, there are guidelines like the CSA standard or the international standard that speak to a process to develop zones, which is correct. That's what those things do, they speak to a process to develop zones. The IAEA guidance does include a range, as was mentioned. But those documents are not a substitute for the Commission examining this question itself as part of its assessment about how safe nuclear power is in Canada, in our submission.

Specific to that question of the CSA standard, one of the reasons we specifically highlighted it today is because, Dr. Binder, you asked the industry and your staff at at least a couple of hearings, I believe, to involve CELA early in the development of that standard. And we had very little involvement. So we wanted to bring that to your attention.

The issue about public availability of the CSA standards is why we say that it's inappropriate to be delegating or referring to standards that are not fully available to the public. Going online and looking at the standard section by section by section by section, which is what you have to do, as opposed to being able to get the whole document and read it -- which CELA has been able to do by request to the CSA agency -- but we have a copy that says, "for CELA use only," means that the standard is not readily accessible to the public.

It's a standard that matters a great deal to the public because you know yourself, all of you, that you've had hundreds of members of the public making submissions to you on the topic of emergency planning at the hearings. So that's why we're concerned about that.

It's not a question that we think every single electrical standard needs to be done by the Commission. Something critical, the fifth of five barriers is emergency planning, and the primary standard that gets referred to by Commission Staff and the industry is not easily available to the public.

So with that I'll leave it. I was quite disappointed in the Commission Staff's updated response that was circulated just before the meeting today in terms of how it dealt with the CELA submission for today. I'm very happy that we've had a robust discussion today of the topic of emergency planning.

CELA's recommendation would be that this must be a central topic for every regulatory oversight meeting, every August, regardless of whether CELA is intervening or not, and that the depth of inquiry engaged in by Staff should be deep regardless of whether CELA is involved or not. Thank you.

THE PRESIDENT: Thank you. Anybody want to ask any final last questions? No?

Okay, thank you. Thank you very much. We will continue until 1:00.

CMD 17-M15.2

Submission from JMH Technology Consulting

MR. LEBLANC: So the next submission is from JMH Technology Consulting as outlined in CMD 17-M15.2, and are there any questions from the Commission Members on this submission?

THE PRESIDENT: Who wants to start?

MR. LEBLANC: This is the one from Mr. Hopwood.

THE PRESIDENT: I think we're still looking for our position for the papers here, so bear with us, in a minute.

Dr. Soliman please.

MEMBER SOLIMAN: I think that in the document -- the document is very very good and it provides us with recommendations in many areas and comments on the oversight report.

I would like to start by recommendation section 3.3, page 5. Also the same thing on report section, the CMD 17-M15, section 3.1.1.6, page 87. Unavailability of ECI for Units 1 and 3, unavailability of NPCS, negative-pressure containment system.

The question is what safety significance of these two impairments and what effect it has on public safety?

MR. FRAPPIER: Gerry Frappier, for the record.

I'll ask Yolande Akl in a minute to come and support the discussion on special safety system availability.

In general on the report from JMH Technology, I think a lot of it is very forward-looking and constructive advice that we will be taking into account, as we mentioned in the presentation, with respect to next ROR report that'll come to you next year.

With respect to your specific question on special safety systems, as people should know, there is a requirement on all licensees to ensure that it is reported to the CNSC anytime special safety systems are unavailable or degraded, and that's information that we pull together, and we report to the Commission both annually and we monitor on a regular basis.

So with respect to the actual results and their safety significance, I had mentioned Yolande

Akl, but actually it's Guna. Guna, if you're available, if you could talk about what we have found in these ones?

MR. RENGANATHAN: I'm Guna Renganathan, for the record. I'm from the Probabilistic Safety Assessment and Reliability Division.

With specifically the ECI unavailability, the licensees have a regular -- that is, a normal program for assessing the availability of the equipment and components, which are very specific to the special safety requirements. One of the systems is the ECI system. The ECI system valves are regularly tested.

When they were testing -- this particular incident, what they have reported here is that when they are testing the valve, the valve operating time was fast; fast means in the sense that if the valve is opening fast, when the ECI is demanded -- the water will be rushing fast and it will be causing the water damage situation in the pipelines. That is why they'll be testing the valve timings.

The periodicity is to determine in

such a way that this will be early detected and it will be attended. In a similar process, when they do the test, they noted that this timing is more than 14 seconds, and they identified and rectified the fault, and after that the fault situation no more exists and the safety systems are, in turn, available for the demanded situation.

DR. SIMIC: Sanja Simic, for the record.

I would just like to briefly complement this response. The issue here is with the stroke time for the valve. So the issue is related to analytical change which happened, so this is pretty much an SOE issue, where the new analysis demonstrated that the stroke time for the valve was not proper. Bruce Power has changed it, they updated the value, so we do not have this issue anymore.

MR. FRAPPIER: Gerry Frappier. Just to summarize, and Bruce may want to add. So just to be clear, there is an analytical aspect to this which indicated that perhaps the timing was going to result in more water hammer and therefore had to be modified. But at no time was it that the valve wasn't going to be operational.

So the safety significance is very small, but the analytical consequences have to be followed through with, if you like, and adjustments to be made to safe operating envelopes or any other operational parameters.

MR. SAUNDERS: Bruce Power, for the record.

This was really sort of a change management issue. Originally, the faster these valves open the better, there was no limit. You know, the original requirement was as long as they opened fast that's all you require. As we gained experience and did more analysis around this it was determined that, yes, sometimes opening too fast might be a problem and that it might create water hammer, which could degradate the system.

So we changed the design basis actually and the design basis was changed to put a bracket on it; it needs to be fast, but not too fast. We changed the safety system test to reflect that change. When we did that change to the safety system test we weren't quite clear enough in what that operating limit was, and so people misunderstood that and the operators were very used to it being a let's open quick requirement, not a you also shouldn't open too quick, so -- and we continued to do the test.

In a couple of cases the test, did the valve open faster in that limit, and it wasn't recognized immediately that that was a problem. During our surveillances we do oversight on these processes, we discovered that that was missed. So we reported it and we corrected the SST. So now it's absolutely clear to everybody that there's two limits now on this thing; one for the speed of the opening in terms of has to be fast enough, another one that says it shouldn't be too fast.

So it was really a change management issue. The valve was always available and the system would operate. It was about how we put the instruction to the operators, and it was a change from many years of doing it a different way. But our own surveillance caught the fact that this hadn't been taken up properly and we reported it and fixed it.

MEMBER SOLIMAN: Does this address both issues, NPCS and the ECI --

MR. SAUNDERS: Yeah -- no, this --

MEMBER SOLIMAN: -- or are these two different issues?

MR. SAUNDERS: These are two different issues. That was simply ECI, yes.

MEMBER SOLIMAN: Okay. So can we address the other one?

MR. SAUNDERS: Yes. There was an issue -- there was two issues actually related, depending on whether you're talking about Bruce B or Bruce A on the containment. One of the issues was related to the PRBs that are on -- there's backup supply, bottles to the seals on the airlock doors, the seals that go into containment. There is a normal supply and then we use separate bottles as a secondary supply that can be used if, for some reason, the other is not available.

Originally, those valves were not environmentally qualified, so they might fail to regulate the pressure properly in an event if there was a harsh environment, and that could cause perhaps the seals to fail from over pressure protection. So that was again discovered in analysis that that was missing. So we reported it of course once we discovered it and we changed the process to put a different PRB on the valves.

We also now store some of these relief

valves in an area that's guaranteed to have a mild environment so that if, for some reason, they should fail we can -- they're quite quickly replaced, they're much like any other supply bottle you'd see in the hospital or anywhere else; you just simply unscrew it and screw another one on.

So we've done two things there; replaced the valve with ones that won't be sensitive to a harsh environment, and provided it's not as easily available to place them if it should be, but that does count historically. They were in place for a period of time, so when you count that in historically that reduced your reliability in terms of the calculations so your past reliability suddenly drops, and that was a cause for it to drop.

On the other issue it was an issue with the emergency filtered air discharge system on Bruce A. This system was set up so that it takes power from the Class 3 turbines, and it has a switch which allows you to switch it over to the qualified power supply, which is a more reliable -- you know, both of them are quite reliable, but the QPS is kind of the ultimate system.

It was determined that that switch

could also fail in an environmental situation. Again, this was a discovery during analysis that perhaps this switch could fail under harsh environment. The fix there was relatively simple; instead of leaving the switch selected to the emergency power generators we now select it to the QPS, which is a more reliable system. So it doesn't actually have to be operated and it meets the environmental qualification requirements for that purpose.

But again, when you report these there's a historical piece to it between the time you did it and the time you discovered it, and that all calculates into your reliability. Because the assumption on all these reliability things is if it might not work, it's assumed it wasn't available even though in real life it was available. But our assumption when we calculate reliability is if you couldn't prove it was available for every event, then it's assumed to be unavailable and that calculates into your reliability stats.

So those are the changes that you're seeing in those stats, it was those discovered items.

MEMBER SOLIMAN: Does Darlington have the same issues?

MR. KHANSAHEB: It's Zar Khansaheb reporting, for the record.

No, Darlington has these same backup air bottle systems, but our PRBs are deemed qualified for environment conditions.

MEMBER SOLIMAN: For ECI?

MR. KHANSAHEB: For ECI, Darlington has limits for our injection valves at 35 seconds for the full stroke open and also for the time limits. But we've never had an issue in terms of stroking too fast or stroking too slowly.

MEMBER SOLIMAN: Do you qualify the ECI system for water hammer?

MR. KHANSAHEB: Yes. The system is -- and that's why we have these limits -- it's Zar Khansaheb, for the record -- that's why we do have those time limits on opening too quickly, and it was designed for addressing water hammer. That is correct.

MEMBER SOLIMAN: Okay, thanks.

THE PRESIDENT: Thank you. Dr. McEwan?

MEMBER McEWAN: Thank you, Mr. President.

Perhaps I could refer to the intervener's comments on maintenance backlogs. In your dispositions you say accepted by Staff. Not actually sure what you mean by that. But I found reading through the sections on maintenance backlogs there was almost no commentary, it was simply a statement.

For example, I don't know the significance of, in Pickering, deferrals of preventative maintenance 110 compared with an industry average of 38. What does that mean? The same as some of the deficient maintenance backlogs, there are wide variations and, you know, Bruce B is 165 compared with an industry average of 111. I don't know what that means and I don't know what that means in terms of safety significance.

MR. FRAPPIER: Gerry Frappier, for the record.

I'll ask Eric Lemoine to come up. But I would agree with you that the maintenance backlog and the different kinds of maintenance is a very difficult thing to get your head wrapped around, which also makes it very difficult to report in an annual report in a way that satisfies everybody. I think every time we've come here with the annual report, the maintenance and maintenance backlog and what's the significance and how does it relate has come up for discussion.

We keep trying to get a mechanism of presenting, if you like, that will meet the need for the public to have some kind of understanding, while at the same time new need to realize it is a complicated program within a plant as big as the nuclear power plants.

But perhaps Mr. Lemoine can add something.

MR. LEMOINE: My name is Eric Lemoine, I'm the Director of the Systems Engineering Division at the CNSC.

So our maintenance and compliance oversight strategy actually has a number of different pieces associated with it. The performance indicators are one piece of that strategy. So there are four indicators that we get reported to us on a quarterly basis from the NPPs: one of them is the corrective maintenance backlog; the deficient maintenance backlog; the number of PM deferrals; and, the preventative maintenance completion ratio. That is one piece of the strategy.

The strategy also includes Type 2 inspections, which we do three different types at three different frequencies: we have maintenance work planning and scheduling; we have maintenance work execution; and, we have system inspections which also cover system structure and component monitoring.

On top of this we also review event reports and we also look at the annual reliability reports as well. As well, another piece of the strategy is the licensees need to notify us of major changes to their maintenance program.

So now to come more closely or I guess directly to your question, this is normally a snapshot in time, these numbers are changing on a daily basis, depending on which work is getting done. So we look at the snapshot in time and we trend it. Now, the trending that we're doing, actually the REGDOC-3.1.1. reporting requirements which require the licensees to submit us these performance indicators they changed in 2015 -- actually changed before then, but we started getting the data in 2015.

So in this report you'll notice there's really only two data points; there's the 2015 data points and the 2016 data points. So we didn't present it in a graphical form this year. We will look at that next year to see if it makes sense to show a chart, let's say.

From a safety significance perspective, so to get to your question directly, what's important here really, from a safety significance perspective, is the corrective maintenance backlog. So something that needs to have corrective maintenance done on it, means it can no longer perform its designed function. Deficient maintenance backlog means it could still perform its design function.

So just to give you a little bit of an example. So you might go to a pump that has an oil system on it. As system engineers are doing their inspection they might see, you know, a little oil drip on the ground. Well, it's important to document that and, you know, as part of your PM program you deal with that in time. But the lube oil reservoir has a level and it's probably fine, right? You may do increased monitoring or other actions.

If you were to go and see all the oil was out of the reservoir, that's corrective maintenance. The pump will probably not perform its safety function in that case. So the technical specialist in the maintenance area looks at all this information and includes the, you know, going to the sites and doing the Type 2 inspections in order to come up with a determination of whether or not he believes this is, you know, a safety significance issue or not.

Do you have some follow-up to that?

THE PRESIDENT: Can I piggyback on this? So you'll recall that we've accepted to use the industry performance indicator itself, right, and invent CNSC. But with that there's got to be some explanation of -- so in your corrective numbers, what is unacceptable to CNSC? so if you have a backlog of, I don't know, 70 per cent, 50 per cent, is there such a number in operation in which if you allow backlog to go to such a high level that you will start worrying about yourself? Is there an action level?

You've got to give us something so that we can understand the significance of those numbers. Let's start with CNSC.

MR. LEMOINE: So I'll start and then I'd be grateful if the stations could add their two cents as well.

So there are ERI COG -- so equipment reliability index COG guidelines that the licensees are trying to achieve. If you just let me check my notes here, unless one of them knows what it is off the top of their head for corrective, I can find it. So that's what the industry is working towards is the COG equipment reliability index guidelines for corrective maintenance backlog.

MR. SAUNDERS: Frank Saunders, for the record.

In getting started this morning I realized I forgot to introduce my colleagues here. But for this question our Chief Nuclear Officer Len Clewett is here and so he's going to take the question.

MR. CLEWETT: Thank you. Len Clewett, for the record.

So, President, your question about what's acceptable at Bruce, and kind of top quartile performance per unit would be less than two per unit. So when you have fuel handling in there for our station it should be less than 10. Typically, we are operating at around that range, 10 or less, some units we have zero.

So excellence really is a case by case basis on what the corrective is and the impact, and we have daily meetings with our operations and engineering staff looking at each corrective, and our goal is always to work off each corrective as quickly as practical and to bring that number back down to zero.

But from an industry best practice the criticals are obviously the most important, and we also track deficients, because you can have an aggregate impact to certain systems and things like that. We have, you know, metrics that we review on a weekly basis to make sure if we see any adverse trends with corrective or deficient criticals we take actions appropriate to drive those numbers down.

A lot of it is that aggregate review of the system health as monitored by operations on a daily basis on a particular corrective critical.

THE PRESIDENT: So you have also a number for the deficient ones? You know, like the big numbers, some of them are -- you know, you see a maintenance backlog which is, you know, big numbers in it; 50, 60, whatever. Is there a number which should be unacceptable to you from an operational perspective?

MR. CLEWETT: Yes, because of the

impending impact you have. So the numbers you see are top quartile metrics in the report. We are driving those numbers down and we do have a target at Bruce to reach that industry top quartile within the year. And that would really be more of an aggregate.

Like I say, the correctives are the most important, deficient are next in line, and our goal is to keep within the industry top quartile and that's mainly to minimize any aggregate impact on the system.

