Canadian Nuclear Safety Commission

Commission canadienne de sûreté nucléaire

Public meeting

Réunion publique

October 5, 2021

Le 5 octobre 2021

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

via videoconference

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

par vidéoconférence

Commission Members present

Ms. Rumina Velshi
Dr. Sandor Demeter
Dr. Stephen McKinnon
Dr. Marcel Lacroix
Dr. Timothy Berube
Ms. Indra Maharah
Mr. Randall Kahgee

Commissaires présents

Mme Rumina Velshi
M. Sandor Demeter
M. Stephen McKinnon
M. Marcel Lacroix
M. Timothy Berube
Mme Indra Maharah
M. Randall Kahgee

Secretary:

Mr. Marc Leblanc

Secrétaire:

Me Marc Leblanc

Senior General Counsel:

Ms. Lisa Thiele

Avocate-générale principale :

Me Lisa Thiele

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by videoconference / par vidéoconférence

--- Upon commencing on Tuesday, October 5,
2021 at 9:30 a.m. / La réunion débute le
mardi 5 octobre 2021 à 9 h 30

Opening Remarks

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

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

I would like to begin by recognizing that our participants today are located in many different parts of the country. I will pause for a few seconds in silence so that each of us can acknowledge the Treaty and/or traditional territory for our locations. Please take this time to provide your gratitude and acknowledgment for the land.

--- Pause

LA PRÉSIDENTE : Je vous souhaite la

bienvenue. Welcome to all those joining us via Zoom or webcast.

I would like to introduce the Members of the Commission that are with us today, remotely: Dr. Sandor Demeter; Dr. Stephen McKinnon; Dr. Marcel Lacroix; Dr. Timothy Berube; Ms. Indra Maharaj; and Mr. Randall Kahgee.

Ms. Lisa Thiele, Senior Counsel to the Commission, and Marc Leblanc, Commission Secretary, are also joining us remotely.

Safety Moment

THE PRESIDENT: My Safety Moment today is about working remotely and learnings from a recent tragic event shared with me by a member of the CNSC's Department Audit Committee.

This member was participating in a board meeting over Zoom. One of the Board members on the call expressed she wasn't feeling well and was clasping her head. The other Zoom participants watched helplessly as their colleague had an aneurysm

and passed away. They did not know where she was calling from, she had recently moved, and could not request any emergency services assistance for her. They had no emergency contact information for her readily available either.

As a result of this incident, our Department Audit Committee colleague's organization has introduced a policy that a virtual meeting organizer should request details of the physical location and emergency contact information of all virtual meeting participants.

As virtual meetings become a permanent feature of our workplaces, this tragic incident should make all of us pause and see if we too need to introduce similar measures for our organizations.

With that, I will turn the floor over to Marc Leblanc for a few opening remarks.

Marc, over to you.

M. LEBLANC : Merci, Madame la Présidente.

Bonjour, Mesdames et Messieurs. J'aimerais aborder certains aspects touchant le

déroulement de la réunion aujourd'hui.

For this Commission meeting we have simultaneous interpretation. Please keep the pace of your speech relatively slow so that the interpreters are able to keep up.

To make the transcripts as complete and clear as possible, please identify yourself each time before you speak.

The transcripts should be available on the CNSC website within one to two weeks.

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.

As a courtesy to others, please mute yourself if you are not presenting or answering a question.

As usual, the President will be coordinating the questions. During the question period if you wish to provide an answer or add a comment, please use the Raise Hand function.

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 September 16th for the list of items to be presented today.

All the Commission Member Documents, or CMDs, listed on the agenda are available on the CNSC website.

In addition to the written documents reviewed by the Commission for this meeting, CNSC staff and other registered participants will have an opportunity to make verbal comments and Commission Members will have the opportunity to ask questions on the items before us.

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

President Velshi...?

CMD 21-M42

Adoption of Agenda

LA PRÉSIDENTE : Merci, Marc.

With this information, I would now like to call for the adoption of the agenda by the Commission Members, as outlined in Commission Member Document CMD 21-M42.

Do we have concurrence?

For the record, the agenda is adopted.

CMD 21-M38

Approval of the Minutes of Commission Meeting held on June 8, 2021

THE PRESIDENT The minutes of the meeting held on June 8, 2021 have been approved secretarially. They are available on the CNSC website.

The first item on the agenda is to provide updates to the Commission and the public on items that were discussed during previous meetings or

hearings.

These updates can be in response to an action item from a hearing or a meeting, such as a request made by the Commission or a commitment made by CNSC staff.

Marc, over to you for the first update, please.

CMD 21-M46

Written Submission from CNSC Staff

Update from CNSC staff on exceedance of the annual dose limit for a Nuclear Energy Worker at Jubilant DraxImage

(Action item from April 27, 2021 Commission Meeting)

MR. LEBLANC: Thank you.

The first item is to provide an update on the exceedance of the annual dose limit for a Nuclear Energy Worker at Jubilant DraxImage. This is in response to an action item from the April 27th Commission meeting. CNSC staff filed a memo to the Secretariat on August 23rd, as outlined in CMD 21-M46.

I note that representatives from

Jubilant DraxImage and CNSC staff are available for questions.

THE PRESIDENT: Thank you, Marc.

I will turn the floor to Commission Members to see if any of them have any questions.

Mr. Berube...?

MEMBER BERUBE: Yes. The question I have here is for CNSC staff with regard to the identification of an actual gap in procedures with regard to transfer of materials from I guess the specific area to the waste storage room and what I would like to know basically is when you are actually doing inspections, how detailed do you get actually into the procedure, knowing full well that obviously not everything can be foreseen in advance?

And the other question is, when you locate something like this after an investigation, how do you actually disseminate that information and ensure that the operator that is responsible has incorporated this into their new policies and procedures?

MR. FAILLE: Sylvain Faille, for the

record. I am the Director of the Nuclear Licensing Division.

I will ask Mr. Michael Davey to provide a little bit of information on the licensing aspect and then Mr. Daniel Alu to provide some information on the compliance side for the licensee.

MR. DAVEY: Hi. Michael Davey, for the record.

As part of the initial application and follow-up applications we do with renewals, we will look at the program for the emergency procedures as well as spills and we go into what the actual procedure is for the initial spill response, how they respond to it, which is quarantine methods, as for sealing off the room, ensuring that no one else can have access. They also take into account who is available on-site at that time and whether or not they need to be checked for contamination, as well as in the case of thyroid monitoring.

MR. ALU: Daniel Alu, Inspector for the Operations Inspections Division, for the record.

So for the inspection process

typically an inspector will review the Radiation Safety Manual ahead of the inspection and they will select items that they want to specifically target during the inspection itself. When we do observations we will be looking -- we will be making notes and going back to the office and once again looking at the manual to see that what was actually performed reflects what's in the manual. If there is a non-compliance, it will be addressed either on-site or in the following report.

THE PRESIDENT: Are you okay with that, Mr. Berube?

MEMBER BERUBE: Yes, that's fine. Thank you.

THE PRESIDENT: Okay.

Dr. McKinnon...?

MEMBER McKINNON: Yes, thank you. I have a couple of questions for CNSC staff. When I read this incident report, what struck me were some of the design issues and that's what I would like to ask about.

In this case, one of the problems was

traced back to the hook arrangement for the lid and that could fall on the glass vial and that broke and that has now been corrected. But that's only, you know, correction of a particular instance. What struck me is, well, how did the lid -- how was it designed to fall in the first place on something that could break. So there are two issues. One is something could fall and break something and, secondly, it could fall on something that is fragile, and neither of those is good. So, you know, there's clearly some fundamental design issues at stake here. And I know in other areas such as transportation of nuclear materials, the containers undergo very stringent design testing and procedures, but there's a lot of instances where smaller quantities of nuclear materials are used. So my question is: What level of design scrutiny goes into all of the materials and procedures using smaller quantities such as the containers, the lids, the glass vials. Are they designed to withstand 2 or 3 metres of fall because they probably will at some stage? Could you discuss the design requirements for these types of container

materials and handling facilities, please?

MR. FAILLE: Sylvain Faille, for the record.

I will just explain how those are used and maybe we will ask DraxImage to provide some further information on the design requirements that we use.

But just to answer your question on the exact event here, these vials are used in a shielded box and they have to be handled with remote handling tools. Therefore, everything -- like in the case of this one, the vial was protruding from the bottom of the lead shield in order to allow the manipulation. Therefore, that's what happened. When the cap was removed -- or the cover, it fell back onto the glass vial that was inside that pot. Like the vial itself had to extend from the bottom of the lead pot in order to be manipulated, but the design change was to use a second hook to prevent that event from reoccurring in the future.

But in terms of the design requirements, I would probably suggest to ask

DraxImage to provide that information. That is not something that we have in terms of the requirements on the specificity of handling those kinds of materials in the hot cell at the facility.

THE PRESIDENT: Do we have someone from DraxImage who can respond to that?

M. CHETTAH : Oui. Bonjour. Kamel Chettah, responsable de radioprotection chez DraxImage.

Donc, pour répondre un petit peu à la question de transcription(ph) des équipements par rapport à l'événement qui est arrivé, je vous rappelle, c'était le couvercle d'un pot plombé qui est tombé à l'intérieur d'une boîte blindée. Ce couvercle, il est soutenu par un crochet, donc avec un télémanipulateur de l'extérieur. Il faut savoir d'abord que les boîtes sont conçues pour ces tâches-là à l'interne. Généralement -- pas généralement -- tout le temps on fait des... avant de mettre en service une boîte comme ça, une boîte blindée comme ça, on fait des FMEA, on fait des tests sur les équipements à l'intérieur, surtout le processus à l'intérieur, et

puis cette boîte-là avait passé les tests.