MEMBER McEWAN: So, the implication of that I think, if I understood correctly, is that it's not only a function of the total number, but perhaps the age of the actions as well. So, if something has been hanging around that's critical for a month, that's probably bad?

MR. CLEWETT: That's correct. Basically our standard and our process is, when it comes in we assess it, make sure we have parts and correct it as quickly as we can.

If it is something that is prolonged, at times we may take bridging actions or other special actions until we get it repaired.

THE PRESIDENT: I assume all of this carries forward in Darlington and Pickering and Point Lepreau?

MR. LOCKWOOD: Randy Lockwood for the record.

A couple of comments and then I'll maybe ask our Director of Engineering, Jason Wight who's here also, to comment.

You've opened up quite a topic and I appreciate the complexity on trying to understand and put it in context.

At Pickering, for instance, where we've got the critical backlog, like I said earlier today more than half, we're running around nine per unit with a target of -- with a target by the end of year of zero or one or two, which is industry best.

Similarly, our deficient, right now you're correct the backlog is fairly high. I've set targets for next year, 2018, and to be chasing industry best around 2019.

It's also important to understand the equipment reliability index and how all this fits together, including the PM backlog, or the preventative maintenance backlog.

And maybe at this point I would ask Zar to comment about where his backlog is at Darlington and then ask Jason Wight to maybe comment a little bit around the

RI.

Okay.

MR. KHANSAHEB: Thank you, Randy. Zar Khansaheb for the record again.

So, at Darlington our critical corrective backlog, we've been working hard at it, and for the last three months now it is at zero. What we do is, because the number is at this level now, we're capable of looking at these individually and ensuring that we're driving towards repairing them at a rapid pace.

For instance, just last week one critical corrective popped up and our team addressed it and it's back down to zero. So, we're now at a spot that we can do that aggressively.

THE PRESIDENT: So, coming back all the way to the regulator, do you have a magic number beyond which you start to get worried?

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

And, as I mentioned, this is a complicated area, but I would like to bring us back to sort of safety significance.

And so, the first step is the question really that Dr. Solimon had which is the special safety systems and are they available or are they not? So, if there's any kind of maintenance activity problem or anything like that that's making it that those systems are not available, we're going to jump all over that. That's something that's unacceptable and, as you can see, we report on that regularly, they report on it, they have to tell us about it immediately if it happens.

Then you move into corrective maintenance. So, corrective maintenance means something's not going to work the way it's supposed to and -- but that may or may not have safety significance and typically if it does, you go back to the other one, we have safety systems that are important to us.

So, for us we're very interested in the trending of that. Is it going down, is it going up? So, those are indicators for us.

It's similarly with the deficiency maintenance and preventive maintenance. You'll remember a few years ago -- well, maybe you won't remember -- but a few years ago we had a discussion here that talked a lot about the maintenance because the trends were going the wrong way, the maintenance backlog was getting longer at several of the facilities.

So, that's an important thing for us. So, it's not specifically a number, it's really about a trend. And then, we are looking at this thing on almost a daily basis.

And I would ask, perhaps first Sanja Simic and then Jeff Stevenson to talk about how we are looking at that from an inspection -- from a compliance perspective on a daily basis.

DR. SIMIC: Thank you, Mr. Frappier. For the record, my name is Sanja Simic.

As you know, Commission Members, we have a team of qualified inspectors on site and one of the tasks that they perform is monitoring of the health of different systems with a focus on systems important to safety.

Systems important to safety are reported on regularly annually as part of the annual reliability report.

And, as Mr. Frappier noted, we're very much interested in trends and if we notice that there is an increase in terms of worsening of the health of the system, like the system going from red to -- from green to red, then -- and we see that the number of instances increases for that particular system, we basically send request to Bruce Power to fix this system and we have done that on numerous occasions in the past. We would send formal correspondence for the system health to be improved.

MR. STEVENSON: Jeff Stevenson for the record.

So, one of our jobs as site inspectors up in nuclear power plant sites is to perform daily surveillance and monitoring of the licensee's plant operations. Part of that surveillance and monitoring is looking at any sort of deficient equipment that breaks down over the last 24 hours or over the weekend. And what we do as site inspectors then is assess the safety significance of that and, if there is safety significance, then we follow up immediately with the licensees.

So, on a daily basis we are tracking these things and we do see the trends over time.

In addition to that, we also perform system inspections on the different safety-related systems where it goes into more detail even into the backlogs and trends and making sure that maintenance processes are followed.

So, we do look at this on a regular basis.

DR. VIKTOROV: It's Alex Viktorov to add to the discussion.

The maintenance falls in the safety control area fitness for service and the CMD in Appendix H lists inspections we have done. The largest number is exactly in this area. So, you'll see evidence that CNSC undertakes oversight in this area very diligently.

And while we may not have a specific number for our backlog, safety significance is assessed through different measures; for example, unavailability of safety systems which is reported and their elements, also the impact on the overall PSA results if systems are not available is tracked and assessed and there are controls in place.

So, the safety is monitored, the impact on safety, from backlog of maintenance activities is controlled.

THE PRESIDENT: Okay. Look, I think that we all understand the meaning of backlog. What we may not understand is the various backlog for various systems and its implications on safety. That's where you guys got to explain it.

But we'd like to see the data. We've been talking about backlog data now for a long, long time.

And, similarly, it would be very useful to have the trend over time and so we can see whether they're going in the right direction or not.

On that cheerful note, I think we're going to break for lunch and we're going to come back at two.

--- Off-record discussion

THE PRESIDENT: Yeah, we'll continue after lunch .

Okay. We'll come back at two o'clock.

--- Off-record discussion

THE PRESIDENT: Okay. 2:10.

--- Upon recessing at 1:09 p.m. /
Suspension à 13 h 09

--- Upon resuming at 2:13 p.m. /
Reprise à 14 h 13

THE PRESIDENT: Okay. We are back.

And last we finished with Dr. McEwan, so Mr. Seeley.

Mr. Seeley, are you ready for the next round?

MEMBER SEELEY: I'll give it a go.

I think perhaps just finishing up on a conversation around improved reporting on trending of data, so I think we were all in support of that recommendation. Then we got to performance indicators and underlying data around key performance indicators, so moving from reliability to things like maintenance backlogs, et cetera, et cetera. That's where we were.

There was a discussion around targets for some of those key things which we get to things like corrective maintenance. And we were hearing the facilities talk about moving to zero, and I like that target.

Maybe -- whether it's achievable all the time, of course, is another story, but then there was some referable to, if you could achieve zero or when you're getting to those corrective actions, actually keeping track of the amount of time or the length of time it takes to get those things resolved that are in the corrective and the very high priority zone would also be a very good measure to be actually reporting.

So as you move towards the zero corrective maintenance target, you also start to track performance around resolving them and the time to resolve them. I thought that was a very good maybe data point we might be able to include in the future.

And I guess what we didn't get to was, you know, what additional data trending could be included in those future reports.

I realize there's limitations to that and, of course, limitations to us being able to absorb all the information, but it would be nice to have a few more layers of information around performance and key performance indicators underneath those performance measures and data.

So those are just my comments and conclusions from prior to the break without asking any questions.

THE PRESIDENT: But feel free to add if anybody wants to make comment on those comments.

MR. FRAPPIER: Gerry Frappier, for the record.

Maybe I'll make a comment, and maybe colleagues from OPG might want to add.

I think there -- as we mentioned, maintenance is a complicated area and we've tried many different ways of pulling things together. I think one of the things that we've done under direction from the Commission was to move to getting indicators from industry that are industry accepted indicators, if you like, so WANO level indicators.

That's made conversation already a lot simpler rather than having two sets. But we do have requirements on industry to be providing us certain data.

I'm not sure we would be having a requirement for them to provide the level of data that you seem to be making reference to, so that's something we would have to look at and make sure that we're not imposing new things unless we decide that's really what we want to do.

Industry, of course, has a lot more data that they're using on a daily basis. I think we had our site staff talk about how we can be present at any one of those sort of discussions and are present at the meetings to make sure we get a feel for how the maintenance and the system health, if you like, of different systems is, and we'll continue to do that.

We also mention that starting in next year's report, we'll be able to have better trending data because that'll -- now that we've switched over to these new data points -- we've only got like two years of them, so once we get three years, I guess you could start trending, but perhaps we'll even look and get -- see what industry could provide us that's maybe a bit bigger trending.

With that as my comments, I'm not sure if -- OPG had indicated they may want to say something, so.

MR. LOCKWOOD: Randy Lockwood, for the record.

You made good points about getting some

simple and consistent metrics. That point was well taken by us.

We thought about it over lunch. Maybe as a group answering your question, we were here and there as opposed to taking a sort of systematic approach and answering you properly.

So with that in mind, my offer's still there. I'm going to resort back to our Director of Engineering, and maybe could walk through a simple analogy and put things in perspective, if you're open to that.

MR. WHITE: Good afternoon. Jason White, Director of Engineering for Pickering, for the record.

So my colleagues and I at lunch tried to understand and maybe perhaps provide a different story or a better story regarding backlog because if you're not in the industry specifically, there's -- it can be hard to understand. There's a lot to backlog.

So starting with Pickering, we have about 40,000 components that we need to manage. Each component has a certain significance. In some cases it's a safety significance, in some cases it's a production or reliability significance.

So we can't manage all 40,000 of them all at once, so what we do is we break them down into categories and criticality. Some have safety significance criticality codes, some are very specific for reliability, and some are, in other words, not as important as the rest.

So the analogy that we thought of was a car. So imagine you had a Cadillac and you were trying to maintain this Cadillac, very similar to a nuclear reactor. And if there was paint chipped off or perhaps the upholstery or there was some cuts in the upholstery, you would go through a maintenance program and eventually get to that maintenance because it's important mainly for the looks of it, but specifically not for the reliability of your vehicle. And that could be non-critical work, so that would be the non-critical work that we're looking at.

And in some cases it could be pipe supports that aren't as important, perhaps, some insulation removed. That would be a binning of the 40,000.

The other binning would be the criticality components, and we rank them 1, 2, 3 as well as single points of vulnerability.

And so we strategically plan and put programs in place to proactively go at these pieces of equipment from equipment reliability standpoint to ensure that we keep reliable, and we have to do that because -- to triage that way because there's just too many components.

So when we talk about backlog, that's how we manage. So we take a look at our -- how we've identified our criticality components with regards to risk and we put programs and strategies in place.

For equipment reliability and the current backlog that we have at each station, we -- every week we look at the backlog, we look at its safety significance, we look at its reliability significance and we put strategies and we pretty much attack them to make sure we can resolve them.

Obviously, if you're running a car and you're -- and it's a critical component and your brakes, for example, are failing, you're not going to operate the vehicle just like we wouldn't operate the reactor.

And so just trying to give some context and maybe put a human element to what is criticality and what is backlog because it can be a very difficult concept.

THE PRESIDENT: So let me just -- again, if we -- the way I look at this, we spend, I think, two or three hearings talking about SPIs. Let me start with that.

And we came, at least from a regulatory perspective, from our CNSC, that they identified something like 30 loss SPIs that they claim was required for them to keep track, basically, from a safety perspective.

My suggestion is, let's start with those 30. I don't -- and some of the data that goes with it. I don't think that we require a lot more graphs and data. What we require is a better explanation of what the data means and how it's related to the safety concern.

So I would suggest that in future years, together with the timelines and the actual 30 or so SPI, we'll have a pretty good set of information and we'll determine then whether they're adequate or not.

MR. FRAPPIER: Gerry Frappier, for the record.

So yes, we are intending next to have more information around the SPIs and their -- well, their importance, what they are, and also some numbers and some trending data.

Of course, of those, there's just a small set that's associated with maintenance program. They include a whole bunch of things with respect to fuel and everything else, so I think it would be very useful. And we're looking at how we can -- without turning the annual report to twice the size it is now, how we can incorporate those in a useful way.

THE PRESIDENT: Thank you.

Dr. Demeter.

MEMBER DEMETER: Sure. Just to -- because it's been brought up again by this intervenor. The issue of emergency preparedness was brought up in the previous intervenor, and this intervenor talks a bit about detailed scope.

And I was thinking about this, about what might help satisfy some of the intervenors and the public is when there's generic statements -- so this is on page 59 of the -- or actually, 55 of the -- of Staff's long presentation.

CNSC Staff have determined that all licensees continue to maintain and improve their nuclear emergency preparedness and response capabilities in a verified nuclear emergency preparedness and response program that meets requirements and so forth.

I wonder if it would be helpful, depending on the nuclear power plant in question, could just reference extant or current emergency preparedness documents by these other parties, whether it's Ontario or New Brunswick, federal government that were used to inform those opinions that all sites are sort of compliant with this.

That might really help sort of -- may help people understand how you came to your decision to make the statement that sites are compliant with emergency preparedness both on and off site.

That was my only comment, is it possible to actually -- all these references change through time. It's an organic process. The current documents that inform those decision, although they're beyond CNSC's documents, but they're used to verify compliance, may be helpful.

MR. FRAPPIER: Gerry Frappier, for the record.

I think that's a good suggestion. We could go through some of them now if you wanted to and get Mr. Sigouin to talk a bit, but I would point out that we have a compliance program for emergency management that operates on many levels, obviously reviewing plans and ensuring that we agree that the plans that are in place are suitable, but then we have a whole bunch of drills and exercises that go over and often, based on the document structure, if you like. And so they would go over and say, okay, we're going to look at you have all these procedures and capability in fire suppression, so we're going to do some drills around that or we require the licensee to do some drills around that.

We would be monitoring that or doing an inspection against it so that it's check marked on that document they've demonstrated it.

And now we go over to, you know, severe accident management guides and what the operators are going to do under severe accident management.

We have some inspections along those lines that will go in and say, okay, we reviewed all these documents and that the training is in place for those.

So we could -- it's hard to do it on the fly like a question and answer, but we could put something like that together. Again, whether we want it in the report or just as a -- some kind of note that would go to yourselves or something, I'm not sure what the best way is.

MEMBER DEMETER: I'm satisfied with the scope of documents that were presented earlier. They seem to be some ones that were sort of seminal to the process in Ontario or New Brunswick.

And if there'd been a preparedness exercise in that particular year, it'd be nice to have in the ROR this is what happened that year or if there's one pending so that someone reading this knows that these -- this is -- this is the fundamental scope of emergency planning beyond -- off site and these are the exercises that have been done or will be done in the near future.

But I'm quite happy with the -- with the documents that were previously presented. They do inform the decision quite well.

THE PRESIDENT: Thank you.

Dr. Soliman.

MEMBER SOLIMAN: My question about Section 3(1), page 4. The recommendation here, I understand that for each unplanned reactor trips we do root cause analysis. I think this is understanding. And we provide this through the OpX to other station and other operators.

But the question here, after we do the root cause analysis, what we do with that? Do we summarize lesson learned from that and use it for future occurrences or unplanned, do we use it to preparing ourselves for the maintenance for the equipment which would be at fault and all of these things?

I would like to hear from the station Bruce, Darlington and Pickering, and then New Brunswick, please, about specific area, what we do after we write the root cause analysis. What other steps would be taken after that?

MR. CLEWETT: Len Clewett, for the record, at Bruce.

So for the root cause analysis, we'll determine corrective actions to prevent reoccurrence, and there's other corrective actions. But as you mentioned, some of them typically would be to revise procedures, processes that could involve training.

One of the very positive things about the nuclear industry is operating experience, so not only do we take those actions at our site, but we would share them through the CANDU Owners' Group with Darlington and New Brunswick, Pickering.

We'd also share them with our industry working groups out of Atlanta. And there's a database that our COG, CANDU Owner's Group, and our industry group, WANO, keeps with just thousands and thousands of entries that the industry has shared.