En fait, ce qui est arrivé c'est que le couvercle... Bon, il y a un crochet puis... Il y a comme un anneau sur le couvercle, puis il y a un crochet qui le soutient. Suite à cet événement, on a encore amélioré la sécurité de ce crochet-là pour prévenir que ça ne tombe encore une fois dans le futur par l'ajout d'un autre crochet. En fait, maintenant on a deux crochets qui sont comme inversés de manière à soutenir de façon sûre à cent pour cent le couvercle.

À noter : Toutes les autres boîtes, les autres boites, les cellules blindées que nous avons disposent de ce système-là de double crochet. Uniquement cette boîte-là pour la MIBG(ph) n'avait pas ce double crochet. Même si, comme je l'ai dit auparavant, ça l'a passé quand même des tests, ce n'était pas quelque chose qu'on avait prévu. En fait, d'après l'employé, c'est quand il a soulevé le couvercle, ça l'a basculé un petit peu et puis peut-être qu'avec la tension qu'il a exercée sur le bras bien sûr à l'extérieur de la boîte, ça l'a balancé

puis c'est tombé. Ce n'est pas quelque chose qu'on avait prévu que ça pouvait arriver. En tout cas, le crochet pour nous c'était assez sécuritaire, mais là, bon, comme action corrective, on a renforcé si vous voulez la sécurité de ce crochet en mettant en place un double crochet pour s'assurer que ça ne se reproduise jamais, ce genre de situation.

Donc, voici pour ma réponse pour le design des boîtes, des cellules blindées. En résumé, elles subissent toutes... avant de les mettre en service, elles subissent toutes des tests, des FMEA, et puis c'est documenté. Voilà.

THE PRESIDENT: Thank you.

Ms. Owen-Whitred, do you have something you would like to add?

MS. OWEN-WHITRED: Yes, thank you. I just want to conclude this response by clarifying -- sorry, Karen Owen-Whitred, for the record, Director General of the Nuclear Substances Regulation Directorate.

So we do -- we take a risk-informed approach to our licensing and our compliance, Dr.

McKinnon, and while we do have processes to certify devices that are considered very high risk, in this case we would not look to the level of detail of the design of the container given the risk level.

That being said, we do expect that should there be an event such as this where there is potentially design flaw, we would expect the licensee to implement corrective actions to make sure that that flaw is addressed and, as we just heard from the licensee, that is exactly what they have done in this case by adding a second hook and other corrective measures. Thank you.

MEMBER McKINNON: Okay. Thank you.

THE PRESIDENT: Okay.

Ms. Maharaj...?

MEMBER MAHARAJ: Thank you, Madam Velshi.

I have two questions for Jubilant DraxImage, two slightly different areas, so I will ask them independently.

The first question I have is with respect to the monitoring of the gaseous I-131. In

the report it says that there are processes that occurred in order to contain the release into the room where the incident occurred and that there are filters so that the iodine doesn't escape into the atmosphere. What I was missing is whether or not there was any monitoring after the incident to ensure or measure whether there was any external atmospheric discharge of iodine.

M. CHETTAH : Oui. Donc, concernant cet événement, nous, nous avons en place un système d'échantillonnage hebdomadaire pour les rejets à l'extérieur, mais quand il arrive un incident comme ça, nous faisons un suivi beaucoup plus régulier, on fait un échantillonnage tous les jours, et puis dans le cas de cet événement, il n'y a pas eu de dépassement de la concentration permise, en fait, de notre niveau d'alerte hebdomadaire. On n'a pas dépassé les limites parce que justement on a contenu les déchets. Tous les rejets d'iode-131, on les a contenus de façon immédiate. On a mis ça dans des sacs à l'intérieur. En fait, les débris qui ont brisé dans la boîte, on les a contenus dans des sacs et on a

transféré ça immédiatement dans la salle des déchets, qui consiste principalement... on a un bunker, un grand bunker qui est ventilé, et puis, bien sûr, au bout du système de ventilation il y a une batterie de filtres au charbon pour retenir l'iode.

L'incident malencontreusement est arrivé durant... l'incident de la thyroïde là, l'uptake thyroïdienne est arrivée durant le transfert de ces wastes, de ces déchets d'une zone de production vers la zone des déchets justement. Puis le gap(ph) c'était que l'employé en question ne portait pas son respirateur tout le temps. Il le portait dans la zone où il y a eu l'introduction, et, comme je l'ai expliqué dans mon rapport, c'est quelque chose aussi qui a été corrigé.

Cette zone de production c'est une zone de grade C. Donc, les employés quand ils rentrent dans cette zone, ils sont... il y a un habillement spécial, il y a un gowning particulier. Il y a un nettoyage. Il faut que ça soit plus ou moins stérile, tout ce qui rentre dans cette zone-là. Le respirateur, il est aussi nettoyé avant de le

mettre, avant de le porter. Donc, le réflexe des employés c'est que... enfin, jusque là, c'était de garder tous les équipements stériles, nettoyés dans cette zone-là.

Au moment de sortir avec les wastes, il y a un pass-through. Donc, on met les wastes dans le pass-through, puis l'employé, il sort par une autre porte. Et en sortant, il s'est changé. Donc, il a enlevé le gowning qui est particulier à cette zone, et puis il est allé emmener les wastes vers la salle des déchets. Ce n'est pas très loin, il y a un corridor qui sépare les deux zones, mais c'était suffisant pour qu'il ait une inhalation parce qu'il ne portait pas de respirateur. Ça, comme je l'ai dit, ça été corrigé.

Ce n'est pas l'objet de la question, mais ça été corrigé en spécifiant de façon très claire et puis en émettant des directives très claires que dans le cas de la manutention de déchets issus de ces productions-là, il faut continuer à porter le respirateur en tout temps. Puis ça, on l'a mis... On n'a pas une procédure particulière pour ça là, mais on l'a mis dans le manuel, dans les règles générales par

rapport à la radioprotection. Dans le manuel il y a un chapitre sur la gestion des déchets, puis on a spécifié donc que le port du respirateur est obligatoire dans des situations comme celle-ci.

Mais pour revenir à la question, il n'y a pas eu de rejets vers l'atmosphère parce que les boîtes sont... il y a un système de ventilation qui est spécifique aux boîtes blindées, et puis il y a des filtres au bout, il y a une batterie de filtres au charbon. Et nous échantillonnons, comme j'ai dit au départ, en routine chaque semaine tout ce qui est rejeté à l'extérieur. Mais dans le cas d'incident comme ça, nous faisons un échantillonnage plus serré là, je dirais, on fait ça tous les jours.

Si jamais il y a un dépassement ou quelque chose, si ça arrive là, si on voit que la tendance est à la hausse, on peut prendre des mesures qu'on n'a pas prises dans cette situation-là, mais les mesures qui sont prévues seraient, par exemple, de fermer la ventilation, de fermer la boîte, de l'isoler complètement, de la fermer pour que les rejets n'aillent pas vers l'extérieur. On a cette

possibilité-là.

On a aussi la possibilité d'utiliser d'autres filtres, de switcher vers une autre batterie de filtres, parce que nous avons toujours deux systèmes, une qui est en fonction et puis l'autre qui sert de back-up. C'est-à-dire si les filtres sont saturés puis que leur efficacité n'est pas... est réduite, on peut éventuellement dans une situation comme ça switcher vers une autre batterie de filtres. Et puis, bien entendu, si jamais il y a dépassement, on peut carrément arrêter toute la production pour éviter justement qu'il y ait une accumulation d'iode qui serait rejetée dans l'atmosphère.

MEMBER MAHARAJ: Okay.

THE PRESIDENT: Before you move to your next one then, Ms. Majaraj, I just had a follow-up to this because I just want to get confirmation from Mr. Chettah.

So for this particular incident you then did a daily sampling just to make sure that nothing untoward was getting emitted and got that confirmation that there was no increase in emissions?

M. CHETTAH : Oui. Dans le cas de cet incident, je ne me rappelle pas la date exacte, je pense que c'était le 20 avril qu'on avait découvert la thyroïde là, l'uptake dans la thyroïde. Le jour même on a fait un échantillonnage et le jour... parce que s'il y avait quelque chose, probablement ça aurait été ce jour-là qu'on aurait vu une captation dans les filtres qui sont vers l'extérieur. Il n'y a rien eu cette journée-là. Et puis le jour d'après aussi on a une donnée. Puis après, bon, on est retourné à nos mesures de routine. Habituellement on fait ça chaque mercredi. Chaque mercredi on échantillonne ce qu'il y a dans les filtres, puis, bien sûr, on corrige l'activité par rapport à la décroissance. On a un facteur de correction pour justement avoir une estimation plus exacte, plus juste de l'activité qui a été rejetée durant toute la semaine d'avant.

THE PRESIDENT: Okay. Thank you very much for that.

Mr. Faille, you wanted to add something to this?

MR. FAILLE: Sylvain Faille, for the

record.

It's just to complement the answer from Mr. Chettah from DraxImage regarding the atmospheric releases.

As he mentioned, the emissions were calculated on April 20th and then the information that we received was there was no release above their alert, which is set at 71 Bq per cubic metre for the weekly concentration of iodine in the air. For that week the activity was 57, so slightly below their alert level, so therefore confirming that there was no significant release due to that event.

THE PRESIDENT: Thanks very much.

Ms. Maharaj...?

MEMBER MAHARAJ: So my final question is with respect to the process for the thyroid testing. What I have read in the report is that you have reviewed your processes to ensure that you have given refresher training to your staff, but I wondered whether or not you have a process where the licensee has some accountability to ensure that a nuclear energy worker who should have testing after a

potential exposure is not allowed to go home without it having been done. Like where is the balance between the licensee's responsibility to make sure people have the testing that is required and the employee's responsibility to present themselves for that testing?