So not only do we utilize the actions, but we share them in Canada and essentially worldwide.

MS SMITH: It's Stephanie Smith, for the record.

So we do very much similar things, so the OpX is shared amongst the sites, it's shared among the industries.

An important thing that we do do with this root cause, as explained, actions do come out of it, and sometimes those actions can be is to update documentation to reference OpX.

So it can say, you know, the last time you did this procedure, there can be a box that says this is what happened. So that might be one of the possible outcomes.

Another important thing is the root cause analysis itself is reviewed by the senior leadership team, so we actually -- before we agree that they've gotten the correct root cause, we as a senior leadership team review that root cause, ensure that we understand it and that we believe that they've gotten to the right answer as far as what caused an event.

MR. KHANSAHEB: It's Zar Khansaheb, for the record, for Darlington.

A couple of other items I'd like to speak about is again to follow up on training.

So when an event occurs, we will build it into future training programs again as part of our operating experience.

The second aspect is that we will also build it into our pre-job briefs for workers that will be doing the work in the future, so we have a database that's specifically talked to regarding OpX, and those events are brought up in that discussion.

MR. NOUWENS: Jason Nouwens, for the

record, NB Power.

We agree with all the comments that were said, and I think those are a good overview of the program.

Two other points I'd like to add is, one, when we do see external OpX come in, we actually enter it into our corrective action program and we'll do our own evaluation of the significance of the event as it pertains to NB Power and then implement corrective actions in our program to track what we'll do about it.

In addition, before any job starts at Point Lepreau -- and this would be consistent with the other sites as well -- we have a pre-job brief, and that pre-job brief specifically looks at the task at hand and looks for OpX from the industry that would pertain to that job as another barrier.

THE PRESIDENT: Thank you.

Dr. McEwan?

Mr. Seeley.

MEMBER SEELEY: I just have a question related to asset management and aging. It's not directly related to the JHT report.

But in the CNSC presentation, it referred to the fuel channel life management program and -- at Bruce and OPG. And so I had a couple questions related to this.

It's an important piece.

And one was, there was a comment about an ongoing research program or additional research needed for extended fuel channel operation, and so my question would be what kind of research, where would that -- where do you anticipate that research being done and perhaps comment on the scope.

MR. FRAPPIER: Gerry Frappier, for the record.

And we could have a long conversation on that. So perhaps I'll start off and then perhaps industry or some of our engineering folks would like to add to it.

But generally speaking, the fuel channel life management project is a program that industry started a few years ago to basically pull their research together looking at what are the long-term effects on pressure tubes -- primarily pressure tubes -- given that they want to continue long-term operation beyond what the original design had envisioned.

That set of testing involves a whole bunch of different testings looking at things like hydrogen pick-up, getting into the metallurgy of pressure tubes and how they evolve. They do a lot of research up at Chalk River, including burst tests, so they artificially age pressure tubes so that they can then see what happens, how easily they fail, what sort of metallurgical properties they have.

It's a big program. It's been going on for a few years, and will continue to go on for a few years.

From our perspective, we have two pieces. One is we require them to do some research to maintain their level of knowledge and to make sure they have appropriate knowledge, but more importantly is, if they are looking to operate the reactors beyond the sort of agreed-upon design area, then they need to demonstrate to us in very specific engineering details that they are confident of the integrity of those pressure tubes.

And I could ask Mr. Glen McDougall to expand on that as to what we're looking for in that research, which might be of interest to the Commission, and then industry could add as to what, exactly, the parameters are that they're doing.

MR. McDOUGALL: Glen McDougall, for the record.

Yes. In addition to what Mr. Frappier said, the industry scope of work has basically focused on three things over the last five years.

The first is a fundamental property of pressure tube. It's called fracture toughness. The second is the behaviour of one of the two types of spacers that exist between pressure tubes and Calandria tubes. This is a particular in-canal spacer made out of an alloy that has some unique properties when you irradiate it.

And the third thing is the development of new methodologies for demonstrating to the satisfaction of the regulator that these components can be safely operated into the future because that's a key part of what we examine as engineering staff at the CNSC.

We don't just look at the current status of a component. We're always asking a licensee to demonstrate it in a forward-looking way.

In terms of where the research is being done, yes, Mr. Frappier's correct. There's -- there is analytical work that's being done through a number of nuclear service providers here in Canada. The primary test bed for most of the examination of radioactive components is the Canadian Nuclear Labs in Chalk River. The Inconel spacers are an interesting example because industry has recognized that because they have very little data that they can use to predict in a forward-looking manner the behaviour of some of these spacer materials they have actually gone as far as the Oak Ridge National Labs in the States to try and get a real jump ahead into the future in terms of the type of damage that can occur to these spacers if you operate them in radiation fields for long enough and there are some very promising results coming out of that program.

THE PRESIDENT: We are talking about research. I assume that a lot of the result of this research will be available for the next Pickering licence extension hearing?

MR. FRAPPIER: Gerry Frappier for the record.

So even the last licensing, relicensing that we did at both Bruce and Pickering did have results from this research that were important to our evaluation and it will definitely be very central to some of the discussions we are going to have at relicensing next year. The research is not finished, it's ongoing and, you know, it's a little bit of a chase game. The industry has to stay ahead of where reality is bringing them as the components get older. So we are all confident about the integrity of the components right now. We want to make sure that in 10 years from now, since they want to continue operating for that long, that we are still going to be confident and that's the sort of research that's going on. And I'm not sure if somebody from industry wants to add to the discussion.

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

Yes, certainly we are going to provide you an update in September/October. In fact, CNL just completed a burst test yesterday, I believe, at 160 ppm, which gets us out to around the 300 kilohours that we are talking about. We won't have the detailed results for another couple of weeks. There's a part of the testing which confirms a hydrogen uptake that is actually destructive, so you can only do it finally after the test is done, you can't do it before. So we believe it's about 160, we will know for sure in a couple of weeks, and that's a key piece of data that's part of the hearings for next year. There are other tests underway as well of course and we promised an update around the end of September and we will have all that.

THE PRESIDENT: Speaking still on research, maybe changing the topic, the intervenor is talking about the need to do maybe Level 3 PSA and maybe comparing it with other industries like the coal industries or something like this. What is staff's opinion about that?

MR. FRAPPIER: Gerry Frappier for the record.

Maybe I will talk about the second one first. As far as looking into other industries and comparisons, we do have within the CNSC an environmental scan sort of process, if you like, that is looking mostly at the nuclear industry but we do look a little bit at the other industry, but that was one of the areas we had sort of mentioned in our slide presentation, that this is perhaps a very good idea and we would like to take a look at how we might do that. I would say that at this point in time we don't have a very -- we don't have results that are easily comparable from a risk perspective. I think the intervenor presented a couple of good cases with coal plants and with major dams, and both of those are -- certainly the major dams are very sophisticated in how they do their risk assessment. So I think it would be an interesting area to look into.

With respect to PSA Level 3, we have had some discussions here in the past. We still think that the Level 3 has so many uncertainties associated with it that it's difficult to bring it into regulatory space, but we are certainly continuing to review that position and in

particularly the high dose jobs and how they are controlled. I mean that's really where the big value is in this.

THE PRESIDENT: Questions anybody? One more question? No?

MEMBER DEMETER: No.

THE PRESIDENT: Okay. I think, first of all, I would like to thank Dr. Hopwood. This was a very useful presentation, challenge. I noticed that staff accepted many of the recommendations and presumably we will see some of them implemented, so thank you for that presentation.

Are we going to move on?

MR. LEBLANC: That's correct.

CMD 17-M15.4

Written Submission from the

Métis Nation of Ontario

MR. LEBLANC: So the next submission is from the Métis Nation of Ontario, as outlined in CMD 17-M15.4, and I would like to see if there are any questions from the Commission Members on this submission.

MEMBER DEMETER: Thank you.

Assessment, page 17, it highlights some concern about fish population and how this risk will be mitigated or mitigated already. Do we accept -- I want to hear from the staff about consultation which has been done with MNO or it will be done in the future.

MR. FRAPPIER: Gerry Frappier for the record.

So if I understand you, looking both at where we are in our environmental risk assessments and then in particular how the Métis Nation of Ontario might be involved?

MEMBER SOLIMAN: Yes.

MR. FRAPPIER: So as far as the Métis Nation involvement, I would ask Kim Noble again and then perhaps Andrew McAllister would like to add on the ERA.

MS NOBLE: Kim Noble for the record.

So just in late July we received a phone call and a request from the Métis Nation of Ontario to come to Toronto as they had a final report for their valued components and they shared that with us. So that was based on a number of -- they worked with OPG and Bruce Power in developing this report, identifying the valued components around the Bruce site. So for those particular sites we are going to -- our staff will be reading those components.

We are already working on our next meeting with the Métis Nation of Ontario to talk about the Bruce renewal, *Fisheries Act* authorization, and obviously we need to better understand their valued components, so that will also be on the agenda.

For the more technical review I will hand it over to Mr. McAllister.

MR. McALLISTER: Thank you, Ms Noble. Andrew McAllister, Director of the Environmental Risk Assessment Division.

We have been having regular meetings with the Métis Nation of Ontario where they have been discussing their different concerns regarding potential impacts to the fish in and around the Bruce site. What was really I think beneficial for all parties involved was the recent Lake Huron/Saugeen Watershed Fish Symposium that was held in June, where the Métis Nation of Ontario presented to us and to all the participants their concerns around those things. So that has really helped I think focus us moving forward to discuss the various issues that they have. And those issues really transcend sort of the different regulatory processes that are happening or will be happening.

We know that Bruce Power is going for a relicensing and as part of that relicensing they recently submitted an updated environmental risk assessment, so we imagine that the Métis Nation of Ontario will have an interest in what's within that risk assessment with respect to how it may affect the species that they value.

As well, there is the ongoing *Fisheries Act* work that's happening and those matters that they have raised to us. We will continue to pursue them through that regulatory activity as well.

MEMBER SOLIMAN: Thank you.

THE PRESIDENT: I recall that in the licence renewal for Bruce there was a lot of discussion about fish and the working relationship between Bruce Power and the various indigenous groups. I thought at that time you were to establish some ongoing mechanism for dealing with specifics concerning the issue. So make sure that whatever environmental risk assessment you do, if they want you to measure a particular fish, that's the fish you're going to measure. What happened to all those plans?

MR. SAUNDERS: Yes. Frank Saunders for the record. We measure all the fish, right, so it's not a matter of whether we leave some out, we don't. We have a very extensive R&D program that we have in place and have had in place for four or five years looking at the impacts not only of radiological but thermal, chemical and other impacts on fish. Much of that work has been -- we were focused first on the lake whitefish and the round whitefish, they were groups of special interest to the Saugeen Ojibway Nation, and we have data on all the other fish and we continue to do that R&D. We do update people on this all the time, including the First Nations. We hold workshops every year on it so people can come and participate in that. I don't think there's any shortage of data or work in this area. You know, I don't --

THE PRESIDENT: I guess my question was because we heard some new concern which I thought should have been addressed in this famous meeting of all parties, recent meeting. Somebody correct me if I got it wrong.

MR. McALLISTER: Andrew McAllister for the record. I can provide a bit more clarity. Then some of my colleagues might be able to add a bit more precision.

In discussing fish-related matters with the different groups, we have been doing so largely on sort of direct discussions with them given that oftentimes their concerns are somewhat different. What this symposium realized was to be able to bring the different stakeholders into the room to hear about what the latest information was. So what was really interesting was not only were there indigenous groups, there were the various regulators at various different levels. We had federal representation from folks like ourselves, Fisheries and Oceans Canada, Environment and Climate Change Canada; we had provincial representation for the Ministry of Environment and Climate Change, the Ministry of Natural Resources and Forestry; we had Conservation Authorities. So it really helped to give participants an idea of how these aspects get regulated and also gave them an opportunity to express, if they so chose to do so, their concerns around potential impacts in Lake Huron or the Saugeen Watershed. And as I said, it was a good exchange of information amongst a large number of parties and a lot of which we will be pursuing with some of these groups on an individual basis. I don't know if anybody else wishes to add anything.

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

So what we heard in the past I think is something that we will be correcting in the future and that is when an environmental risk assessment is submitted, often a surrogate fish species is selected that would be representative of a number of species of fish. For example, certain species of salmon may from a scientific basis allow us to understand what the risks are for all salmonids, different types of salmon and trout, and that species was represented in the environmental risk assessment and helped us as scientists. What we heard from the First Nations and other indigenous communities is that that may not be necessarily the very species of fish that they are interested in and they would like to see the fish that they are interested in consuming represented in the environmental risk assessment. So I think that was a very good point and we will be looking to target those specific species of fish through our IEMP once we understand what species they are interested in through the structured tables that we will have to engage indigenous people, and we will be informing the licensees that those are the species of fish that we would like to see represented in their environmental risk assessments as well.

THE PRESIDENT: I thought we heard all those concerns in 2015. So that's why I'm reacting that here we are in 2017 we are hearing the same story. And also, I thought by now the authorization licence from DFO would have been done, which requires also consultation with indigenous. So what am I missing here? Bruce...?

MR. SAUNDERS: Yes. We too thought it should be done by now, but the issue with -- I mean in fact we already do what Mr. Rinker talked about. In fact the reason we looked at lake whitefish was because they were the species of special interest to the SON. Our scientific selection was round whitefish that we thought was a better representative in terms of the environment in general. They asked us to do lake whitefish, so we did, and we are doing round whitefish as well. We don't have a particular species requested from anybody else and we could do that to the limit we can. There's some limit about how many species we can do R&D on and so forth, so it has to be reasonable and has to make some scientific sense, right, to do what we are doing, but we haven't had any further requests.

On the DFO application, you know, it is a very painful process is all I can say about it. It is really designed for new projects. We are not a new project, we have been operating for 30 years, the rules around the new projects are very cumbersome to work with. It has taken us longer to do this DFO application than it did to update our Probabilistic Safety Analysis for the Fukushima event and we are still going.

So I think we are nearly at a conclusion, to be honest with you, but it is a very ill-defined process, there is really not much guidance on how it is to be done. There are various opinions about how it is to be done and you are constantly going back and reworking the data in a slightly different way to satisfy a question. So it has been slow and it has been painful.

We did do all the data, we certainly have it all and we are working on a standard through the CSA to help kind of standardize this process a little bit so it doesn't take this long to do things, because it shouldn't, quite frankly.

The data calculations here aren't that fantastic. The issue really is because there is not -- you are not getting a lot of fish, the uncertainties are fairly high. So you can spend a lot of time talking about the uncertainties and whether it should be this or that or where it goes, but at the end of the day we are an ongoing operation, we are monitoring and measuring every year and we will continue to do that, so if the uncertainties aren't quite right, it will soon show up in the monitoring process.

The same way with offsets. We have selected to do a large number of offsets, about eight times what we think the impact actually is, even though there is some uncertainty on whether those offsets will produce everything they should. The eight times will certainly take care of it we think and as we monitor the effects from that, if it doesn't actually take care of it, then obviously we will change the offsets to match. And just to note, we have actually been doing offsets for years, we just didn't call them offsets, we called them environmental projects.

But the other rule that the DFO has had is that if you have it already underway you cannot count it as an offset, which drives us a little crazy, so we stopped some work in that process. We are turning some of it back on this summer because we don't want to lose the season, but we understand we are doing it at a risk, DFO may not accept that as an offset if we do it now. So there's all kinds of things in this process which, in my view, are just not helpful, but we are getting through it. I think we are nearly at the end.

THE PRESIDENT: CNSC, are you part of this painful process and how does -- the indigenous consultation requirement, was that part of the process done already or not?

MR. FRAPPIER: Gerry Frappier for the record. I will ask Caroline Ducros to add to that, or Mike Rinker, whichever one may want.