MR. FAILLE: Sylvain Faille for the record.

From our view, there is a response procedure from the Radiation Safety Manual. It confirms that all workers that are present must be identified and monitored to ensure that they are not contaminated and that there their thyroid scan is done before they -- if they where identified as being in the area. So for us, we rely on their manual and their procedures and then it would be up to the licensee's responsibility to ensure that that is followed, and if not, then we could take some additional measures if we discover that they are not following their internal process and procedures where they said they would do these steps whenever there is an event involving, in this case, the release of

iodine that could potentially uptake to the worker.

THE PRESIDENT: Okay. Thank you.

Dr. Demeter...?

MEMBER DEMETER: Thank you very much.

This is a question for CNSC staff and I know you may not have the answer and that would be okay, but I looked at the committed equivalent dose to the worker's thyroid, which is 560 mSv, and I'm not sure if health Canada gave you any advice, if you back calculated that to how much they actually internalized, and based on the usual clinical dose we give to suppress the thyroid, to reduce its function if it's overactive, are we anywhere near a threshold where there may be an expected physiologic response or are we way below that threshold? I just want to see if Health Canada did sort of some back calculation to tell you if this was a clinical patient we would give him this much and they would internalize it and we would expect this dose in the thyroid. This is the dose you got here, 560. Is that anywhere close to what we would normally see as a clinically suppressed dose?

MR. FAILLE: Sylvain Faille, for the record. I'll ask Julie Burtt, one of the licensing staff or specialists from the CNSC to answer that question on the health effect.

MS. BURTT: Thank you.

Julie Burtt, for the record.

This is not information that I have provided to me by Health Canada, so if you would like we can take this as an undertaking and have that conversation with them.

But at the dose that they received at 560 millisieverts committed equivalent, this isn't something that we would expect health effects for an adult in this age range. So we know that at these types of doses and this age, cancer risk is -- little to no evidence of any additional cancer risk. Where we're concerned is non-cancer effects. But in looking at the literature, the doses would have to be higher than what this individual received.

So if you would like, we can take that as an undertaking to speak to Health Canada, but that's not information I have in my possession today.

MEMBER DEMETER: Yeah, that's good. I think it's good to get a sense of the order of magnitude or more difference in what I would give a patient externally and when they internalize it comparative doses. And I think it's good for the public to get a sense of whether or not this dose was at all close to suppressing your thyroid just physiologically. And the cancer risk, I understand that. So I'm fine with that. Thank you.

DR. LAFRANCE: This is Norman LaFrance, the chief medical officer for Jubilant DraxImage.

Dr. Demeter, your reflection is exactly correct. I'll defer to CNSC and Health Canada for specific numerical feedback to you, but this is significantly below what is expected for even a suppression scenario, and at levels that there is no discernible risk for thyroid malignancy or any whole body effects.

So fortunately, even though this employee did not follow procedure and removed the respirator before our procedures mentioned and did

unfortunately get a measurable thyroid exposure, they're well below any physiologic or pathophysiologic scenarios.

This is further emphasized by independent physician follow-up in Montreal and review. I'm not seeing those records *per se*, because it's confidentiality, but we've gotten reports that there's absolutely no thyroid physiology abnormalities that have been determined, and we're being very compulsive in following up on that.

But the actual calculated values give us further comfort that we're well below the issues of thyroid ablation that you're referring to that could be done at smaller iodine-131 doses.

Hopefully this feedback is helpful, and I'll stop here. Thank you.

MEMBER DEMETER: That's very helpful. Thank you.

THE PRESIDENT: Thank you. So we do have an action for CNSC staff to get that information from Health Canada. I think it would be useful to have that for reference.

Thank you, Jubilant DraxImage, for showing up today and answering our questions.

Marc?

CMD 21-M48

Written submission from CNSC staff

MR. LEBLANC: Thank you. The next item is to provide an update on the exceedance of the annual dose limit for a nuclear energy worker at Alberta Health Services. This is in response to an action item from the June 8 Commission meeting. CNSC staff filed a memo to the secretariat on September 20th as outlined in CMD 21-M48.

I understand that representatives from Alberta Health Services and Landauer are available for questions.

Madame la Présidente.

THE PRESIDENT: Yes, thanks.

Before we get to questions, CNSC staff, I understand you have some remarks you'd like to make. So Ms. Owen-Whitred, over to you, please.

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

I'm going to turn the microphone over to Marnie Sullivan who will just deliver a brief statement before we go into questions.

DR. LAFRANCE: And may I -- I'm sorry to interrupt. I'm assuming that DraxImage can be excused from this call now?

THE PRESIDENT: Yes.

DR. LAFRANCE: Yes. I wanted to be sure of that. And thank you very much for the opportunity to participate and answer the questions. Very appreciated.

THE PRESIDENT: Thank you, Dr. LaFrance.

MR. CHETTAH: Okay, merci. Merci.

THE PRESIDENT: Thank you.

MR. CHETTAH: Merci. Au revoir.

MS. SULLIVAN: Good morning, Madam President, Commission Members. My name is Marnie Sullivan. I'm a licensing specialist for the Directorate of Nuclear Substances and Radiation

Devices.

I'm here this morning to provide an update on the EIR presented to this Commission on June 8th, 2021, exposure to a nuclear energy worker exceeding regulatory limits.

On May 19th, 2021, CNSC staff were notified by the radiation safety officer of Alberta Health Services that a dosimeter worn by a nuclear medicine technologist working at the Walter C. McKenzie Centre in Edmonton, Alberta, reported to have received a dose of 145 millisieverts in excess of the annual 50 millisievert regulatory effective dose limit for a nuclear energy worker.

The technologist whose dosimeter received the elevated dose underwent a bio-dosimetry test conducted by Health Canada, the results of which indicated that the majority of the dose recorded to the dosimeter was non-personal. In addition, the licensee's investigation of this event concluded that the most likely cause of the elevated dose was contamination of the dosimeter and not the individual.

A return to work request was submitted

by the licensee and the authorization was approved by radiation protection staff on August 4th, 2021. CNSC has also received a dose change request from the licensee, which is currently under review by the CNSC staff.

On June 1st and 2nd, 2021, CNSC staff conducted an inspection of this licensee, focused on the implementation of the radiation protection program and on contamination monitoring. The inspection found that the licensee has appropriate procedures for managing dosimeters and was following good practice with respect to contamination monitoring.

However, CNSC staff noted that there were no documented procedures for this monitoring and no supporting documentation to demonstrate that the hand monitoring verification had been completed by workers prior to leaving the department for breaks, lunch, or for the day. The inspection report noted this deficiency.

The original event report from the licensee indicated one possible scenario was improper badge storage during the technologist's three-week

rotation in the PET department.

During the inspection, CNSC staff took dose rates in the cabinet where the dosimeter had been stored and confirmed that this was not the cause of the over-exposure.

Following the inspection, the licensee submitted revised site-specific procedures for handling of dosimeters and hand monitoring for each site covered under the Alberta Health Services umbrella. The applicant authority committed to roll out training to all staff as well as revise and implement the above-noted procedures. This was completed by all hospital locations licensed under Alberta Health Services as of the monthly update received on September 3rd, 2021.

After the June 2021 inspection, Alberta Health Services had reported additional incident events at other sites that are of concern to CNSC staff.

One incident involved a small amount of contamination received by a resident radiologist due to not wearing appropriate PPE -- a lab coat.

The second report made to the duty officer was in relation to a missing I-125 seed post surgical removal, which was deemed to have been caused by deviation from procedures and inexperience.

Neither of these events are of a significant risk; however, CNSC staff met with the applicant authority on August 24th, 2021, to discuss CNSC concerns. The applicant authority provided reassurance to the CNSC that a number of additional actions are underway to correct any deficiencies and integrate CNSC staff suggestions for improving the radiation safety program.

CNSC staff have reviewed all the information provided as a response to the inspection and are satisfied with the corrective measures put in place. In addition to a thorough radiation safety program review, CNSC staff will conduct follow-up inspections of one or more of the Alberta Health Services licensed locations within the next fiscal year.

Although the exact cause of the exposure of the dosimeter has not been determined,

CNSC staff confirm with the licensee's conclusion that a large portion of the recorded effective dose is non-personal and the worker in question did not receive a dose in excess of the annual dose limits for a nuclear energy worker.

While CNSC staff are satisfied that the subject of the EIR has been resolved, we still consider it important that the licensee seek to understand the cause of the high dosimeter reading, and we continue to monitor the licensee's efforts in this regard.

This concludes our update on this event. CNSC staff are now ready to answer any questions the Commission may have. Thank you.

THE PRESIDENT: Thank you.

Let me turn the floor to Alberta Health Services and see if you've got any remarks you'd like to make. So Mr. Chies, over to you.

MR. CHIES: Good morning. Mauro Chies, Applicant Authority Alberta Health Services.

I have nothing really to add. I think the summary that Marnie provided is accurate and

correct. We continue obviously to try to enhance the safety culture in Alberta Health Services with respect to radiation safety. We have a Radiation Oversight Committee that is provincial in nature, and the events that have taken place between June and August for discussion have been disseminated to staff and we look at and continue to enhance training and reminders to staff on safety protocol. That's all.

THE PRESIDENT: Okay, thank you.

Well, let me turn the floor to Commission Members for questions. Let's see.

While I'm waiting to see if any of my colleagues have questions, maybe I'll ask the first one. And I'll ask the licensee first.

So what is your hypothesis for the high reading, given that it wasn't improper storage because that's been dismissed. What other possible causes could it be?

MR. CHIES: Thank you. Tough question to answer. We're working with Landauer to determine possible sources of contamination as we still rest on that hypothesis. As CNSC had indicated, the post-

inspection didn't yield any sources for possible contamination. So we continue to work with Landauer on options on that, given this is the second event in two years of a similar nature. But right now, it's still considered contamination and we continue to investigate and work with Landauer on possible outcomes.

THE PRESIDENT: Okay, thank you.

Dr. McKinnon?

MEMBER McKINNON: I would like to follow on with that theme, but my question is to CNSC staff.

Obviously, it's very important to try and understand, you know, what was the cause for the high reading. And in this case, it looks like it may be very difficult to do. So what happens to cases where it isn't possible to identify the cause? Are they archived anywhere for future reference? Because I imagine every case is valuable and, you know, could be re-examined with new knowledge. So how are they stored for the future if they can't be resolved in the short term?

MR. FAILLE: It's Sylvain Faille, for the record.

Typically for all events, not just this one, but all of them, they're kept in our central database, and they're also on the licensee's file for the record. So we can always refer back to them if we are aware of another event.

And in this case, I see as we mentioned in our summary, we were aware of a second instance that was reported back in 2019, and we went back and look at that one first when this new case came and learned from what we had learned at that time, trying to look at what could be the possibilities. And we're also looking at other events that we've seen in the past as well that could be of similar nature, just to try to put everything together and try to help us in determining what could be the cause or get some lead as to what could be done initially just to discover if there's anything that could be done to help with the new case that we are reviewing.

So yes, in short, everything is kept

on file and on records for each of our licensees and in our central database for all events. And we can refer to those as needed.

MEMBER DEMETER: Okay, great. Thanks very much.

THE PRESIDENT: Okay, thank you. And thank you to Alberta Health Services, and I believe we had a representative from Landauer here as well. And you know, we will be looking forward to getting updates on your initiatives to address the issues that have been identified and really strengthening the safety culture, because I'm sure you're very disturbed by this series of events, and the Commission certainly is. So again, thank you for coming today.

MR. CHIES: Thank you.

THE PRESIDENT: We'll move to our next update. Marc?

CMD 21-M50

Written submission from CNSC staff

MR. LEBLANC: Thank you.

The next update is regarding an action item from the minutes of the November 8, 2020, Commission meeting.

During the 2020 presentation of the Regulatory Oversight Report on nuclear substances in Canada and Class IB accelerators, the Commission directed CNSC staff to provide details related to enforcement actions per licensee. CNSC staff filed a memo on August 31st, 2021, as outlined in CMD 21-M50.

As Commission Members notified the secretariat in advance that they were satisfied with the information, this action item is now closed.

CMD 21-M43

Written submission from Ontario Power Generation

MR. LEBLANC: The next item is an update regarding an action item from the minutes of the April 27, 2021, Commission meeting.

The Commission requested Ontario Power Generation to provide statistics on damage to the irradiated fuel bundles. OPG filed a memo on August

23rd as outlined in CMD 21-M43.

Representatives from OPG and CNSC staff are available for questions.

We will turn the floor to OPG. Ms. Irvine, do you wish to add anything or make a statement before the President opens the floor for questions?

MS. IRVINE: Sara Irvine, manager of Regulatory Affairs for Pickering Nuclear.

I have no opening statements, but I am prepared to answer questions as they arise.

THE PRESIDENT: Excellent.

Well, then, let's open the floor. And I see Dr. Lacroix has his hand up. Over to you.

MEMBER LACROIX: Well, first of all, thank you very much to OPG for digging out this information and sharing it with us.

When I look at the number, the small fraction of damaged fuel bundles, 0.0001 per cent, it seems to be, I don't know, is it the correct number, or is it 0.001? Because it makes a big difference. So just want to make sure that for the record that we

have the right data. Thank you.

MS. IRVINE: Sara Irvine, for the record.

Yes. I apologize for the incorrect mathematics in the memo. As you'd pointed out, yes, the math is incorrect. But it was an order of magnitude off, but yes, you're correct.

MEMBER LACROIX: Thank you very much.

MS. IRVINE: Thank you.

THE PRESIDENT: Just to make sure we've got the record correct, is it then 0.001 per cent?

MS. IRVINE: Sara Irvine, for the record.

Yes, it is 0.001 per cent.

THE PRESIDENT: So two orders of magnitude?

MS. IRVINE: Yes.

THE PRESIDENT: Okay, thank you.

Dr. Berube?

MEMBER BERUBE: Yes, my question's for OPG. Recognizing, of course, that the failure rate

here is relatively small, I think you indicated in your report that most of the issues happened during handling in the IFB itself, the irradiated fuel bay.

Could you expand on exactly what was happening there? Was it tooling? Was it operator error? What was the majority of the reason for the failure? What is the nature of that failure, actually?

MS. IRVINE: So Sara Irvine, for the record.

So prior to 2013, there were, well, a small number of handling issues. The tooling used actually grasped the fuel bundle mid-pencil, so it was grasping the bundle right in the middle. And that led to flexing of the pencils. And some pencils were becoming disconnected from the end plates.

So in 2013, a new tooling system was procured and it actually lifts the bundles from the ends, so close to the end plates. It reduces the flexing of the bundles. And since then, the trending has indicated that the new tooling has significantly improved the handling damage.

MEMBER BERUBE: So there was no crackage of the sheath or anything like that due to the flexing? Because obviously coming out of the reactor, they would be pretty brittle, I would think, and they're cooled quickly, so. What was happening, was the welds popping on the end caps or -- that was the nature of the error; right?

MS. IRVINE: Yes, Sara Irvine, for the record.

It was pencils becoming displaced from the end plates.

MEMBER BERUBE: Good. Thank you very much.

THE PRESIDENT: Okay, I see no further hands up, so thank you, OPG, for coming to answer our questions.

CMD 21-M41

Written submission from CNSC staff

THE PRESIDENT: We'll move to the next item on the agenda, which is the status report on

power reactors as outlined in CMD 21-M41.

I note that we have representatives from the nuclear power industry and CNSC staff joining us for this item, and they can identify themselves later, before speaking.

Dr. Viktorov, the floor is yours.

DR. VIKTOROV: Thank you.

Good morning, Madam President and Members of the Commission. My name is Alex Viktorov. I am the director general of the Directorate of Power Regulation. And with me today are other regulatory managers and specialists available to answer your questions.

The status report on power reactors, CMD 21-M41, was finalized on September the 23rd. The following are short updates reflecting changes since that date.

At Darlington, Unit 4 began a planned maintenance outage on October the 1st.

For Pickering, on September 30th, Unit 5 experienced a turbine trip due to stator cooling issues. The reactor was set back to low power, but

the primary heat transport system remains hot and pressurized. The transient didn't lead to any safety impacts to the workers, public, or the environment.

Under the conditions of the designated officer order, a restart authorization wasn't required from the Commission; however, OPG has already submitted an anticipatory request should a heat transport system cool-down be necessary to implement maintenance. The unit is currently at 0.1 per cent of full power. Target date for a return to full power is yet to be determined.

Also at Pickering, Unit 6 is derated to 72 per cent of full power due to fueling machine unavailability. And target date to return to full power is still also to be determined.

And that concludes the verbal update on power reactor status. And CNSC staff are available to address your questions. Thank you.

THE PRESIDENT: Thank you.

Let's open the floor for questions from Commission Members to CNSC staff or licensees. And we'll go around the room for this, and we'll start

with Ms. Maharaj, please.

MEMBER MAHARAJ: I don't have any questions at this time, Madam Velshi.

THE PRESIDENT: Okay. Okay, well, let's see. We've got a few hands up, then

Dr. Demeter?

MEMBER DEMETER: Thank you. I've got two quick questions. One was related to the KI project specifically for Pickering. And I was looking at the sort of timelines from what started out as a very simple question of schools requesting stockpiling starting in December 2018, I believe. And now we're in 2021, and we've sort of gone through iterations.

I want to get a sense of what is the timeline to completing this consultation and coming up with a strategy?

And secondly, you know, if it's beyond the lifespan of Pickering, it won't be that useful. But can it be generalized, perhaps, for Darlington? I know Bruce has got their own -- they've already supplied schools I believe from the last -- from way back, from what I remember.

But what is the end date for this project so that it might have some utility while Pickering is still functioning? And can it maybe be generalized for Darlington?

And I have one other question, but I can ask later.

DR. VIKTOROV: Yeah, allow me to start and then I'll ask Lee Casterton to supplement my general response.

Again, we are eager to see this project to completion. It has taken much longer than anticipated, but the impact is clearly due to the pandemic's impact, and in particular the availability of our partners in this activity. They have not been able to dedicate the required resources.

Hopefully the Phase I of the project will be brought to the completion very soon. I believe we have one of the final milestones planned for November, and that will bring us essentially to the completion and we'll bring the matters to the Commission's attention by the year end.

And Lee, are you able to provide

additional details?

MR. CASTERTON: Yes, thank you, Alex.

Good morning, Members of the Commission.

Just to supplement Alex's response there, so specifically for timelines, Phase I, we are hoping to get to a conclusion by the end of this year with presenting a report to the Commission.

Following Phase I, Phase II will start, and that is actually one of the objectives of Phase II specifically to look at the feasibility of distribution of KI to all schools. And so that was one of our main objectives of Phase II, and that's really what we'll be working on next year.

So we'll be having a Phase II workshop early next year to discuss that, and we will be drafting a Phase II report as well. And the -- we hope to complete the work on Phase II by the end of next year with a report again being submitted to the Commission with our recommendations on the feasibility.

THE PRESIDENT: Dr. Demeter?