DR. DUCROS: It's Caroline Ducros for the record.

Yes, CNSC is part of the process. We are the single window of contact on the *Fisheries Act* for the review stage, so we have been working with Bruce Power. We are meeting as well in mid-September with DFO, Bruce Power and ourselves for a technical meeting on offsets to try to resolve some of those issues. And concurrently, to follow on to your question, we are meeting with the Métis Nation of Ontario and the Saugeen Ojibway Nation and the Historic Saugeen Nation. So no, it -- sorry, pardon me. To finish your question, no, the consultation process is ongoing at this point. We still have some technical conclusions to make as well, but we are hoping to resolve a lot of this in September in a technical session.

THE PRESIDENT: Thank you.

Dr. McEwan...?

MEMBER McEWAN: Thank you, Mr. President.

I would be interested in staff's view on page 17 of the MNO report of their suggestion that something around aboriginal consultation is formally added into the safety and control area subsection evaluations.

MR. FRAPPIER: Gerry Frappier for the record.

So the regulatory framework has sort of three big components to it. One is guidance on applications and things like that, so that's section 1. Then we have our safety and control areas which we talk about the most here and we have 14 of those. And then we have a third section, which is Other Regulatory Matters, which has for instance financial guarantees in it and a couple of other things, and one of the areas there is aboriginal or indigenous engagements. So I would say we already have that and we have a REGDOC associated with that, and so I take the point that they are making and we probably don't maybe refer to it as a safety and control area but it's managed the same way, if you like. So I think effectively we have that.

MEMBER SEELEY: Maybe just a comment on the DFO permitting process. I understand DFO has its own requirements and CNSC I presume is trying to help facilitate this process, so somewhat the Sherpa here in Ottawa here with the DFO group. But I do understand that the whole application is submitted to CNSC first, then they review it, then it goes back, and once they are happy with it then it goes to DFO. So that to me sounds a bit duplicate. Is there maybe some thinking about how that process could be improved such that those permits and approvals could be put in place in a timely way?

MR. FRAPPIER: Gerry Frappier for the record and I will get Caroline Ducros to add to that.

But it's a little bit more sophisticated than that in the sense that the legislation has sort of provided opportunities for CNSC to have responsibility under the *Fisheries Act* and so in fact we are doing certain activities that DFO would have otherwise done, so that the concept having been at the time to have sort of one project, one regulator, if you like. So that's how we have sort of gotten ourselves really involved in this. How much it is relieving DFO from having to do things, I'm not so sure, and perhaps Caroline Ducros can add to that.

DR. DUCROS: Caroline Ducros for the record.

The reason why the MOU was put in place was to try to have, as Mr. Frappier said, a one window, one regulator approach. The legislation currently doesn't delegate authority to CNSC. So, as you say, we do do the review. Part of the reason why we do that is because we also have to assess the environment under the *Nuclear Safety Control Act*, so we have expertise onsite that works quite closely with regulators on the effects to fish and fish habitat under our legislation. So rather than reviewing under the NSCA from the CNSC and having DFO review under the *Fisheries Act*, we have this single point of contact doing the review. Once we are satisfied, as you say, with the application and we feel that it will meet all DFO's requirements, and their requirements are set out in the *Fisheries Act Regulations*, then we ask the regulator to send their completed *Fisheries Act* application to DFO and copy ourselves. But in the meantime we are working with DFO throughout the process and so we will give a report to DFO about our review of that application, including the completeness of the engagement with aboriginal groups. So the intent is that by the time DFO has the application it will take less time for them to come to a decision.

MEMBER SEELEY: Do you have, what should I say, agreed to timelines around this process?

DR. DUCROS: Caroline Ducros for the record.

There are under the *Fisheries Act* regulatory timelines for once a completed application comes to them. Those timelines are 60 days for a completeness review and 90 days for the Minister to make a decision. However, the length of time that it would take to actually review the application depends on the completeness of the information. So if CNSC were not doing the review and it went directly to DFO and there was missing information that they found in that first 60 days, that would go back into the -- the timeline would stop and it would go back to the regulator to complete that information. So a lot of the length of time it takes to do an application depends on the quality and completeness of the information. And I can't -- there is no specific timeline, there are decision timelines that are in regulations.

MR. LOCKWOOD: For the record, Randy Lockwood.

Perhaps we have gone -- we are at the front end of the process for Pickering and we have completed it for Darlington. I could ask Raphael McCalla to give his view.

I have read our recent application front to back. I was particularly interested in offsets, what are the requirements, have we properly consulted with indigenous people, where are we at with the overall process, so I would offer that. We have completed the process for one of our stations and we are at the front end for the other, if you are interested.

THE PRESIDENT: Please, go ahead.

MR. McCALLA: Raphael McCalla for the record. I am the Director of Environment for OPG.

Randy Lockwood is correct in the sense that yes, we do have one authorization completed for our

Darlington facility and we are currently seeking an authorization for the Pickering site. The process that OPG followed was slightly different than what was described by the CNSC insofar as that OPG worked exclusively with DFO in terms of preparing that application. While CNSC participated in some of the meetings that we were having, we worked directly with DFO, and the reason we were required to do that is simply because of the offset measures that we put forward to address the impacts that we were having. So a decision was made early in the process to allow DFO to be the lead with respect to our application. So our application was submitted in July and it's currently being reviewed to ensure that it is complete so that we can get into the 90-day window, which is the period in which the Minister will make a decision and, if acceptable, issue the authorization.

I will say that there are many components to completing the application. I think one of the more challenging parts of completing the application is around the agreeing on the offset measures and that is the one that I would say is in a lot of ways perhaps not well understood and requires a lot of interaction, if you will, with the Fisheries and Oceans Canada to make sure that you have that right.

In terms of the engagement with aboriginal groups, OPG conducted a number of engagement sessions to identify the project and what exactly we were doing with respect to not only the impacts that we recognize but also the offsets that we were proposing. So we met with I believe it was five different aboriginal groups, or five or six aboriginal groups to discuss the project, to consult with -- well, to engage them around whether or not they saw the work that we were doing as being acceptable, and that information was shared with DFO. Our understanding is that DFO is the regulator that would actually do the consultation with the aboriginal groups and not the licensee.

THE PRESIDENT: Okay. Any further questions?

Okay, thank you. Thank you very much.

CMD 17-M15.5

Submission from the

Canadian Nuclear Workers' Council

MR. LEBLANC: So the next submission is from the Canadian Nuclear Workers' Council, as outlined in CMD 17-M15.5.

Any questions from the members? Dr. McEwan...?

MEMBER McEWAN: So on page 3, the second last paragraph, the paragraph where they say "...member Unions work very closely with the Licensees ... and ... participate in the licensing and regulatory process[es]", can we just get a sense of how that closeness is achieved and what added value it brings?

MR. FRAPPIER: Gerry Frappier for the record. So I can talk on behalf of certainly from the CNSC's perspective and then industry may have their perspective.

The unions, both this one and others, have participated at I think all of our licensing hearings that I can think of anyways with respect to providing a viewpoint from the workers' perspective. It's quite important in certainly the occupational health and safety aspect. They have also had comments on safety culture that I think were very good, are very relevant. With respect to the regulatory document process, they are a member of the public like anybody else and have participated, and I think we might hear a little bit more about that tomorrow.

In certain REGDOCs, I think that they have been selective in the ones that they do, the ones that have a particular emphasis on workers and the life of a typical worker, if you like. They have not necessarily participated in all the REGDOC development. They have also participated in our regulatory making process, so we have had comments from them on some of the regulations that we have put together.

With that, I would turn it over perhaps to industry to talk about their relevance to their engagement with industry and -- but just to be clear, the CNSC does view them as a valuable member. We meet with them regularly on, like I say, various regulatory documents that are being developed and we also meet with them as station representatives, if you like, both right up to and including the President.

MR. SAUNDERS: Frank Saunders.

Certainly we do deal with of course the union membership quite frequently on these issues and they participate with us on REGDOC reviews. We also have policy committees and joint working committees that we work with the unions themselves around safety, radiological safety, conventional safety, work protection, et cetera. So yes, they are pretty intimately involved at that level. In a lot of cases like the hours of work, fatigue management and the like, of course they were involved both within our organization and others in commenting on those things. So yes, there's some pretty healthy involvement there. You can't really avoid it. I think, you know, if you have a healthy relationship you are going to discuss these things and we do.

THE PRESIDENT: And as we will see tomorrow, they are not shy about telling us when they are not happy about something that we do.

MR. MANLEY: President Binder, it's Robin Manley for the record, Ontario Power Generation, Vice President Nuclear Regulatory Affairs and Stakeholder Relations.

Just to expand on what Frank Saunders said in terms of union participation in review of regulatory documents and the licensing process, and not to speak for them but just to give as an example, I meet regularly with one of our unions, the Society of Professional Engineers, with respect to providing them an update on what's going on in regulatory document development from the CNSC, making sure that they are aware of what the major REGDOCs are that are coming, and giving an update on our Pickering relicensing for example is one of the topics that we have briefed the union on.

THE PRESIDENT: Thank you.

Questions? No? Okay. Thank you.

CMD 17-M15.6

Submission from the Power Workers' Union

MR. LEBLANC: The next submission is from the Power Workers' Union, as outlined in CMD 17-M15.6.

Any questions from the Members on this submission?

THE PRESIDENT: Dr. Demeter...?

MEMBER DEMETER: On the first page of the document it talks about:

> "We negotiate provisions in our Collective Agreements that exceed regulatory requirements such as dose limits, the unilateral right of certified Joint Health and Safety Committee ... Members to shutdown unsafe work and additional training..."

From a CNSC point of view, do we track such work stoppages that are done by the Certified Joint Health and Safety Committees, and if so, what is the frequency of this?

MR. FRAPPIER: Gerry Frappier for the record. I will ask Miguel Santini to provide some information on that.

MR. SANTINI: Miguel Santini for the record.

Work stoppages are handled by the Ministry of Labour in Ontario. So basically they are called to intervene kind of as a mediator and make a determination whether it's reasonable or not to stop the work, and in those events we participate with them on the assessment.

MR. STEVENSON: Jeff Stevenson, Power Reactor Site Inspector, for the record.

So in addition to what Mr. Santini said, we do have a Memorandum of Understanding with the Ministry of Labour. So we do follow up with them on these work stoppages. Being on site, we are aware when these work stoppages happen, so we are able to independently investigate these issues to see if there's any safety issue there that needs to be resolved and we can take corrective actions ourselves, if necessary.

MEMBER DEMETER: Is there a sense of relative frequency; once a year, once a month...?

THE PRESIDENT: What does industry practice?

MR. CLEWETT: Len Clewett of Bruce Power.

I would say maybe two or three a year and, you know, certainly it's a very good process, whether it's management or the power workers or society, we expect anyone to stop when work is unsafe. We have a process to vet before we return to work, a healthy process, probably two or three times a year probably, we use it at Bruce Power.

MR. KHANSAHEB: It's Zar Khansaheb for the record.

Very similarly to Bruce Power, it's a very rare occurrence. We have a graduated process where a worker identifies an issue, that issue results in the work being stopped. At that point it's not declared an official work stoppage per the Ministry of Labour requirements and very rarely would it ever progress to that level.

So, we are able to solve it internally with our internal processes to manage that as necessary.

MEMBER DEMETER: All right. Thank you.

THE PRESIDENT: Thank you.

Any other comment? Questions?

Okay. Thank you.

MR. LEBLANC: The next submission is from Northwatch as outlined in CMD 17-M15.7.

CMD 17-M15.7

Written Submission from Northwatch

MR. LEBLANC: Dr. McEwan?

THE PRESIDENT: Dr. McEwan?

MEMBER McEWAN: Thank you, Marc.

So, I thought this was a helpful intervention, I thought it was well written and certainly brought some important things forward.

And on page 3 where they sort of ask for commentaries going forward on fuel bays, if I remember, staff felt this was something that they would incorporate in future reports.

If you would just give us a little sense of that process and what you hope to put in.

MR. FRAPPIER: Gerry Frappier for the record.

So, certainly any issues around the irradiated fuel bays that are of safety concern would be in the report.

They make reference to a specific sort of phenomena in key parameters, identification ranking. That's a task team that is undertaking some activities and if you're interested in that we could have Mister -- I think it's Vali Tavasoli who can talk to us a bit on that.

MR. TAVASOLI: For the record, this is Vali Tavasoli, Director of Physics and Fuel Division.

The study that Mr. Frappier referred to is research work that we are doing with CNL Lab. As part of that is to develop a good understanding of all the phenomena involved in accidents that related to fuel bay and ranking of the parameters which we have to be able to better model if you're going to simulate it.

MEMBER McEWAN: And so, going forward there will be sort of a slightly more structured approach to this in the RORs?

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

So, certainly as Mr. Tavasoli mentioned, there is this particular initiative going on. I could also talk a bit to the regular compliance program we have and I'd ask Suzanne Karkour to perhaps come and talk a bit about the recent inspection.

With respect to the ROR itself, I don't think we were intending on putting any more additional information in, but that's certainly something that if there's an interest we can.

The irradiated fuel bay is a pretty straightforward area that's obviously very important because it has a whole bunch of spent fuel on it, but as far as an engineering safety review we do have a compliance program and if there's any findings that would be of significance, like all the other inspections that we do, they would show up in the ROR, but perhaps Ms Karkour could explain a bit on how we go through that inspection.

MS KARKOUR: Suzanne Karkour for the record, Senior Inspector at the Darlington Nuclear Power Plant.

So, as was alluded to earlier, CNSC staff routinely conduct inspections on systems important to safety and every year based on regular routine surveillance and monitoring and attendance of plant health meetings where system health are presented we select certain systems to perform inspections.

So, the irradiated fuel bay system inspection was actually conducted at Darlington in May, 2015 to assess compliance with regulatory requirements in areas of various safety control areas including management system, human performance management, operating performance, physical design and fitness for service, amongst others.

And during that inspection CNSC staff did identify many compliant findings as well as some areas for improvement. And what CNSC inspectors do when we identify areas for improvement in systems important to safety such as the irradiated fuel bay, so we enhanced our regulatory oversight of that system by conducting regular meetings with senior management, additional walk-downs of that system to ensure that the corrective actions taken by the licensee were satisfactory to prevent reoccurrence and to maintain system health to our satisfaction.

So, as a result of the enhanced regulatory oversight conducted by CNSC staff in May, 2017, CNSC staff have deemed the corrective actions to be acceptable and deemed the regulatory oversight to be no longer required and the actions taken on OPG was closed.

So, this process is done on all systems important to safety and the IFB happened to be one of the systems that was selected in 2015 and was monitored for two years to ensure that the corrective actions were taken.

MEMBER McEWAN: So, you've been monitoring it now for two years and yet it was invisible in this report.

So, it's hard to think that Northwatch don't have a point, that there is some lack of clarity.

MS KARKOUR: Suzanne Karkour for the record.

The reason it may have not been in this report is because it was a 2015 inspection, so it may have appeared in last year's report, but it wouldn't have appeared as its own section because, as I said, the inspection covered many safety and control areas.

MR. FRAPPIER: Gerry Frappier for the record.

So, Northwatch is correct that we don't put -- that we don't have a particular chapter, if you like, on the irradiated fuel bay.

We are looking at how we're going to be providing information on waste at nuclear -- NPP sites and that will be part of the ROR starting next year. We'll combine the information associated with the licence on the waste facility that is essentially on site, if you like, and that will then have a smoother transition between sort of the irradiated fuel bay and the dry storage. And so, perhaps in there that's going to start then taking on additional attention.

THE PRESIDENT: I think Northwatch has a real good point. I don't understand why -- you know, for a long time we were talking about how long should the fuel remain in the pool, how fast they will take it from the pool to the dry storage, what's the capacity of the bay.