MEMBER DEMETER: Yeah, thank you. I'm still a little bit uncomfortable with the long timelines to actually implementation. That's just to be noted.

The other question I have for the operators, there's a number of sectors -- public sectors with critical jobs, mostly the health care sector, but also transportation, that have looked at requiring COVID vaccination for critical workers, so this would be components of your minimal staff complement, critical safety staff.

Are any of the operators looking at strongly recommending or requiring COVID vaccinations for critical positions?

THE PRESIDENT: Well, why don't we go through licensee by licensee? And maybe start with Bruce Power.

MEMBER DEMETER: Thank you. That's good.

THE PRESIDENT: Mr. Burton?

MR. BURTON: Good morning, folks. Maury Burton, for the record, Chief Regulatory Officer

for Bruce Power.

To answer your question, at Bruce Power we are strongly recommending that all staff that come to site get their vaccination, and we are currently looking at a vaccination policy. That's still under study, but we will likely have something by the end of November as a vaccination policy for the company.

THE PRESIDENT: Thank you.

And from OPG, Mr. Bevacqua.

MR. BEVACQUA: Thank you. Val Bevacqua, for the record, Director of Ops and Maintenance for Pickering.

OPG has always strongly promoted the use of vaccines for our staff. We currently have entered into a vaccination policy where we are asking our staff to declare whether they're vaccinated or not. Staff are given the option to choose not to declare.

Any staff that reports not to be vaccinated or chooses not to declare will be part of a twice-a-week PCR test -- excuse me, rapid test of

COVID to enter the facility, so that will become routine testing for the individuals that are not vaccinated.

End of comment.

THE PRESIDENT: Thank you.

And from New Brunswick Power, Mr. Nouwens.

MR. NOUWENS: Good morning. Can you hear me okay?

THE PRESIDENT: Yes, we can.

MR. NOUWENS: Thank you. Jason Nouwens, for the record, Director of External Affairs.

Similar to OPG and Bruce Power, we've always strongly encouraged vaccinations, dual vaccinations, for all of our workers, particularly for our critical staff, but also similar to OPG, we have asked people to disclose whether they're vaccinated or not.

We're not forcing them to disclose, but we are asking for those who have not disclosed that they are vaccinated, there is a three times per week rapid testing protocol that we have implemented

starting today. And also, there's additional protective measures for any staff that are on site that have not been fully vaccinated, so we've -- I do want to point out that we have kept all along our protocols in place from, you know, New Brunswick -- or New Brunswick as a province is green now, but we have kept all the protocols that were in place when we were at yellow and orange, so we do have those protective protocols in place. But we are definitely promoting dual vaccinations.

MEMBER DEMETER: Thank you very much.

THE PRESIDENT: Thank you.

Okay. Dr. Berube.

MEMBER BERUBE: So a couple questions for CNSC regarding Bruce Unit 3.

I might have missed this during update. Sorry if I did, actually, so just to verify. What is the intended return to service date being planned by Bruce at this point?

And also, there is a note here regarding a CMD that's under way for permission-consent to restart Unit 3 approval. I haven't seen

it. I think the date indicated is 1st October.

If you could just give me an idea where that is.

THE PRESIDENT: Maybe I can get the Secretariat to respond to that. We do have a panel of the Commission that is reviewing that request, Dr. Berube, and so Bruce Power cannot restart until they get the Commission's approval to do so.

Mr. Leblanc, did you wish to add anything to that?

MR. LEBLANC: Not really. Sorry, Madam la présidente.

Yes, we have a process that is ongoing, but I don't really have anything else to add beyond what you first stated.

THE PRESIDENT: All right. Thank you.

Dr. Lacroix.

MEMBER LACROIX: This is a question for staff. When I look at the number of employees at Bruce, Darlington and Pickering that have been tested positive for COVID-19, that amounts to 400 employees. That's about four percent of the staff.

And I was wondering, is it -- is this number comparable to other industrial sectors?

DR. VIKTOROV: Alex Viktorov, for the record.

I expect that licensee will be in a better position to provide specifics and comparisons, but the numbers that we have, and we track relatively closely, are inclusive of contractors working on the site, so it may be difficult to draw inferences that it's a certain percentage of licensee staff.

And the number of infections or the rate of infection has gone down, which indicates the efficiencies of protective measures in place, but with this, I'll ask a representative from the licensees to comment on how they compare with comparable industries.

THE PRESIDENT: Thank you.

Mr. Bevacqua.

MR. BEVACQUA: Al Bevacqua, for the record.

Yes, we compare ourselves continuously with Ontario Health, which is currently at around 4.1

percent. We continue to be at or below that current rate, which we track daily, the current provincial rate, and we have not seen, you know, on-site transmission at the rates seen at other industries at this point.

We've always communicated when we have had on-site transmission to the staff.

End of comment.

THE PRESIDENT: Thank you.

Dr. Lacroix, you okay with that?

MEMBER LACROIX: Yes, thank you very much.

THE PRESIDENT: Okay. That concludes this agenda item.

Staff, I do want to commend you for the report on the COVI-19 activities. It is very insightful and helpful, so thank you for that.

We will now move to the next item on the agenda, which is a presentation from the Independent Electricity System Operator, or the IESO, on the duties and role of the IESO in Ontario as outlined in Commission Member Document CMD 22-M44.

I wish to note that representatives from CNSC Staff, Ontario Power Generation and Bruce Power are joining us for this item and will be available for questions.

I'll turn the floor to Mr. Leonard Kula for this presentation.

Mr. Kula, the floor is yours.

CMD 21-44

Presentation from

Independent Electricity System Operator (IESO)

MR. KULA: Great. Thank you, and good morning, everyone. Nice to be back.

You will recall that I was here in June of 2020 with our then Chief Operating Officer -- Chief Executive Officer, Peter Greg, and so happy to be back. This time I am joined by Chuck Farmer, who is our Vice-President of Planning, Conservation and Resource Adequacy.

Chuck and I are going to split the presentation, and I'll cover the first and the end and

Chuck will cover the middle.

Slide 2, please.

Very briefly, the IESO executes a central coordinating role in the Ontario electricity sector. We have a control room that operates the provincial electricity system on a 24/7 basis. That's the high-voltage grid, making sure that we balance supply and demand and that, should things happen on the system, that flows on the power system remain within the capability of the transmission elements to carry it.

In executing that reliability function, we use electricity markets to go ahead and find the most effective and efficient way of determining what is the right amount of supply to meet Ontario demand. And in support of that, we plan for Ontario's future energy needs.

Frankly, we plan what's going to happen or what we anticipate happening in the next five minutes, and that planning covers a wide variety of timeframes all the way to 20 years out with a variety of different methodologies and reports and

information in support of that.

In support of those primary functions, we support innovation and emerging technologies, recognizing that new things are connecting or wish to connect to the grid and so we need to support that in aid of efficiency and reliability and also to anticipate what the impacts might be as it comes to the power system. And we work closely with communities within Ontario to go ahead and recognize that there is an Ontario-wide perspective, but also a local perspective that we need to balance in putting forth reliable and efficient solutions.

And last but not least, we enable energy conservation in the province and have had a long history of success in effectively reducing the amount of electricity demand in Ontario.

With that, I will turn it over to Chuck Farmer to carry the next bit forward.

MR. FARMER: Thank you very much, Len, and thank you to the Commission for this opportunity.

If I can get Slide 3, please.

So where we sit now is really a change

in the paradigm of electricity planning in Ontario. And if we think back to the last 10 or more years, we really have experienced very healthy planning reserve margins in order to be able to operate the system. We have added significant amounts of generation over the last decade. And in that time, we've seen demand for electricity sitting relatively flat or declining as we see a number of impacts coming through, including sort of a shift in the way that people use electricity from the reduction in some of our large industrial loads, the impacts of very aggressive energy efficiency type programming and the impacts of things like a financial background 2009.

So these have led to very healthy surpluses, but as we move forward, we start to see a shift in that paradigm. We see conditions starting to tighten in the mid-2020s. The potential for demand growth is starting to re-emerge.

We do see the end of life of the Pickering generating station and we have significant turnover in our fleet as contracts that were signed 20 years ago start to expire and we have to decide what

to do with those facilities next.

So if I can have Slide 4.

As a recap, Ontario has quite a diverse supply of electricity. We are anchored by significant nuclear and hydro assets. We have strong participation in our -- in our system by renewable energy and we are supported by the flexibility of a significant natural gas fleet. But overall, in 2020, 93 percent of the generated electricity was emissions free.

Slide 5.

So since the last conversation, there have been significant impacts on the power system from the pandemic. Demand is overall lower, but now is starting to recover as the economy returns and as people start to return to what we hope to be a more normal existence.

The shape of demand has changed considerably. We certainly saw residential consumption increase as increasingly customers were working from home, and so higher residential consumption and capacity impacts on that.

Our large industrial market stayed relatively stable, so the strength of manufacturing was a bit of a surprise through that, but our small and mid-size commercial markets were heavily impacted with the health measures that took place in Ontario.

Looking forward, we see electrification and decarbonization as significant impacts on demand for electricity, particularly in the transportation sectors and in the decarbonization of some of our industrial sector. We see the economic recovery also leading to some significant economic growth, particularly in the areas of agriculture. We have very significant greenhouse markets in southwestern Ontario, and they're growing very, very rapidly. And a resurgence of our mining sector in the north.

And our residential sector is recovering and will start to grow as immigration levels return to more pre-pandemic type levels.

Next slide, please.

On the supply of electricity side, the outlook is relatively unchanged. We have been

managing the availability of electricity through a very high level of collaboration with the nuclear operators to optimize the schedule for the purposes of refurbishment, but also to minimize the impacts to adequacy. And that has been something that has been very, very helpful.