Where are all those -- you know, where is all this described in the ROR and why isn't it described?

It's been a debate and argument in the industry for a long, long time and those are very simple parameters that connect from the operation to the waste management.

So, I would like to see in future RORs a lot more attention, not only to safety, but just on the parameters of the fuel bay going from wet storage to dry storage.

MR. FRAPPIER: Note taken.

THE PRESIDENT: I think somebody is coming to help us here.

MS GLENN: Good afternoon. My name is Karine Glenn and I'm the Director of the Waste Decommissioning Division at the CNSC.

Northwatch did raise similar concerns when we presented the annual regulatory oversight report on waste in December and at that point in time we did mention that we would look to consolidating the waste management facilities as part of the NPP reports and that's going to be starting with the 2017 calendar year to be reported next year.

However, I would like to point out that currently the Canadian National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management covers both the wet storage and the dry storage aspects of spent fuel or used nuclear fuel management and that's published every three years and it is posted on the CNSC website.

The last edition was dated October, 2014 and we are in the process of finalizing a new edition which will be posted to the website early in 2018 following French translation.

THE PRESIDENT: Dr. McEwan?

MEMBER McEWAN: And if I remember, we had a commitment there'd be a brief presentation on those during one of our meetings just to have some sort of public background to it as well.

THE PRESIDENT: Okay. Questions? Dr. Soliman?

MEMBER SOLIMAN: Page 2 of the CMD, last paragraph, talk about the PSA with respect to multi-unit impact and the severe accident -- severe accident management guide including event in an irradiated fuel bay.

It has been mentioned in the report CMD

17-M15 on page 29, the last paragraph, that for multi -- under probabilistic safety assessment that the -- for a multi-unit station and the events in irradiated fuel bays, a number of these updates due to Fukushima has been completed and CNSC staff were satisfied with the progress. So what exactly is the update to severe accident management guidelines and how -- and what is the progress in that?

MR. FRAPPIER: Gerry Frappier for the record.

So you brought up a couple points there. So again I didn't -- certainly the fact that the irradiated fuel bays are not talked about a lot in the ROR does not mean we're not doing things about that or that we're not reviewing it. So as our inspector noted, we do have an inspection program.

As you have noted and was mentioned in here, we have also updated the requirements around PSAs.

So one of the additions to the requirements of PSA was to ensure that the radiated fuel bay is part of the under probabilistic safety assessment as one of the areas to be reviewed and to be included in the PSA.

You also mentioned about then the transition of all that information if you like into severe accident management guides. So the severe -- updating severe accident management guides is something that's been going on since the Fukushima lessons learned, if you like, and so to speak a bit more on that I would ask Mr. Noreddine Mesmous, please.

MR. MESMOUS: Noreddine Mesmous for the record, Director of the Reactor Behaviour Division.

So, yes, current severe accident management guidelines do include irradiated fuel bay assessments and all the design improvements as part of the Fukushima action items have been included. It's mainly connections. I think water connections to the pool.

So it should be noted that analysis had indicated that sufficient time are available to stop irradiated fuel bay accidents from progressing to severe accidents. So there is sufficient water and it is possible to add water.

MEMBER SOLIMAN: Okay. How the irradiated fuel bays fall under probabilistic safety assessment? Isn't this deterministic more than probabilistic?

MR. FRAPPIER: Gerry Frappier for the record.

So like other systems you can look at in both ways, both deterministic and probabilistic. So from a probabilistic perspective you breakdown what are the various failure mechanisms that could occur, what is the probability of their occurrence and what are the consequences should they occur?

I think one of the things that has become clear out of the various analyses that we've done is, as Mr. Mesmous mentioned, there is a lot of time with respect to taking care of any kind of leakage or failure of irradiated fuel bay systems which is important in the CANDU design that you actually do have that.

As far as what exactly is the process by which the PSA would go through that, I'd ask -- I'm not sure if it's Guna or -- oh, okay, Mr. Jammal. That's even better.

MR. JAMMAL: No, thank you. I'm not going to talk about PSA. It's very important to put in perspective what we're talking about. Deterministic element and the assessment takes place for the fuel bay as part of the safety case. So that is done every time there is a review for the safety case. I want to put that element, so deterministic element is being considered as part of the safety case.

With respect to the fuel pool, I want to go back to the safety assessment that was done for the fuel pool post-Fukushima and prior to Fukushima. I do note, for the public sake, that in the -- I am going to use it -- layman's term -- we burn dirt in a nuclear reactor that means natural uranium in the CANDU. The fuel pools that we've got are not similar to what happened in Fukushima. They are not up on the third floor. Nor, they are containing an enrichment element.

As part of the safety case, looked at the criticality element, looked at when the pools are completely drained, seismic elements. So the licensees put enhancements in place, let it be liners and so on and so forth. So the deterministic element determined the condition and what would be the doomsday scenario as known as such. So that's a key element here.

With respect to the PSA I will pass it onto our colleagues, but I just did not want to leave the discussion out that there is a safety element that was not considered in the safety case for the fuel bays.

THE PRESIDENT: We have a whole session on PSA coming up right after this if we ever get to it. So I really would like us to reserve this discussion for later on.

Any other question on Northwatch's intervention?

Okay, thank you. Marc...?

CMD 17-M15.1

Submission from Jane Beecroft

MR. LEBLANC: So the last submission is from a Ms Jane Beecroft, as outlined in CMD 17-M15.1.

I would like to note that this intervention was inadvertently permitted but should have been returned as it contains inappropriate language.

But since this intervention was admitted and is part of the record, I will still ask the Members if they have any questions on this submission.

THE PRESIDENT: No questions.

MR. LEBLANC: So we have completed the written submissions, Mr. President.

THE PRESIDENT: Thank you. So now let's open up the floor for Commissionaires asking questions. Let me start with Dr. Demeter.

MEMBER DEMETER: There is a number of references to minimal shift complements referring to episodes where they were not met with a comment that there was no adverse safety effects related to such, but my understanding of a minimal shift complement is that there is a minimal shift -- such an event occurred you could react appropriately, versus saying thank god nothing went wrong when we didn't have a minimal shift complement.

So help me understand what a minimal shift complement means, whether it's really minimal or it's recommended, sort of from a safety point of view, help me understand what that minimal shift complement is.

MR. FRAPPIER: Gerry Frappier for the record. I'll ask André Bouchard to provide some additional information.

But generally speaking, minimum shift complement is the result of an analysis of all the different potential circumstances the station could find themselves in and who you might need and how many of them for whatever occurrence might happen. It does go deep into the organization though as far as it's not just about nuclear operators for instance. It also goes both your fire response team and also into other groups that are needed to support activities that might happen at a station.

But Mr. Bouchard, if you could add to that?

MR. BOUCHARD: André Bouchard for the record. I am the Director of the Human and Organizational

Performance Division.

Minimum shift complement is part of the defence in-depth. So there are several other measures but minimum shift complement is -- it is the minimum set of qualified individuals with being able to perform whether in current operation or emergency situations. That set of individuals and their qualifications is determined through an analysis of operating conditions as well as emergency conditions which needs to determine the type of knowledge, the technical competencies of these individuals and must be present at all times at the facilities.

In the case that we are discussing here with regards to these occurrences, when a licensee -- and that happens due -- as an example, if one of the workers fell ill during his shift then obviously that worker needs to be evacuated from the facility and sent to the hospital.

Then the licensee has other measures in place that are put in order to mitigate the time within which a replacement can actually be brought into the facility to ensure that the minimum complement is back to normal.

MEMBER DEMETER: Just so that I understand that, so routine operations would be at the minimum so that if one person were left, like there is no redundancy built into having an N-plus, some cushion so that if people get sick you're not below that threshold?

MR. FRAPPIER: So Gerry Frappier for the record, and I'll get industry to provide you some more details.

But not, it does not -- it's not quite such a fine line. But there is -- as I mentioned, it goes deep into the organization with respect to the numbers of people that are viewed as being part of the minimum shift complement. But there are various situations where industry might find themselves below that for a certain period of time and our reporting requirements are such that they -- it's mandatory for them to report to us.

But perhaps somebody from industry would like to give some examples of how and why they might be below minimum shift complement.

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

The minimum shift complement is not exactly what you would say the minimum that you actually need. It's the minimum we're licensed to require and it can happen a couple of ways that you get that.

Generally, we have a normal shift complement and a minimum shift complement but at any given day, it's possible that you might be at the minimum. And that does -- it's a pretty rare occurrence actually that we miss a minimum shift complement that it does occur.

The other way it occurs on occasion is there are a number of qualifications that we require to be present, you know emergency quals usually, and sometimes somebody makes a mistake and they don't realize that that qual is not present. We typically will find that out after the fact but we report it just the same. It doesn't mean the person wasn't there. They just didn't happen to hold this qual.

But in many cases we have extra, like authorized nuclear operators we actually require four to do what we do. We have six on as a minimum shift complement and that occurs in other areas. So our ability to actually respond to an event is not impinged by that.

In other cases like the shift manager there is typically only one shift manager there. He is part of the minimum shift complement, very seldom gets sick. Luckily he's a healthy guy. But if we had to we would -- we'd bring somebody in very quickly to fill in that spot and the control room shift supervisors are normally qualified to step into that role as well.

As far as emergency duties are concerned, both these guys are trained to do that job. So we have duplication kind of built in all over the place and the system for the obvious reasons.

MR. LOCKWOOD: Randy Lockwood for the record. I am going to ask both Zar and Stephanie to comment, particularly how we track minimum complement.

MS SMITH: Stephanie Smith for the record.

So we track minimum complement using a database. So employees use their TLD badge. It has a bar code on it. They swipe into a computer. The computer keeps track of who is in, makes sure that it has enough quals. If somebody goes to badge out and would put as below minimum complement there is a warning and that employee is not allowed to badge out. So that gives an indication to the employees that they shouldn't be badging out.

Another important point of managing minimum complement as, I believe it's John said, we seldom have had cases where we had to go below minimum complement. Normally it's a sickness or something to that matter. When those cases do occur we do go -- the procedural guidance to the shift manager says that we put all of the units in quiet mode. So you would operate the station, hands off, just to prevent anything from happening. Example, you wouldn't open up a channel. You would stop fueling. You just keep everything nice and quiet until you get a replacement in.

MR. HARE: Michael Hare for the record for NB Power.

We follow the same rules of engagement that OPG and Bruce do too. We have a minimum shift complement study that dictates the number of people we need on shift. If for sickness or any injury or anything that occurs, we do have a procedure like OPG that we would go to quiet mode operation. It's very deliberate and tangible of what activities we would or would not do until we bring in a replacement person for the person that did not happen to be there.

THE PRESIDENT: Thank you.

Dr. McEwan...?

MEMBER MCEWAN: So a question, I think, about SCAs on page 5 and 6 of the executive summary of the staff CMD.

And again, thank you for the appendix where you describe them and the calculations behind them, very helpful. But I think it probably comes back to trending and partly the differences. I am surprised, for example, that Bruce A and B can have different integrated plant ratings. And also, if I look at Table 2 where you have highlighted those with a decrease in the rating from the previous year, I think it would be very helpful to see trending of that. If we see one plant which is trending downwards in multiple years in multiple different areas it is presumably giving us a message that all is not well.

But how can Bruce A and B have different integrated plant ratings when they have a single licence?

MR. FRAPPIER: Gerry Frappier for the record.

Yes, they do have a single licence but we do still review their compliance -- the compliance program is set against both stations and so that we keep -- both stations get their own rating system, if you like, and of course some of their aspects of their rating are programatic that may be applied to both and some are not, though, in that they are station-specific.

But I'll ask Brian Gracie to talk about the specifics here.

MR. GRACIE: Brian Gracie for the record.

There have often have been a number of questions about the rating system. For a large number of years we have had numbers behind the rating system which we don't print, but what we had described in the appendix is this sort of range of numbers. For example, from a value between 6 and 8 gets you a satisfactory rating, a value between 8 and 10 gets you a fully satisfactory rating.

It so happens that a lot of the ratings that we have seen in NPP RORs sort of is very close to that of border, actually, at around 8 and a lot of the times it's 7.8, 8.1 and quite often the differences you see, even though they show up on a piece of paper is orange versus green as an example, they are often actually that close. So that's an important thing to take into account. That actually was the case in a lot of the ratings that formed the -- a lot of the numbers that formed the basis for Bruce Power this year.

THE PRESIDENT: Thank you.

Mr. Seeley...?

MEMBER SEELEY: Yes. Maybe with respect to conventional safety or worker safety, so slides 18 and 19 in the presentation, just a general comment that very pleased with the sustained safety performance of the nuclear power plants with respect to worker safety and, you know, how well this compares to the world. To the world average, for example, that this is continued high performance across all the facilities. So congratulations on that.

I think these metrics although we don't overlook them, they are a very important piece of the puzzle because a well-managed safety program for worker safety of course can reflect in many, many other programs in the facility, so well done there.

I had a question. There was a comment on slide 18 with respect to 2016 and the WANO, World Association of Nuclear Operators, not including the data. I think it was about employee safety plus contractor safety, the metrics that changed there.

But just a clarification; does already of the MPP, the Canadian MPP data include both workers, both staff and contractors in their numbers or is it just staff employees in their statistics?

MR. GRACIE: Brian Gracie for the record.

This particular safety performance indicator that was used in that graph does not include contractors for the data that we collect from the MPPs. That was -- that's -- I don't know the history but perhaps that was chosen at the time when we chose the performance indicators because WANO did it the same way and it did actually offer a comparison. Now, WANO has changed what they are doing so we cannot make the direct comparison any longer.

MEMBER SEELEY: For me it would be certainly useful to have the data with the contractors, particularly with the refurbishment activities that are going on at site. It's an important element of the overall performance, so I would like to see that going forward.

THE PRESIDENT: So are you planning to develop something that's compatible with WANO or no? I mean we always -- we like to see benchmarks and data, so what are you going to do about the new WANO metrics?

MR. GRACIE: Brian Gracie for the record.

We are certainly planning to do something. I already in fact had mentioned it in another part of the report another area where WANO had changed the way that we were reporting and that no longer -- it was no longer possible to make the comparison that we used to make.

The timing of the report, as written this year, sort of left us in a difficult situation even before we posted the CMD for public consultation we didn't have that WANO data yet. We were not in a position to go to the WANO website and find the data because it wasn't published yet. It was only between the time it was posted and we came here today that we sort of discovered that WANO is suddenly doing things differently.

So we certainly hope to have more -- more benchmarking in the report, at least replace what we have lost, but we haven't had a chance to really think about that yet.

MR. FRAPPIER: Gerry Frappier just to add.

So we've talked often about trending. So we have some data now. We change the parameters we are going to lose the ability to trend. But we also like to compare to industry because that's usually the benchmark you are trying to sort of see are you in the ballpark or not or doing better or substantially worse.

So we are going to have to sort of crunch through some of those things and see what we would suggest makes the best approach going forward. But I think somehow or other we'll be using the WANO document -- data, rather, whether it's one graph or we go to two graphs for a while or something. I’m not sure.

MEMBER SEELEY: Yeah. I'm sure there is a number of years of data with contractor safety performance as well, so that would already exist. So it would be easy to trend that and include it in the future report.

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

We separate basically along the lines of who we supervise and who we don't. So if the contractors are supervised by us they are in our data. If they're not, they're in the contractor data but, yes, we certainly track the contractor data. We do have it and we use that actually as part of our selection process when we hire contractors that they have a good safety record.

So we have the data. We just like to keep the accountability clearly where it belongs. If the contractor is supervising the individuals directly and they are doing that we track it, but we track it as part of their data.

So there are certainly ways of doing this if you want visibility to the contractor performance. That's for sure possible.