So not much on the supply side.

If I can move to the next slide.

So as we look forward to what the needs in Ontario are likely to be over -- over the next decade and beyond, they are largely for capacity. So the flexibility of our natural gas fleet gives us the capability to produce energy as the gas fleet can ramp up while we support the nuclear refurbishment program and the retirement of the Pickering nuclear generating station.

Moving forward, we're working on processes to reacquire the resources that are starting to come off contract that are getting to the end of those 20-year commitments. They still have significant life left in those resources and also, processes to acquire new capacity and accounting for

uncertainty to the extent that we're able, significant policy decisions and customer preferences do have the potential to impact the outlook as we go forward.

So in all, we are preparing for being adequate throughout the next 20 years and we have plans in place to achieve that.

And then on the next slide, for interest is the latest -- next slide, please. Thank you.

Is the latest nuclear refurbishment schedule. Again, this continues to evolve as the operators continue to move through their refurbishment programs and as we continue to work together on minimizing the impact, you will see for these purposes we do have Pickering going to -- four of the units going to the end of 2025. Our planning fully recognizes that that would be subject to a CNSC decision on the ability of those units to operate.

With that, I will turn it back to Len.

MR. KULA: Great. Thanks, Chuck.

Next slide, please.

So changing tack somewhat to talk

about the recent CNSC Orders related to pressure tube hydrogen.

So as the system operator and being very interested and understanding the state of the resource fleet in Ontario, Bruce Power notified us in a very timely manner that the pressure tube sampling showed unexpected results and we continue to interact with both OPG and Bruce Power to understand the state of the Orders, their responses to it. And so we have been very much kept in the loop.

So we're aware of the Orders. We're monitoring the hearings that are taking place.

To be very clear, the IESO takes no position on CNSC and the decisions that they will take, you know, with regard to the state of the nuclear units. From our perspective, we are looking at it from trying to understand what the potential impacts are on the availability of units as it pertains to balancing supply and demand in Ontario.

Next slide, please.

So recognizing that the length of time to return a nuclear unit from service after either a

planned outage or a forced outage might be longer than we anticipate, we are -- we conduct ongoing adequacy assessments to go ahead and understand what that potential might be.

You know, we operate the power system that -- in such a manner that it is typical following a forced outage that a nuclear unit returns to service 48 to 96 hours after the forced outage, after the poison out. Sometimes it takes longer, but generally we know that a unit can come back as quickly as two to four days after the event that causes the forced outage.

From a planned outage standpoint, we get information from the nuclear operator as to the anticipated return to service date, and that will -- that might change and the nuclear operators keep us up to date as those date changes -- as those dates change.

If, as a result of these Orders, the requirements to acquire restart approval changes those timelines, we want to have as good an idea as we can of understanding what the impact is from a timing

perspective and, as such, determine whether additional action needs to take place on our part to go ahead and make sure that we have the right amount of supply to meet anticipated demand.

That -- the impacts of that will change depending upon the time of year. If a -- any generator were to be removed from service now and were to be gone for some amount of time, right now because we are in the shoulder season of the year where electricity demand is not particularly high, that is a relatively easily managed impact on the system.

If we're talking next summer when supply is tighter, well, then, that will have different implications for power system operations. But we are constantly taking the best information that we have, providing our assessments of adequacy, and then taking actions and pulling levers in our toolbox to go ahead and make sure that we can manage the power system reliably.

With that, that concludes the presentation and Chuck and I are available to answer any questions that you might have.

THE PRESIDENT: Okay. Thank you very much for the presentation.

And I'll open the floor for questions from Commission Members.

Ms. Maharaj.

MEMBER MAHARAJ: Thank you, Madam Velshi.

If I could return the IESO to around slides 3 and 4, I had a couple of questions with respect to the relationship between the installed capacity and projected load.

So if I -- I'm just going to pull up my copy quickly here of the slide deck.

So on slide number where you have the two doughnut graphs relating to the installed capacity and the energy production, what I think I'd like to understand better is with the current balance in generation to -- the installed generation to the demand, how do you see the forecasted supply crunch or the -- you know, the supply changes being serviced by the existing installed capacity?

Do you see that there's a risk that

there won't be a sufficient amount of installed capacity to meet what you're projecting to be high demand during the summer of 2022, I think it was -- 2022 and then the winter season 2022-2023?

MR. FARMER: So if I may, we've been preparing for a considerable amount of time for the 2022-2023 season, so I think within your question there's a couple of things to consider.

There are many, many sort of ways to look at capacity for electricity. What we've shown here is installed capacity, but in our planning we actually look at effective capacity, so the expectation that the resources will be there during the peak demand periods or during times of need because maybe you've lost some supply on the system, and so we have significant information that allows us to predict, for example, the performance of solar, the performance of wind, the performance of nuclear, et cetera.

So that's actually what we would use to be able to balance our projections of supply and demand, so you apply factors. We have sort of more

than 35,000 megawatts of installed capacity. When you look at it in terms of effective capacity, that's more in the sort of 24,000-25,000 megawatt range for a summer peak period.

But as part of those requirements we are also putting in place planning reserves. So we carry very healthy planning reserves based on the make-up of the fleet.

So if you have a higher number of -- for example, a higher proportion of intermittent renewables, that would impact the nature of the planning reserve calculations and you would actually probably carry a little bit more planning reserve to be able do deal with that.

So we've been looking at the period coming up for next year for quite a considerable amount of time, and we're carrying a fairly healthy planning reserve into that period.

We will then revisit those assumptions when we do our what we call reliability outlook, which is an 18-month forward-looking period. So we're looking at those periods now and that will be used to

manage the outage schedules on the fleet as well.

MEMBER MAHARAJ: Thank you. Do you see any significant change to your forecast based on what appears to be just generally an increasing electrification of transportation and a real desire I think in the marketplace to become more carbon neutral or carbon zero? There's a really big push. Have you accounted for those changes in your forecast?

MR. FARMER: We have and we continue to, because I agree, I think in your question there is this notion that it is a quickly evolving file, and I think that's very important to keep in mind. But we update our forecast for electricity demand on an annual basis.

In the 2020 forecast we had significant amounts of electrification of transport, transit systems as well.

As we lean into our next forecast, which we will be releasing towards the end of this year, we're seeing industrial investments that are going to have some impacts as you start to decarbonize the industrial sector. Very significant announcements

at the federal level around targets, and we incorporate those into our demand forecast.

I, to be honest, don't expect to be caught off guard because these things are trends that take some time to manifest in the form of higher demand. So we're ever vigilant, but always updating forecasts to account for those trends.

MEMBER MAHARAJ: Thank you.

MR. KULA: If I can just add to Chuck's answer.

So the supply and demand picture is one thing. The other thing is that the IESO takes actions to go ahead and close gaps. So in fourth quarter last year we announced a resource adequacy framework that identified a series of measures, actions, mechanisms to go ahead and acquire supply in Ontario.

Long story short, but the primary vehicles are an annual capacity auction, a mid-term request for proposals that would give commitments to resources for a three to five-year time period, and a long-term request for proposal for new capacity, you

know, that would give the commitments on the order of seven to 10 years.

We executed our first capacity auction in December of 2020, that provided capacity to meet summer of 2021 needs. And we are anticipating running our next capacity auction, that's the annual activity, in December of 2021 for summer of 2022.

So any gaps we can go ahead and address with these short-term mechanisms. But also looking longer term, we have mid-term and long-term requests for proposals to go ahead and acquire -- or acquire new or reacquire existing, to go ahead and address those gaps.

MEMBER MAHARAJ: Thank you.

THE PRESIDENT: Thank you. Dr. Berube.

MEMBER BERUBE: Yes, thank you very much for your presentation. I appreciate you coming forth and actually sharing this information with us.

One of my concerns is the adaptation, the S-curve on the transportation sector, which has actually been mentioned already at this point. And

I'm looking at the European numbers in particular, and very much the leader here is in Norway where the adaptation curve here is reaching a peak already.

Projected that we're looking at almost zero petroleum-based vehicle new sales already, which is an exceptional case. But the rest of Europe is moving very very near this. And I think fundamentally it's following an S-curve adaptation cycle which is, you know, can be quite uncomfortable, especially if that were to happen here in any way.

I'm just wondering, how often do you actually revisit your demand forecast?

And second of all, the other question I have is, you know, the entire North American grid, what is the surge capacity on the grid at peak consumption? I guess that would probably be in summer, this summer in particular because of the heatwave that we had experienced would have been quite hit.

So if you could just give me some idea of how dynamic this forecast is, how fast you can accommodate change.

MR. FARMER: So thank you for the question. So we do update our forecast on an annual basis, or more frequently if something does happen that causes us to need to revisit them, it's something very significant, major announcements for example.

I agree with you, the potential for a tipping point in transportation is a little unsettling. You don't see tipping points until after they have occurred, is generally the rule of thumb.

But I am more concerned as a forecaster, to be honest, about decarbonization in the industrial sector.

And to put transportation in context, we have about seven million passenger vehicles in Ontario, and if one million of them were electrified, and we're a long way from that, that would add about two to three terawatt hours of electrical demand to a system that's sort of 145ish terawatt hours.

So the overall impact to the system actually isn't that great, although it has very significant impacts locally where you see clustering of charging vehicles which could be very disruptive

for our distribution companies.

And so we do encourage the distribution companies to be on top of understanding how their loads are changing and being prepared to make those investments to support. I think energy management will be extremely important as we go forward.

In terms of capacity, I'll maybe lean on Len for the capability of our neighbours. But we're capable of meeting demands in the sort of 24,000-25,000 megawatt range, which are higher than we have experienced in our recent summers.

THE PRESIDENT: Okay, thank you. Dr. McKinnon.