MEMBER SOLIMAN: Thank you. My next question is on Table 5, page 22, CMD 17-M-15.

Table 5 is -- describes a number of unplanned transients. When the station or the reactor unit sees unplanned transient there is a variation in pressure, a variation in temperature, a variation in flow. So if you consider this as a transient, say, process; unplanned transient which creates conditions of different flow and pressure and temperature distribution, what the station do? Do they record these variations? That's number one.

Number two, they do proper analysis in

order to see the impact of these transients on the life of the component or usage factor.

MR. NEWMAN: Gary Newman, Bruce Power, for the record.

Yeah, so I think we touched on it earlier in the discussion when we talked about root cause investigations or apparent cause investigations. You typically will always do some level sliding gradient of analysis, depending on the severity of the transient that you've experienced.

But in many cases, we would do at least an engineering eval which would look at what the implication is to not only the component that was involved or system that was involved but also an extent of condition to other parts, other units, other parts of that same plant, et cetera.

So it's pretty comprehensive treatment, and it could result in corrective actions, leveraging our corrective action program, which would change, for example, PM frequencies for that component or system. It would also look at if there are implications to usage factor, as the Commissioner pointed out, we would obviously take that on board. And we keep track of that; it's a cumulative effect, and so we monitor that as part of our ongoing program.

THE PRESIDENT: Okay. Dr. Demeter.

MEMBER DEMETER: I'm going to refer to in the staff CMD Figure 18, Radionuclides demitted to air, page 52 -- Figure 18, Radionuclides demitted to air by Canadian nuclear power plants in 2016.

Given this is -- acknowledging that all the levels are well below an action level or a regulatory limit, this is a logarithmic scale, and I was having trouble trying to figure out why the Bruce A and B -- well, Bruce A, there's two orders of magnitude difference in iodine released to air, even though these are small numbers. Bruce B doesn't have any data. And the particulate -- radionuclide particulate has almost three or four orders of magnitude between Bruce A and Bruce B versus Darlington and Pickering. Again, I'm acknowledging that all the -- the absolute levels are all below levels.

Is this just a statistical thing, that they're such small numbers that the confidence intervals would really overlap or -- I'm trying to understand why Bruce A and B are performing so much better than Darlington and Pickering for those two indicators.

MR. FRAPPIER: Gerry Frappier for the record.

And I'd ask Mr. Mike Rinker to explain that. And perhaps industry would have comments as well.

MR. RINKER: Mike Rinker for the record.

So I'm just looking at the data now. There's a couple variables. One of them would be what is the detection limit at the particular site. And the other one is the proximity, particularly with particulates, to the monitoring stations to activities such as the waste facilities that are at the site and other construction activities. So I'm just conferring to verify what the answer is.

MR. McCALLA: Raphael McCalla for the record.

The iodine and particulate values represented by Pickering are actually lower than what's actually reported. So we typically report less than 0.01 percent of our DRL. But the actual values are significantly lower than that. And that is why the Bruce numbers appear to be significantly lower than the Pickering numbers.

THE PRESIDENT: We're a bit slow. Could you repeat this mathematical --

--- Laughter / Rires

MR. RINKER: Mike Rinker for the record.

So just looking at the data, the Pickering numbers are in fact much lower, but they have a particular detection limit for which they have confidence at which is significantly higher than what Bruce Power is presenting. So it's really a question of not the actual levels that are released and observed but the detection limit for which it is being analyzed.

MEMBER DEMETER: So I infer from that that the detection methodologies and equipment between these sites is different, so that the lower limit of detection is different or minimal detected activity is quite different between the sites? So it's more of a monitoring statistical phenomena versus an actual three orders of magnitude difference.

MR. RINKER: Mike Rinker for the record.

So I would say precisely it's more about how the two different companies have decided to manage the very low levels of data, that -- how to manage that data and have confidence in what data they're reporting. Whereas OPG has decided to set a detection limit at a certain level that is much higher than what Bruce Power is.

THE PRESIDENT: Just as an observation, I think that -- and I like this part of the presentation when you try to put the data of performance of all of them side by side. But what it means is that I think you will have to give better explanation for the variation. Even though they're very low numbers and for safety perspective you don't care, I would argue that's from staff. For us, when we see those big variations, even though they are tiny numbers, it begs the question of at least explain some of the variation here. And that's going to become more and more in practically every comparison in every chart that you put in front of us.

So something for you guys to think about.

Who is next? Dr. McEwan.

MEMBER McEWAN: So Figure 5 on page 26 of staff CMD. Can you again for the record and for the non-engineer here explain what a forced loss rate is, what the safety implications are, and can you offer a slightly more structured reason of the difference between our statistics and WANO than you put in the text.

MR. FRAPPIER: Just getting to the pages there, so page 26, Figure 5.

MEMBER McEWAN: Figure 5, the forced loss rate between WANO operators and Canadian operators.

MR. FRAPPIER: Right. So I know I cannot explain that. I don't know if somebody in industry is while I'm trying to find out who the name in the CNSC that is responsible for this chart.

MEMBER McEWAN: So whilst you're doing that, can somebody explain what a forced loss rate is and what the safety implications are.

MS SMITH: It's Stephanie Smith from Pickering.

Forced loss rate is any time that the reactor is not running at a hundred percent for a reason that is unplanned.

MEMBER MCEWAN: Okay.

MS SMITH: So that can be a transient that brought the unit down to zero percent. It can be a planned derate, and it can also -- Pickering, because by lack of fuelling availability which we've struggled with in the past, especially in our unit 1 to 4 outage. So if you have to derate the unit because you don't have enough for activity, that percentage goes towards our forced loss rate.

MEMBER McEWAN: So it's a summed value so to speak?

MS SMITH: Correct.

MEMBER McEWAN: Okay, thank you.

THE PRESIDENT: So does that mean that -- what I'm trying to do is does that mean that CANDU is different than the rest of the fleet internationally? And what does it mean, it's less reliable? More transient, more --

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

This was a request, the historical element again with respect to the forced loss rate. It's key element here to put the fact in place. This is a power production indicator rather than a safety indicator. And this was requested by the Commission several RORs previously with respect to the output of the reactors against other technologies and WANO.

So I'll just reiterate the fact that it is a power production with respect to the forced loss rate to WANO. And I will let someone else answer your specific question, but the industry should be able to answer the question.

THE PRESIDENT: Well, that was a very clear answer. But if you read on page 25, it says the reason for the difference, if I'm looking at the right chart, is not clearly understood.

Well, I guess Mr. Jammal, you didn't write this.

--- Laughter / Rires

MR. JAMMAL: For the record, Ramzi Jammal.

I did not write this, but I did review it. So if you look at the variations that -- and the reason for the difference is not clearly understood because, again, it's power production. But the -- what's being done here is -- could be due to the differences in reactor technology and the number of operating reactors in each group. So it was when we put it even back historically we said it's mainly with respect to 19 in Canada, power production, versus 400 or so reported in the WANO value.

So the key point here, we got to go back to the factor, is it of value to the Commission, or if it is not of value for the Commission. At the time, there was a question for staff, to determine, tell us what is the power production of the reactors' technology.

And I am opening up the floor. If I'm wrong, tell me I'm wrong. But that was the intent of it.

THE PRESIDENT: Well, industry, do you have any view on this?

DR. VIKTOROV: If I may add to this. It's Alex Viktorov.

In fact, this may be an indication of a conservative, safe approach. The Canadian utilities may go in shutdown or lower power, whereas other operators may not do so. So again, the reasons exactly may not be known, but again I will repeat the point, it's not a safety indicator. It may be an indication of conservative, safe approach.

THE PRESIDENT: That's very creative. Is it true?

--- Laughter / Rires

MR. SAUNDERS: I would have to agree with that, I think, yes.

Now, Frank Saunders for the record.

Yeah, the enforced loss rate tells you something about your ability to plan your operations and so it has value in that. We use it of course from financial and planning point of view to predict what the year's going to look like.

It does have some link back to reliability of operations. It wouldn't be fair to say it has none, because obviously it's forced loss, it was unplanned loss, so we didn't intend to do the maintenance.

But as Mr. Viktorov had said, it means that when we seen the maintenance was necessary, we went and did it irregardless. And so it implies both, actually, that maybe in some cases your equipment wasn't quite as reliable as you'd like it to be, but on the other hand, when you found that was true, you did the safety thing you should've did and went and fixed it.

So forced loss rate is really simple as that. You thought you were going to operate all year and you found out you had to come down to fix something or you had to reduce power to fix something. So it really is nothing more than that; it's your ability to plan kind of exactly what your performance is going to look like.

MR. LOCKWOOD: Randy Lockwood for the record.

Again, I agree with the earlier comments. It's nothing to do with the safety parameter, but as a peer just said it is some indication of reliability of the plant. And I think there's many, many factors that go into this. And we could probably talk about this for a long time. But it is of course indication of the reliability of the plant. How much value it is looking at it in its present form, I'm not sure.

I will say this: worked in many different plants and many different -- in many different countries, and there's a lot of factors that go into this. I will turn it over to DOM, though, to give you confidence that -- or to Zar, the DOM from Darlington -- that we have beat or met this forced loss rate from the other plants, the WANO -- the WANO target.

MR. KHANSAHEB: Yeah, it's Zar Khansaheb for the record.

Just to clarify, of course, this is really around electrical production. This is not around reactor power. So this is a percentage of time that the unit was not at full power, essentially, the subtraction of that.

From our perspective, Darlington has surpassed in terms of the forced loss rate from WANO. It's dependent on the year. It's also dependent on various other factors in terms of fuelling capability, and some of those factors that are not present in that technology in the US, for example.

MR. FRAPPIER: Gerry Frappier.

So perhaps just to wrap a bow around that, unless there's other questions, this is information we've been asked to put in. We do not use this information as part of our compliance program. We do not use this information as part of our assessments of the licensee licence application or of the assessment of the rating, if you like, of the licensees over the year.

THE PRESIDENT: All we ask is that there be some -- if you're going to put a graph, there got to be an explanation what does it mean. I like international benchmark, but -- so if you're telling me -- it should be a little of, well, at least a paragraph the explain in layman language why is it part of our -- of your regulatory oversight.

Next? Dr. Soliman.

MEMBER SOLIMAN: Next question on the CMD 17-M15, page 56 and 57. This is the topic on the SCA security. We address the security facilities and equipment, response arrangements, security practices, drills and exercise. Is it possible to address security training and qualification?

MR. FRAPPIER: Gerry Frappier for the record.

I'll ask Mr. Mike Beaudette to provide in detail -- if I understand, your question is where is it that we're assessing people's actual training and their qualifications, because that would be part of what we assess for sure. We have requirements on them for different positions as to what sort of training and requirements they have to have. So the licensee must have a program that ensures they have those competencies. But I'll let Mr. Beaudette add to that.

MR. BEAUDETTE: Michael Beaudette, director of the Nuclear Security Division for the record.

The training requirements are evaluated by the Nuclear Security Division through a number of means. There's -- obviously we set the training standards for things such as the weapons handling and fitness standards, and there -- we actually oversee the course standards for the nuclear response force. We review the course syllabus and we review the standards of that training and then of course we evaluate those through varying means through various visits right up through force-on-force exercises.

I turn to Yves Poirier in case he has anything to add to that.

MR. POIRIER: Yves Poirier, Nuclear Security Division.

Just to elaborate a little bit, the training is covered under response arrangements, the specific area of response arrangements. And that's where we use several regulatory documents as criteria for the training and qualifications of nuclear security officers and nuclear response force members.

THE PRESIDENT: Thank you. Mr. Seeley? Dr. McEwan?

MEMBER McEWAN: Thank you.

THE PRESIDENT: Go ahead.

MEMBER McEWAN: Thank you for putting the chemistry in. I think that again it's an important element and it's good.

I don't understand one sentence that you've written. Page 40. It's in the chemistry index paragraph. "Recent out-of-specification chemistry trends indicate there are no adverse effects on chemistry or corrosion control." (As read)

I'm not sure that's clear what that means.

MR. FRAPPIER: Gerry Frappier. I'd ask Mr. Ram Kameswaran to come and explain that.

MR. KAMESWARAN: Ram Kameswaran for the Systems Engineering Division and the chemistry specialist.

The chemistry index is an aggregate of about 15 parameters. Some of them are on the secondary side and some of them on the reactor side. So for example, the condenser tube leakage leads to some dissolved oxygen increase in the system. It's not an immediate safety significance. If allowed, it could lead to corrosion, so it's a long-term effect. So that's why we said some of these trends, even though the -- it's lower, the values are slightly lower, that's not of much safety significance. That was the intent for that sentence.

MEMBER McEWAN: I'm not sure that sentence says that. It's saying we found an abnormality; therefore, there are no risks. That's effectively what you've said in that sentence. So I think it needs -- I mean, I understand what you're saying. It's not what you said.

MR. FRAPPIER: So Gerry Frappier for the record.

Well, I think we know what we wanted to say. And we can look at improving the language there before it goes out. Maybe it'll take an extra line or two. I know we're often squeezing people to say we want to have it in one paragraph, not two. So we'll make sure we get it right.

THE PRESIDENT: Dr. Demeter.

MEMBER DEMETER: This may be because I'm a relatively new Commissioner I'm asking this question -- it might have been answered before. Just an interesting observation. Page 106, there's a comment that Darlington is the only nuclear power plant in Canada that operates a tritium removal facility. And I'm curious, is this an economic decision? Is this -- can you sell this product? Or why -- why aren't the other ones removing it? Just sort of why is there differences where one NPP does this and the other ones don't?

MR. KHANSAHEB: It's Zar Khansaheb for the record.

So this facility was determined to be

built -- designed and built at Darlington, given that Darlington was a new facility back in the late '80s. We process water for many of the sites. All of the OPG sites as well as Bruce Power. We also get international supplies of water to process as well. So it can process a lot of water through and we don't need multiple facilities at each site.

MEMBER DEMETER: Thank you. That helps me.

THE PRESIDENT: Questions? Dr. McEwan.

MEMBER McEWAN: So again, this is a question we asked last year, maybe the year before. How come CNSC has a higher accident frequency than the NPPs?

MR. FRAPPIER: Gerry Frappier for the record.

CNSC is a very safe place to work.

--- Laughter / Rires

MR. FRAPPIER: Let's start with that. And we have a good record. But I like keeping it in there, because for anybody who here and in the office environment, of course we do have inspectors on site and that, we have actually a very good safety record.

And it actually is I think a real indication and an indication of how good industry is in this area that they have a much, much more hazardous environment of the nuclear power plant. They have a lot of more workers, mind you, so there is maybe a statistical advantage they have over us. But I think it's more an indication of how low they are as opposed to how bad we are.

With respect to the specifics on why our data is such -- is Robin here? Oh, okay, Peter is going to add to where these come from.

MR. ELDER: I'm Peter Elder. I'm the vice-president of Technical Support Branch, but I'm also the head of -- or the management head of the CNSC's Policy Health and Safety Group.

So it's interesting -- Gerry said it's an interesting comparison. When we're looking internally, we like to compare ourselves in terms of how we're doing against other office-type work.

We've noticed this trend in other sectors. I think in the uranium mines and mills report we did notice that from a health and safety perspective better to work in a uranium mine than in an office in Saskatoon. And it's just the nature of the -- you know, when you look at this, the nature of the hazards, they're very well controlled in nuclear power plants.

What you find in an office are very typical office injuries -- back strains, lifting, you know, slips and falls. So there isn't really a -- we look at it in terms of comparison to what we are, which is a largely office-based work force, and we do compare favourably with office-based work forces.

It's really the comparison that's saying to industry where you've got lots of people that are working in the field in a very safety-oriented business that there actually are very small hazards -- or not their hazards are small, but that actually performance is very good and occupational health and safety. But we do look at the data.