MEMBER McKINNON: Thank you for a very interesting presentation.

My question is also in regard to the change in energy sources that you're projecting. I've come across locally some instances where people want to install solar power and use net metering, but they were denied that option because of the local configuration of the power system, they were not able

to accommodate it. It was a capacity issue.

So scaling that up to, you know, changes in the energy sources when Pickering is no longer available and these very significant changes in the inputs. My question is about the ability of the grid to manage these major changes, and what is the flexibility and the status of the grid going forward with these projected changes in energy sources?

MR. FARMER: A very interesting and good question. So, as the IESO, we are accountable for the IESO-controlled grid. So often times when you see customers trying to undertake net metering, maybe they're installing solar or something, that is a limitation on the feeders themselves that are at the distribution level. And that sort of, to me, speaks to the need to continue to modernize the system that we have, particularly at the local level.

Many investments have been made in the IESO-controlled grid. We continue to work on transmission planning with Hydro One and other transmitters to make sure that the grid is ready. So there have been considerable activities to get ready

for the refurbishment of the nuclear fleet and prepare for the retirement of Pickering, for example. So we've bene working on that. We've bene working on some work around interties with Quebec to enable more firm capacity to flow.

And, in general, Hydro One have been investing in their system to enable much more capability for power to flow in two directions. So the grid continues to get smarter is the term people use, more flexible maybe is a better term. But there are many more investments on the transmission system, in my view, to come to enable the full transition.

MEMBER McKINNON: Very interesting. Thank you very much.

THE PRESIDENT: Thank you. I've got some very kind of nuclear-specific questions that I want to take today's opportunity to get your perspective on. One, on the nuclear refurbishment schedule, did any of that change as a result of COVID?

MR. FARMER: I would probably defer to the nuclear operators on the changes they made to their schedules. What I will say is they kept us

highly informed as they went through it.

THE PRESIDENT: Okay. So I can get that information from them at another time.

From a planning perspective, what are you showing as the timing for the introduction of maybe new nuclear capacity?

MR. FARMER: Thank you for that. So we are not currently -- in our planning forecasts what we don't do is speculate on what the replacement technology is. So we don't actually have a new nuclear component, just as we don't have additional gas or solar or anything else, frankly. We show the gap in them, we like to hold competitions to meet that.

However, we are aware of and accounting for the potential for 300 megawatts, for example, of small modular reactors towards the end of the decade that the Government of Ontario has express some support for and OPG have been moving towards.

THE PRESIDENT: Thank you. And it was good to see the [indiscernible] you and our licensees, particularly around the recent pressure tube issue

which, as you indicated, could result when there's a post-outage taking longer for the units to come online in order to comply with the order, and perhaps even longer duration for outages in the future if additional inspections or pressure tube replacements, et cetera are required.

Have those been factored into your planning already or is this premature?

MR. KULA: It has been and it hasn't been factored into the planning. And what I mean is so we have our plans, we've produced a number of reports.

What we've done is a number of scenarios to go ahead and say, if as a result of whatever process additional nuclear units were unavailable, 1, 2, 3, concurrently, what might that be and what actions might we take in response to that? And where are the pressure points, where are the areas or times of year that are more critical for us?

So Chuck's plans, and Chuck is the longer-term planner, wouldn't necessarily have taken that into account yet. But my plans, because I'm

responsible for the operation of the power system, I'm looking out typically 18 months, they have taken place, but not necessarily in the public reports, but more in the what if scenarios that we run.

THE PRESIDENT: Thank you. This concludes this item, but I really want to thank you again, Mr. Kula and Mr. Farmer, for accepting our invitation to present to the Commission today. I mean, it helps us understand the better and the broader context of the nuclear sector, and your session today was extremely informative.

So again, thank you and we look forward to seeing you again next year.

We will now take a break and reconvene at 11:15. Thank you.

--- Upon recessing at 11:01 / suspension à 11 h 01

--- Upon resuming at 11:15 / reprise à 11 h 15

THE PRESIDENT: Welcome back.

The next item is a technical briefing by CNSC Staff on the symmetry and dose assessment as outlined in CMD 21-M29.

Ms. Purvis, the floor is yours.

CMD 21-M29

CNSC Staff Presentation

Dosimetry and Dose Assessment

MS. PURVIS: Thank you, and good morning. For the record, my name is Caroline Purvis, I'm the Director of the Radiation Protection Division here at the CNSC.

Today we'll be presenting information on Dosimetry and Dose Assessment. My colleagues, Mr. Bertrand Thériault and Mr. Diego Estan, both experts in the Radiation Protection Division, will help me with this presentation.

We're also supported by other CNSC Staff who are available to answer questions.

The purpose of the presentation today is to provide a briefing on dosimetry and dose assessment approaches. This briefing is for information only and no decision is being requested of the Commission.

The presentation will consist of four

sections: first, we'll briefly cover the related regulatory requirements; and then, we will give a high-level overview of dosimetry and dose assessment; after presenting two case studies we will finish with some summary points.

To begin, we should take a moment to review some basic concepts. Radiation is energy that is transmitted in the form of waves of particles. There are two types of radiation; ionizing and non-ionizing. Today, we'll be discussing ionizing radiation.

When ionizing radiation interacts with matter it deposits energy. The energy absorbed per unit mass from exposure to radiation is called a dose. People are constantly exposed to low levels of ionizing radiation from the environment, and this is called background radiation. We can also be exposed to radiation from activities that involve the use of nuclear substances.

Research has shown that exposure to radiation above certain levels can cause adverse health effects and, for this reason, exposure to

ionizing radiation is monitored and controlled.

Next, we'll touch on the regulatory requirements that relate to dosimetry.

The Canadian Nuclear Safety Commission (CNSC) regulates the use of nuclear energy and materials to protect the health, safety, security, and the environment, to implement international commitments on the peaceful use of nuclear energy, and to disseminate objective scientific, technical and regulatory information to the public.

In carrying out its mandate, the CNSC is responsible for ensuring the protection off the public and workers from exposure to ionizing radiation. This is achieved, in part, through the Radiation Protection Regulations (RPR), which sets radiation dose limits.

In addition to ensuring that dose limits are respected, the RPR requires that licensees implement radiation protection program to keep doses to persons as low as reasonably achievable.

The CNSC Staff's role is to verify that the licensee's radiation protection program meets

regulatory requirements and is commensurate with the risk of the licensed activity.

For the purpose of keeping a record of doses of radiation in accordance with the *Nuclear Safety and Control Act*, subsection 5.1 of the RPR requires that every licensee ascertain and record the doses of radiation received by persons present or performing work in connection with licensed activities. In this context, this means that doses to all workers and any other person must be determined. This could include members of the public.

Subsection 5.2 of the RPR states the method in which dosage shall be determined. The first and preferred method is ascertaining dose by direct measurement through monitoring. If, however, the time and resources needed to perform direct measurements outweigh the usefulness of that method, then the doses can be estimated. It is up to the licensee to demonstrate if estimation is an appropriate method for the assessment of dose.

CNSC Staff review the licensees proposed methods for ascertaining dose. This

oversight ensures that the selected approach is appropriate for detecting and accurately measuring radiation exposures.

Section 8 of the RPR further stipulates that licensees must use licence dosimetry for measuring radiation doses for nuclear energy workers who may receive an effective dose greater than 5 mSv in a one-year dosimetry period or an equivalent dose to the skin, or to the hands and feet, greater than 50 mSv in a one-year dosimetry period.

As defined in the *Act*, a licensed dosimetry service measures and monitors doses of radiation. This type of licence is issued by a designated officer of the Commission. As per the RPR, doses measured by a dosimetry service for an NEW must be submitted to Canada's National Dose Registry.

Licensed dosimetry services must meet the requirements of the RPR and the CNSC Regulatory Document, or REGDOC 2.7.2, Vol. 2, must be met. This REGDOC specifies technical and management system requirements that the dosimetry service must follow in order to ensure that dose results are accurate,

repeatable, verifiable, and properly recorded.

In this section we'll present the foundational concepts for ascertaining dose. The subject will be presented at a high level and will focus on occupational dosimetry.

As previously discussed, the RPR provides flexibility in the methods for ascertaining dose. The measurement and calculation of radiation doses referred to as dosimetry can be classified into three general categories.

The first, and preferred method, is direct monitoring, also called personal dosimetry. Personal dosimetry techniques will depend on whether the source of radiation is outside the body or taken into the body.

The second method is indirect monitoring, otherwise known as workplace monitoring. Indirect methods use measured radiation levels or measured concentrations of nuclear substances in the air, along with other information to estimate doses to persons.

Dose modelling may also be used in

situations where the radiation source is well-understood. This calculation approach is typically carried out using software and involves the use of published dose coefficients.

The important takeaway is that the manner in which doses are ascertained will form a key part of the licensee's radiation protection program. In this regard, the CNSC will assess whether the choice of dosimetry is consistent with the potential risk of exposure.

The first step for licensees when determining what dosimetry may be required is gaining an understanding of the workplace conditions. It is expected that the characterization of radiation conditions takes into consideration the nuclear substances that are expected to be present in the workplace, the radiation types and energies emitted by these nuclear substances, and the physical form of the sources of radiation (for example, if it is a solid, a liquid or a gas), in addition to information about the source geometry and shielding.

Understanding the radiological

conditions in the workplace is important because different types of radiation have different characteristics which will inform the choice of dosimetry.

The second step is reviewing the potential for exposure to radiation.

More specifically, the range of a given type of radiation, that is the distance that it travels, and its penetrating ability will influence which tissues of the body are at risk of exposure. Knowing what tissues are at risk will inform the type of dosimetry that is required.