MEMBER MCEWAN: I do like the comparison.

THE PRESIDENT: Dr. Soliman?

MEMBER SOLIMAN: My next question is page 42 of CMD 17-M15. This is one of the SCA, which is very important radiation protection. We address in the report application of ALARA; Worker Dose Control; Radiation Protection Program Performance; Radiological Hazard Control; Estimated Dose to Public.

Is it possible to address classification of area and the local zones, and protection equipment and instrumentation? These two are not given in the -- it's highlighted on the document guide, but it is not given in the report. The first one, classification of areas and local zones, and the second one is protection equipment and instrumentation.

So maybe the station can help with that.

MR. FRAPPIER: So just to make sure I understand the question. You're saying so these, what's listed there, is what we call our -- it's the area below the SCA, if you like?

MEMBER SOLIMAN: Yeah, yes.

MR. FRAPPIER: It is intended to review the complete program.

MEMBER SOLIMAN: Yes.

MR. FRAPPIER: If I understand what you're saying is the classification of areas and the actual use of equipment, where would that fit into there or is it something that we've not included in our program?

Perhaps I can ask Caroline Purvis to talk about first from a regulator's perspective how we look at those things. Then industry may want to add as to how it's in their program, because their program might be organized differently than what we're doing here.

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

The specific area of radiological hazard control contains the elements that you've just mentioned. So classification of areas in terms of zoning, monitoring of areas for contamination or ambient radiological fields. The use of instrumentation and the expectations associated with calibration of instruments, et cetera, is all captured in that specific area.

Our compliance program will look at those elements that I've just described by both site staff and through focused inspections with special staff at each of the locations on a baseline frequency.

MEMBER SOLIMAN: The industry, maybe you would like to add to that?

MR. MANLEY: Robin Manley, Ontario Power Generation, for the record.

Speaking for OPG, we have a radiation protection program which covers all of these elements, covers qualification and training of staff, management and leadership in radiation protection, it covers performance indicators and, you know, those performance indicators include ensuring that we have sufficient numbers of radiation instruments, we have programs around the quality of those radiation instruments in terms of maintaining them, purchase, supply QA, and the same for protective equipment.

Then within the plant we have extensive programs on how we ensure that we understand the radiological hazards in the different parts of the plant, on different systems, changing trends over time, ensuring that that information is made available to the workers working in the station, posting of hazards, et cetera.

So the full elements of a good radiation protection program are in place and we've received excellent from international experts and peers on the quality of our RP program.

MR. SAUNDERS: Frank Saunders, for the record.

Yes, the programs are essentially the same in that regard. We control the stuff, the data you see here on effective dose of course is the end sum of all that. But, like most of our programs, they contain many elements to make them effective and we measure those at their individual levels and then we sum it all up at the end to get an overall value. But our program is very similar to OPG's, nothing particularly different there.

MR. HARE: Michael Hare, for the record.

Our radiation protection performance remains solid. Station practices continue to protect workers from significant unplanned exposure, ensure the radiation dose to station staff, as well as the public, is minimized.

One thing we've gone to over the past year is we've put together a radiation protection improvement plan that's helping us close any remaining gaps to excellence. We take advantage of opportunities to benchmark with our industry peers as well as getting information from our colleagues in WANO to make sure that we have the best processes in place and measure them against the rest of our industry.

This has helped to strengthen our RP program and provided learning opportunities for our staff. This plan stays focused on improving proficiency of our workers performing radiation work as well as further improving our contamination control practices, specifically around our outage preparedness and radiation work planning.

THE PRESIDENT: Questions? Go ahead.

MEMBER MCEWAN: It's a presentational request. In Appendix E, where you're describing collective doses, it would be helpful to have the same scales. You have person-sieverts and person-millisieverts, and you have the graphs going to different person-sievert/ person-millisievert levels. With some consistency, it would just make it a little easier to review.

MR. FRAPPIER: Okay, thank you for that.

THE PRESIDENT: Questions?

MEMBER SOLIMAN: Is there somebody of licence record for Point Lepreau? Somebody said the Commission also noted NB Power's commitment to update its nuclear emergency technical planning basis and expected annual update on the progress of this project to be provided during CNSC Staff's presentation of the annual ROR.

So can we be updated on that project?

MR. FRAPPIER: Gerry Frappier, for the record.

Just before I hand it over to New Brunswick Power, at the hearings that were just held we talked about that area and we said that we would provide an update. From our perspective, Staff's perspective, that'll show up in next year's ROR, if you like, so we'll certainly have something there.

But I think given that New Brunswick Power is here, I'm sure they're probably able to talk to it today.

MR. NOUWENS: Jason Nouwens, for the record.

There were two key aspects from our Day 2 hearing that provided the wording that you read. One of them was to make our current technical planning basis available to the public, which we committed to do by the end of August and we are on track for that. The second one was to provide an update on the update to our technical planning basis.

So the update, our technical planning basis, is going under review through a third-party company. They've provided a draft document to us, we're currently reviewing that. It'll take many months for us to go through that document and look for the potential improvement opportunities to our currently planning basis, but that process is underway and we'd be pleased to give an update at a future date.

THE PRESIDENT: Okay. I think we'll allow you quick final words and, to Staff, quick final words. Who wants to start?

MR. FRAPPIER: Gerry Frappier, for the record.

I don't think we usually get final words, but --

--- Laughter / Rires

MR. FRAPPIER: Thank you for the

opportunity, because it is a lot of work. As we mentioned, there's about 30 per cent of the effort of the CNSC is going into ensuring the compliance and licensing of nuclear power plants. There is a lot of work that goes on to provide the information, and we do our best in this annual report to summarize the efforts that we've been doing.

So we appreciate the opportunity to let the public know this is what their regulator is doing for them. Thank you.

THE PRESIDENT: Point Lepreau?

MR. HARE: Michael Hare, for the record.

I just wanted to thank the Commission for allowing us to come, giving us the opportunity to explain within the body of the documents our continuous improvement path. We are trying to ensure that we have a culture of prevention at Lepreau. We've seen it with improved human performance and equipment reliability both with our human performance record as well as the performance of the station.

It's a great opportunity to come and to have people ask questions of us to make sure that we're not missing anything as a corporation, but also to explain what's going on, use our industry experts, our industry peers to help us and have this collaborative arrangement and meeting to make sure that we are meeting all of the commitments that we plan to as a nuclear power plant in Canada.

Thank you.

THE PRESIDENT: Thank you. OPG?

MR. LOCKWOOD: Randy Lockwood, for the record.

On behalf of the entire team here today from OPG, I also thank you for the opportunity to participate in this meeting and for our various team members to provide some insight and clarification and answer your questions. Clearly, it was a learning experience for all of us.

I started the morning with my initial comments where I made reference to that I had come to really appreciate the Canadian regulatory framework, having worked overseas for many many years in the industry. Again, that's reemphasized to me again today the openness, the allowance of the public to provide input.

So on behalf of the entire team thank you very much.

THE PRESIDENT: Thank you. Bruce Power?

MR. SAUNDERS: Nothing much to say other than just to I guess remind everybody that with our licence renewal coming up next year. That application is on our website along with the environmental risk assessment and many other documents, accumulating a couple thousand pages I think by the time we're done. So it's all there for public viewing and available for anybody who wants to look at it.

THE PRESIDENT: Thank you. Thank you very much.

We will break and come back at 4:50. Thank you very much.

--- Upon recessing at 4:36 p.m. /
Suspension à 16 h 36

--- Upon resuming at 4:55 p.m. /
Reprise à 16 h 55

THE PRESIDENT: We lost a lot of the audience here. I don't know why, this is just an interesting topic.

The next item on the agenda us follow-up on the enormous letter discussed at August 2016 Commission meeting. This is outlined at CMD 17-M37, 17-M37.A and 17-M37.1.

I understand that CNSC Staff will

introduce an expert that you have contacted with. I understand, Mr. Jammal, you have the floor.

CMD 17-M37/17-M37.A

Presentation by CNSC staff

MR. JAMMAL: Ramzi Jammal, for the record.

Before I start, sir, usually you ask if the technology is working. So the expert, Dr. Fleming, is online.

THE PRESIDENT: Dr. Fleming, can you hear us?

MR. FLEMING: Yes, I can. Thank you.

THE PRESIDENT: Okay, thank you.

MR. JAMMAL: Bon après-midi, Monsieur le Président et membres de la commission. Pour l'enregistrement, mon nom est Ramzi Jammal. Je suis le premier vice-président et chef de la réglementation des opérations à la Commission canadienne de sûreté nucléaire. Je suis aussi le champion de la culture de sûreté.

As the safety culture champion, I would like to state the fact that the culture for safety is embedded in law in the *Nuclear Safety & Control Act*. Our inspectors and designated officers are empowered to stop any operation or make an order to any person with respect to any safety issues. They do perform these duties accordingly, and no safety issue is left unaddressed by our staff.

The CNSC has the most competent world-recognized experts. We do not hesitate nor are we afraid of continuous improvement. As a matter of fact, in response to the anonymous letter, the CNSC has established the position of Chief Science Officer, Mr. Peter Elder took that position in order to ensure the resolution of technical disagreement within CNSC is addressed.

All nuclear safety issues raised by Staff are treated seriously and are expected to be resolved in a timely and effective manner. The CNSC has always fostered an environment for raising concerns where Staff can feel free to raise nuclear safety concerns without fear of retaliation, intimidation, harassment or discrimination.

The CNSC has numerous processes in place for raising and resolving concerns to include the protection and the confidentiality of the individual raising the issues. This is done completely independent from line management. CNSC Staff opinions are valued and they are encouraged to voice concerns, provide suggestions and ask questions. At the CNSC we strive to ensure that differing professional opinions are respected, discussed and resolved in a timely manner and that employees are informed of steps taken in response to their concerns.

The work completed by Staff further strengthens out policies and processes in this area and aims to make further improvements to our safety culture as a regulator. In addition, the work completed by CNSC Staff shows that Canada leads the world in the potential application of whole site probabilistic safety assessments, which will be referred to as PSAs in the presentations, and that the CNSC is consistent with international practices in the way it applies PSAs in its regulatory framework.

Furthermore, the Commission should be made aware that the CNSC is one of the very few regulators in the world to carryout a safety culture assessment of its own.

With this introduction, I will now turn the presentation over to Mr. Raoul Awad and the CNSC team to provide you with the staff presentation as outlined in CMD 17-M37.A.

Thank you.

MR. AWAD: Good afternoon, Mr. President and Members of the Commission. My name is Raoul Awad, I'm the Director General of Directorate of Regulatory

Improvement and Major Projects Management. With us today, Mr. Ross Richardson, the Director of Internal Quality Management Division; Ms Yolande Akl, Director of Probabilistic Safety Assessment and Reliability Division; we have Dr. Victor Snell, Adjunct Professor with the Department of Engineering Physics, McMaster University; and online, as you heard, Dr. Mark Fleming, a Canadian National Professor of Safety Culture at Saint Mary's University.

We have also some of our specialists, our staff, supporting us.

The purpose of today's presentation is to update the Commission on the follow-up action completed by CNSC Staff following the August 2016 Commission proceedings on the anonymous letter.

We'll start by presenting the background and the management action plan which was prepared to address the follow-up actions from the commission proceeding on the anonymous letter. Then we'll present the actions completed by CNSC Staff. The actions pertaining to probabilistic safety assessments will be presented by Dr. Snell and Ms Akl, and the action pertaining to raising issue on safety culture will be presented by Mr. Ross Richardson.

As a background, in May 2016 the President of the CNSC received an anonymous letter claiming that the Commission had not received information that was important to the 2015 licensing decision for Darlington and Bruce Power generating stations. The concerns expressed in this letter were largely related to probabilistic safety assessments.

These allegations were taken seriously and an immediate in-depth technical review was undertaken by Mr. Peter Elder who, at the time, was CNSC's Senior Strategic Advisor to the Executive Vice-President and Chief Regulatory Operations Officer with 25 years of technical expertise in nuclear safety and reliability.

The results of the review were presented to the Commission in August 2016 in CMD 16-M56 entitled Technical Review of Probabilistic Safety Issues Raised in an Anonymous Letter.

The review concluded that the latter allegations were unfounded and that there was no impact on safety. However, the review identified opportunities for improvement. The Commission heard evidence in August 2016 and was satisfied that the issue raised in the anonymous letter were not of safety concerns. However, the Commission directed CNSC Staff to complete a number of additional actions as documented in the minutes of the meeting.

To address the follow-up actions from the Commission's proceedings on the anonymous letter, CNSC Staff prepared a management action plan to track the completion of the work. CNSC Staff consolidated these actions into two categories; actions pertaining to PSAs, and actions pertaining to raising issues in safety culture. We'll speak to the details of each action in the subsequent slides.

The action pertaining to PSAs include the relevant actions arising from the direction received from the Commission, the recommendations from Dr. Victor Snell, and the recommendations from Mr. Peter Elder.

Now I'll turn the presentation over to Ms Yolande Akl.

MS AKL: Thank you, Mr. Awad. Mr. President, Commission Members, good afternoon. For the record, my name is Yolande Akl, I am the Director of the Probabilistic Safety Assessment and Reliability Division. I will be discussing the actions pertaining to PSAs.

During the Commission's proceedings of August 2016 the Commission directed CNSC Staff to engage third-party experts in providing information regarding PSA international best practices, whole site PSAs, and where PSAs fall within the regulatory framework.

To respond to this request, CNSC Staff hired a third-party expert, Dr. Victor Snell. Dr. Snell's report, Probabilistic Safety Assessment and Regulatory Framework, and the disposition to Dr. Snell's recommendations are included as part of CMD 17-M37.

Dr. Snell has 43 years experience in nuclear safety. He's currently the owner of VGS Solutions specializing in nuclear safety, education and licensing. Formerly Director of Safety and Licensing at AECL CANDU: he managed the industry side of the pre-project regulatory reviews of SES-10, a small heating reactor; CANDU 3; CANDU 9; the advanced CANDU reactor; and, the enhanced CANDU 6 reactor.

He was Program Director of University Network of Excellence in Nuclear Engineering, UNENE, and has 80 publications on reactor safety and licensing.

I will now turn the presentation over to Dr. Snell to present his report. Following his presentation, I will be presenting CNSC Staff's disposition of Dr. Snell's recommendations and the actions completed pertaining to the probabilistic safety assessment.

DR. SNELL: Thank you, Ms Akl. For the records, I'm Victor Snell. I'll be giving a presentation which was requested by CNSC Staff on the safety and regulatory framework of PSA. I do take a rather broad picture, so if some of you know all of this in advance I apologize for that, but it seemed useful to have it all in one place.

So the particular contract was let to me by the CNSC called the Role of Probabilistic Safety Assessment, PSA, in the safety analysis area and in the regulatory framework. That's the words from the minutes of the CNSC meeting. There's two components which I will deal with separately; one is to document the regulatory role of the PSA. I also note the CNSC Staff has done that from a very particular Canadian point of view. Then document and provide an independent discussion of the role of a whole site PSA. So I will do those separately.

The process I followed was to look at selective current national and international regulatory practices in both deterministic safety analysis, which I'll abbreviate as DSA, and PSA. I use my own experience analysing information to draw conclusions and recommendations. I would point out that the report was written for a public audience, so I have not used protected material, and all my references are available to anybody who wishes to pursue them. I had been working independently of both CNSC Staff and the industry, which means that any mistakes are completely my own.

I want to start off with a bit of a disclaimer or warning that people often equate safety analysis to safety. They are not the same, whether it's PSA or deterministic safety analysis. Nuclear plant safety depends on many factors, and I'll not read them all to you, but things such as the fundamental design characteristics, operating competence, safety culture, design authority, and many other aspects which to some extent are captured in the CNSC's safety controlled areas.

So in red safety analysis is one, means testing the design and operation of mitigating systems and human actions against postulated accidents. Maybe a somewhat narrower definition than most people think of when they think of safety analysis.

So I'll now cover topic by topic, the first being regulatory role of PSA. We're going to spend a little time on the graph here. It's a little bit design-oriented and we will come to more operations-oriented aspects later on. But if you look down the vertical line, so this is a line from design to operation. One of the fundamental issues in a nuclear power plant when you're designing it and when you operate it is how do you know you've got all the accidents? How do you know you haven't missed anything?

Historically, this is done by something called deterministic requirements, which came really from a rather limited experience on research reactors, plus people thinking well how could things go wrong, more or less heuristically.

That sequence on my left-hand side, deterministic requirements, event identification, it gave a list of what we now call design-basis accidents. When analyzed deterministically, which I'll cover in a minute, they would confirm that the design of mitigating systems are in fact appropriate. In terms of operations, they would set some parameters such as safety systems, set points, operating limits, various key things for plant operation.

Obviously I'm simplifying pretty drastically here, given the time I have, but that's one line of verifying that the mitigating systems are appropriately designed and operated.

I'll come back later to the history of PSA. But after DSA was in place a number of people realized that it was missing certain aspects of safety and probabilistic approach to safety analysis were developed. This had a different method of identifying potential accidents based on frequency. To some degree these two boxes overlap, to some degree they are different, and we'll get a different set of accidents categorized by frequency.

Those are analyzed probabilistically and also gave a set of performance requirements on the safety systems, but the difference being that they went beyond the design basis. So they went into severe accidents as well and they could test how well the safety systems would respond to severe accidents.

In operations they'd have a very large impact with a basis for things like emergency operating procedures, severe accident management guides, equipment reliability programs, and many many other things. So that's a one-page picture, a fairly complex topic.

So, in words, I've covered most of this so I won't read it again. Traditional approach was based on experience plus a heuristic review of what could go wrong. Out of that review, one selected a small set of accidents with apparently bounding consequences. We then used pessimistic assumptions to analyze them and used them in the design of mitigating systems, which is why nowadays they're called designed-basis accidents.

The underlying philosophy is that a plant could be shown analytically to withstand a set of apparently bounding stylized accidents using pessimistic assumptions. It could therefore withstand a much larger number of accidents which may actually occur.

PSA comes at it from a different point of view. It answers three questions; what can go wrong, how likely is it to happen and, if it happens, what are the consequences.

The pioneering study applying PSA to reactors was done in the U.S. Sometimes you hear it called the Rasmussen study. The official term was the U.S. reactor safety study.

It was done in 1975 and used two techniques which we still use called fault trees which determine the frequency of initiating event, and event trees determine the failure frequency of mitigating systems and containment.

I'm not going to explain those now. There's an appendix in my report giving rather trivial examples just to explain what they are.

The highlights from the RSS are actually quite interesting. I remember when it came out we were sort of -- we were quite surprised. But the most severe design basis accidents under the deterministic approach were not necessarily the ones that dominated risk.

Everybody -- to that point, it felt that large loss of coolant accident was dominated risk but, in fact, the risk was dominated by small loss of coolant.

Some event combinations could lead to -- and this is a PWR core melt at frequencies comparable to single design basis accidents. Core melt sequences, again, PWRs, were more frequent than previously estimated but had lower consequences. This, in fact, was evidenced later on by 3 Mile Island where human error was a major accident contributor. So a little shift in mindset.

I've summarized on the next two slides of the strengths and weaknesses of each approach.

For design basis accidents, they give -- on the strength side, the answers are believed to be pessimistic, and real accidents are expected to be less severe. Because of that, you can optimize the effort in safety analysis by choosing bounding accidents rather than all accidents and because of that, again, you can apply it very early on in the design process before all the design details are complete.

On the weakness side, they really aren't useful for risk informed decisions because they don't -- they barely contain frequency. They do to some extent, but not very much. And then therefore, event selection can be inconsistent.

One can look at rare events with almost the same scale as one looks at frequent events.

They're not much use for accident management procedures because they give a very pessimistic picture of plant behaviour, whereas what you want for accident management is a realistic picture of plant behaviour so the operator sees what he expects to see.

One has to be careful on what "conservative" means, and it's difficult in that framework, with some exceptions, to identify combined or consequential events.

On the other side PSA, PSA, on its strength side, does combine -- provide, sorry, a measure of comparative risk. It's not risk itself, it's comparative risk, so it allows you to -- a basis for choosing -- making decisions based on risk.

It's very effective, likewise, in early design. It allows you to evaluate the balance between automatic and operator action in a more fundamental way than deterministic analysis, so one can decide based on PSA whether an action should be automated or should be left to an operator.

It has no end point, so it gives you a gateway to be on design basis accidents which, of course, have become very prominent in the last couple of decades, including severe accidents.

It can be used as a basis for emergency operating procedures and severe accident management guides. As a basis for doing PSA, the bias is to be realistic where possible, not pessimistic.

Identify something called cliff-edge effects where a small change, for example, in frequency could cause a large change in accident consequences.

On the weakness side, it does not predict absolute risk. One of the criticisms of WASH-1400 at the RSS was that it claimed to predict absolute risk and compared the risk of nuclear power to the risk of other energy activities. One has to be really careful doing that because it's difficult to get comparable risk measures which are sufficiently complete to compare absolute risk.

It does a very good job of looking at risk of design options on the same plant or the risk of similar plants -- relative risk of similar plants.

It has trouble handling very rare single events for which there is not a good historical experience. It doesn't handle software errors very well because they tend not to be random. They're either absent or they occur at probability 1 given the right set of circumstances.

Some common cause failures can be rather subtle and can be missed. It isn't -- it's difficult to apply it to fully passive structures and systems, although there are techniques for doing that developing.

It's not the tool of choice for looking at safety culture, so though many accidents have as an ingredient lack of safety culture, it's difficult to measure that with a PSA. There are other techniques that have to be used.

And traditionally, it's not used for malevolent acts which tend to be treated deterministically.

PSA is used extensively in operational decision-making, besides design. My bias is design, it's my background, but it is used heavily in operational decision-making. We've heard a little bit about that.

It's used to assess proposed design changes. It's used to look at the effect of impairments in safety-related equipment; is it important, is it not important. It's used to optimize maintenance, testing, inspection, and it's used to deal with what I believe is called discovery issues when you get a surprise, an unexpected thing happening in station of a research program.

So all this leads to the rather obvious

conclusion that PSA and DSA strengths and weaknesses are complementary and, of course, both should be used in a balanced approach to safety. And it certainly affects my view in that graph that I showed you.

PSA in Canada has had a rather long history. The NRX research reactor accident led to a fundamental rethinking of power reactor philosophy, and part of it was to try and get numbers on the frequency of severe accidents to meet safety goals.

And the way they do that is to translate that into something which is useful to designers and to operators which will limit the frequency of process system failures and the demand on availability of safety systems.

And that philosophy has carried on since the accident itself and has always been a fundamental part of CANDU.

In fact, Douglas Point, if you're a history buff, was licensed on a risk basis, not risk informed. It was actually risk analysis. But it was realized that -- afterwards that the technology was not adequate for treatment of common cause failures, so it was not pursued after Douglas Point until recently.

However, it did give the designer and operator specific tools to measure success, reliability of mitigating systems, frequency of process failures. And that was actually a world first. Nobody else was doing that at the time.

Once we got to the licensing of the large CANDUs, Pickering, there was a shift away from probabilistic techniques because of the weakness I mentioned, and the licensing philosophy became somewhat more deterministic, but not completely.

The -- as you all know, the licensing bases of every plant up to Darlington was initially called siting guide, which split accidents into two classes, which were frequency based, later consulted a document C-6, which is used for Darlington licensing, split them into five classes, roughly frequency based, so there was still a probabilistic component even though the licensing basis was deterministic.

There are a number -- the weaknesses in the deterministic approach which I mentioned earlier on were recognized by designers back in -- I'm trying to remember -- I think the late seventies, early eighties.

And the designers felt they needed a tool beyond that to help their design. These, at the time, were called safety design matrices.

If you looked at them today, you'd say

that's a limited Level 1 PSA. And it was an internal tool.

AECL, for whom I worked at the time, had set up its own acceptance criteria, and it resulted in many changes to the design. And eventually it became recognized as a useful enough tool that it was adopted by the regulator who, of course, then set the regulatory acceptance criteria.

And I'm not going to go through the whole industry, but PSAs are now done for all CANDUs.

I looked at the regulatory status of PSA in Canada. I think the CNSC report has done a lot more detail in terms of the processes.

It's not -- PSA is not specified as such in the Act nor in the Class 1 Regulations, nor would you expect it to be. They're much too high level documents to specify a methodology, which gives the CNSC staff and CNSC itself very broad discretion.

The way you find the requirements of PSA are in the CNSC REGDOCs and RD series, particularly three which I've listed.

Sorry. I looked through those. The most recent one is REGDOC 242, which is probabilistic safety analysis that gives the scope of what one's supposed to do. RD/GD 369 talks about what's required to construct a nuclear power plant.

PSA's in there, but the wording implies it's optional. It says "should" instead of "shall". However, REGDOC 2.5.2, which covers design, says you shall do it.

So my view is that, well, we should clean that up. The CNSC in the next appropriate revision of REGDOC -- sorry, RD/GD 369 should be made consistent with the 252 and put the "shall" word in there rather than "should" to make them consistent.

I looked at non-power reactors. The CNSC does have requirements for PSA. On non-power reactors, it's required.

So I didn't really have any comment on that other than, in some cases, it was difficult to find a public summary.

Power reactors do a very good job of publicly summarizing their PSAs. It's easy to find. For non-power reactors, one has to dig.

A PSA summary has been published, but it's difficult to find something for non-power reactors, although it's referred to.

Now, for non-power reactors, one would -- one must and will tailor the scope of a PSA to fit the inherent hazard and complexity. Generally speaking, there would be less scope in a non-power reactor than a power reactor.

So I simply again recommend, for consistency, that CNSC should ensure that suitable PSA is performed at the appropriate time for non-power reactors -- I believe that's the case -- and a public summary made available.

I have a comment on safety goals which, in facts, has been picked up and dealt with, I think, quite well in the CNSC companion document, of course, which I didn't have at the time.

CNSC sets numerical safety goals on individual risk and social risk from a nuclear power plant. This is in common with international practice. They're a little different, but not significantly.

They -- that includes frequency limits on core damage, frequency limits on small releases of radioactive material, and frequency limits on large releases of radioactive material. And the numbers are largely consistent with international standards.

To show compliance, in my view, effectively requires a PSA. Pretty difficult to do that without a PSA.

One of the issues that I have with a pass-fail criterion is it's a sum of an artificial boundary. It implies precision in the PSA that doesn't really exist. It implies somehow the risk -- acceptable risk changes abruptly as you cross the boundary and it implies that existing plants are less acceptably safe than new design for which the criteria are quite stringent.

I'm not suggesting changes to these, but I am -- there needs to be context setting when these things are presented, and I believe, having looked at the CNSC document that was produced just recently, that that document does that.

The recommendation 3 has essentially been taken care of, which is CNSC should explain the meaning of what a safety goal is in a way which acknowledges the inherent uncertainty of both acceptable risk and the means used to calculate it.

Some countries use a range of acceptability, some used fixed lines, and those are dealt with in my report.

PSA is used heavily in operations, particularly in what in Canada is called a risk informed approach. Risk informed is different from risk based.

Risk based is -- uses the PSA numbers as a decision tool. Risk informed uses PSA as one input to a decision.

And I’m not going to read all these, but these are some of the areas where I understand PSA is used in operations. My industry colleagues can confirm and possibly add to that risk -- add to that list, sorry.

I think it'd be nice to see more stuff published in the public literature on that. Some of it is. It's, I think, a useful story.

My own view is that it should be easy to find and published to show that it's a tool that's being deployed and ends up with useful results.

I'd add parenthetically that one of the issues with PSA is one has to be careful what one publishes, not just because of proprietary information, because one has to be a little careful about publicizing too widely means of causing accidents. And this is common to PSAs all over the world.

I spent some time looking at Canadian approach, which is really what I was asked to do, compared to international practice.

One can make this very complex, and one of the risks of summarizing things on a table like this is that you'd end up with a footnote -- number of footnotes that would take the rest of the presentations.

So I apologize in advance for over-simplifying in the attempt to put something on one page.

I looked at about seven different areas how PSA is being used. A numerical safety goal is required. Is it required for pre-project design, it's required for construction licence. It's required for operating licence. It's required for periodic safety review.

Is it used for technical specifications or, Canadian terminology, safe operating envelope? Is it used to risk inform regulations?

And I didn't take every country in the world. I took the big nuclear players plus some others that I thought were doing innovative work. But it's certainly missing a number of countries that also do PSAs.

Again, at the risk of over-simplifying, countries seem to fall into two groups. One is where PSA is used pretty much across the spectrum and ticks almost all the boxes. In that category I would place Canada, United Kingdom, certainly, Finland, Argentina.

There is some variation as to whether PSA is required in pre-project design. In practice it's required. For example, in Canada it's required as part of vendor design review, and almost anyone who's going to introduce a new design in Canada would have a vendor design review.

So I'm going to just -- like I say, one could put a lot of footnotes on this.

The second category of countries, the ones that don't really have PSA embedded in their regulation on licensing but catch it in other ways.

So the U.S., for example, there are numerical safety goals. If you want to do a design certification, then you're doing a PSA. If you want to do plant refurbishment, you have to do a PSA. If you want to look at severe accident management design alternatives, you've got to pretty much do a PSA.

So they catch it other ways even though it's not formally required for a construction licence under 10 CFR50, or an operating licence. And the U.S. does not do periodic safety review.

So the second category of countries is ones that don't formally require it as part of a construction or operating licence but sort of get it other ways.

All countries use it to risk inform their own regulations.

I'm not going to read the words. I've just said that on that slide.

I will read, however, the conclusion that, from my point of view, Canada is generally consistent with best world practices in the way it uses PSA regulation.

I'll now come to topic 2, which is whole-site PSA. Sometimes it's called MUPSA, Multi-unit PSA. It's a better acronym, but not quite as accurate.

So multi-unit site holds obvious challenge. To date, with one exception, PSAs are based on single units with some incomplete treatment of multi-unit effects. I'll get to the exception in a minute.

And this is particularly an issue in Ontario where plants share parts of safety systems such as containment, parts of emergency -- sorry, in OPG terms, emergency coolant ejection, emergency electrical power and water. Those are shared among the units.

And if you simply take a single unit PSA number, multiply by the number of units, you can get -- you can be quite wrong and not know which way you're wrong.

You could over-estimate risk because some common cause events such as seismic are already included in the single unit PSA. You could under-estimate risk because it doesn't look explicitly at all multi-unit effects.

So there isn't -- whole-site PSA is a preferred term because when you say multi-unit PSA, it's not clearly including other sources of radioactive material such as spent fuel bays.

Obviously, the accident at Fukushima emphasized the importance of looking at spent fuel bays in multi-unit accidents.

So there are broader whole-site issues. A lot of these came from Fukushima. And again, there's no point in my reading them to you, but I'll select a couple.

Unexpected adverse conditions on site such as radiation and debris. Lack of communication. Organizational failure. And certainly we saw all four of those at the Fukushima accident where they couldn't actually get to some of the places they needed to get to because debris was blocking the roads.

Lack of communication, organizational failure. It wasn't clear who was in charge, or they couldn't communicate with people they wanted to communicate, and that's all been very well documented.

Human performance. I think -- I'm not a human performance expert. There's people behind me who are.