The image on the slide presents these concepts for different types of radiation.

Alpha radiation has a very small range and a low penetrating ability. The image shows that the alpha radiation travels only a short distance in air and stops before interacting with the person due to its small range. In terms of penetrating ability, alpha radiation can be stopped by the dead outer layer of skin. For these reasons, alpha radiation outside the body does not pose a radiation hazard. However,

when alpha-emitting nuclear substances are taken into the body they can be hazardous. This is because the energy of the alpha radiation is absorbed into tissues and organs.

Beta radiation has a longer range and higher penetrating power than alpha radiation.

The image depicts how beta radiation travels through air and interacts with the body by penetrating the dead layer of skin and depositing its energy within the active skin cells. Beta radiation typically does not irradiate deep tissues when outside the body, but it can pose a risk to the skin and to the lens of the eye. Beta radiation-emitting nuclear substances can also be hazardous if taken into the body.

And lastly, photons, also referred to as gamma radiation or X-rays, and neutrons have even longer ranges and penetrating power. These types of radiation can pose a risk to the skin, the lens of the eye, and to the tissues and organs of the body from external exposure. Both types of radiation can also be hazardous if photon- or neutron-emitting nuclear

substances are taken into the body.

On the previous slide, we briefly discussed how the radiological conditions in the workplace and the types of radiation are key inputs when choosing dosimetry.

It is also important to understand how the worker is exposed to the source of radiation.

The first type of radiation exposure is the external pathway. This is when a person is exposed to a source of radiation that is outside of the body. External dosimetry is appropriate for measuring radiation that can penetrate the dead layer of skin: specifically photon, beta and neutron radiation.

Over the next few slides, we will summarize the various types of external dosimetry commonly used by licensees.

The second type of radiation exposure is internal. This occurs when a nuclear substance is taken into the body through ingestion, inhalation, injection or absorption through the skin. We will discuss internal dosimetry approaches later in this

presentation.

Today, we are going to focus primarily on direct monitoring methods. As indicated earlier, other methods can also be used to ascertain doses to persons, such as using indirect monitoring or dose modelling, although these approaches are less common.

In order to ascertain external doses to workers, direct monitoring is carried out using a radiation detection device called a dosimeter.

As pictured on this slide, there are two types of dosimeters: an example of a passive dosimeter on the left and an example of an active dosimeter on the right.

Passive dosimeters are used to measure photon and beta radiation. Some passive dosimeters can also measure neutron radiation. The passive dosimeter consists of a detector inserted into a holder. The detector contains the sensitive elements and the holder contains the filters. Some dosimeters have multiple filters of different thicknesses and compositions, and this allows for measurements representing the deep dose, the shallow dose and in

some dosimeter designs, the lens of eye dose.

Passive dosimeters are worn for a period of time by the worker and are then returned to the dosimetry service for reading. This means that the dose result for the worker is provided after the exposure has occurred.

Active dosimeters are also capable of measuring photon and beta radiation, but they have the advantage of providing real-time dose and dose rate information. These dosimeters display the dose readings electronically on a screen and are also equipped with an audible alarm which can alert the wearer when a pre-set dose rate or cumulative dose is reached. This makes active dosimeters very useful for managing worker exposures on an ongoing basis.

In some cases, workers will wear both a passive and an active dosimeter. This is very useful in situations where the work has the potential for elevated or changing radiological conditions.

It is also important to ensure that the chosen dosimeter is suitable for the workplace conditions and the types of radiation that are

present.

In this context, many factors can influence the quality of a dosimeter's result. Therefore, licensees must do their research before selecting a dosimeter and ensure they understand any limitations of the dosimeter.

For example:

How the dosimeter is worn is a key factor in ensuring that the result is representative of the worker's dose. Dosimeters should be secured to the body to prevent them from falling off during work activities. Dosimeters should be positioned to face outward toward the source.

Where the dosimeter is stored when not in use is also critical. It may seem obvious, but the dosimeter should never be stored near sources of radiation. In fact, the dosimeter should be stored with the control dosimeter. The control dosimeter is not assigned to a worker and it remains at all times in the storage location for the purposes of monitoring non-occupational dose. The control dosimeter also measures dose from background radiation during

transport.

The storage location should be in an area where the dose rates are as close to background levels as possible and where the dosimeters are protected from environmental conditions such as direct sunlight, extreme temperatures, dust and humidity.

Lastly, dosimeter response can depend on the radiation energy and the angle of incidence.

Taking into consideration these factors when choosing a dosimeter can ensure that the results are reliable and representative of the occupational dose received by the person. Failure to take into account these factors can result in anomalous dose results.

Now we will just briefly introduce the types of external dosimeters commonly used by our licensees, starting with the whole body dosimeter.

Most external whole body dosimeters measure two quantities:

The first is the deep dose, which represents the external component of effective dose. The radiation types that contribute to the deep dose

are the more highly penetrating photons and neutrons.

And secondly, shallow dose, which represents the equivalent dose to the skin. The types of radiation that contribute to shallow dose are photons and beta particles.

All commercially available whole body dosimeters licensed by the CNSC monitor exposure to photon and beta radiation. There are also some whole body dosimeters that are capable of monitoring for photon, beta and neutron radiation, such as the one shown on the slide.

The recommended placement of the whole body dosimeter is on the trunk of the body between the waist and the neck.

In addition to dosimeters worn on the trunk of the body, dosimeters may also be worn on the extremities to measure the dose to the hands and feet.

The dosimeter type shown on the left is worn on the finger, whereas the dosimeter on the right can be strapped to the wrist or ankle. Both extremity dosimeters have a filter that measures shallow dose from beta and photon radiation that can

penetrate the skin. Extremity dosimeters are often worn by workers involved in the fabrication of uranium fuel pellets.

At this time, most licensees are using the whole body dosimeter result to estimate the lens of eye dose. However, some situations may require additional direct monitoring of the lens of the eye.

There are many factors to consider when assessing whether a worker is at risk of receiving higher doses to the lens. A careful analysis of all factors is required to ensure that the appropriate dosimeter technology is selected. Guidance on these aspects is provided in CNSC REGDOC-2.7.2 Volume I, titled "Ascertaining Occupational Dose".

At the current time, there is no regulatory requirement to use licensed dosimetry to ascertain dose to the lens of the eye.

One of the most common methods for neutron dosimetry is using a passive dosimeter with particle track detection technology. An example is pictured on the left of the slide. Here, neutron

radiation interacts with the dosimeter, which produces tracks in the dosimeter material. The tracks are made visible through a chemical etching process that are then viewed and counted by the licensed dosimetry service. The number of tracks is proportional to the dose delivered.

Active neutron dosimetry may also be used. This involves the use of a portable neutron monitoring instrument, as shown on the right. The neutron doses are determined from the results of workplace measurements and known occupancy times.

Now we will move to the topic of internal dosimetry.

The purpose of internal dosimetry is to determine the dose that results when nuclear Substances are taken into the body. To establish the most appropriate internal dosimetry approach, similar steps must be taken to that previously discussed for external dosimetry.

The first step is to gain an understanding of the radiological conditions in order to select the best monitoring approach. Then an

assessment is done to determine what types of individual monitoring should be used to detect potential intakes and, when detected, to ascertain dose.

Monitoring workers for intakes of nuclear substances is done through individual measurements and may be complemented with workplace measurements.

Individual monitoring may consist of measuring nuclear substances in the body or monitoring nuclear substances excreted from the body.

There are two types of measurement methods used, called *in vivo* and *in vitro* bioassay.

In vivo, which means "in the body", involves measuring radiation emitted by nuclear substances taken into the body using detectors that are positioned outside and near the body.

In vitro means "in glass", and this type of bioassay involves measuring the quantity of nuclear substances excreted from the body in order to determine the quantity that is in the body. Such analysis is carried out in a lab and includes the

measurement of a human sample such as urine.

The approach used to detect nuclear substances that are in the body depends on a number of factors.

The range and type of radiation emitted by the nuclear substance is important as some will not be detectable outside the body. In such cases, *in vitro* bioassay is the preferred approach.

The amount of time between successive bioassay measurements is determined by the half-life of the nuclear substances.

The solubility of the nuclear substance taken into the body will define what types of monitoring method should be used. For example, soluble compounds are quickly excreted from the body and can be detected with *in vitro* bioassay. On the other hand, insoluble compounds tend to be retained for longer periods in the body. If they emit penetrating radiation, *in vivo* measurements can be used.

How the nuclear substance distributes within the body will inform the type of *in vivo*

measurements that are needed. For example, radioiodine taken into the body can preferentially accumulate in the thyroid gland. *In vivo* thyroid monitoring would be the best approach if this were to occur.

And lastly, the likelihood of intake informs the frequency of monitoring and the potential magnitude of dose guides the selection of monitoring methods. For example, for workers with the potential for very low internal doses it may be appropriate to perform workplace monitoring on a routine basis and only initiate individual bioassay measurement in the event of an upset condition.

In order to detect nuclear substances within the body, these substances must emit radiation with sufficient range to escape from the body. An example is photon radiation.

In vivo monitoring methods use technology which has the capability of detecting the unique energy spectrum of a given nuclear substance and measuring the amount of activity, or the number of becquerels, that is present in a worker. *In vivo*

bioassay results are normally the most accurate because they are a direct measurement of the amount of nuclear substances in the body.

In vivo monitoring methods include both whole body and partial body monitoring.

Whole body monitoring, as shown on the left side of the slide, is used to monitor for intakes of nuclear substances that are rapidly absorbed into the circulation and are then uniformly distributed throughout the body or distributed throughout several organs. This type of monitoring is typically used at nuclear power plants.

Partial body monitoring is used to monitor for the presence of nuclear substances that are preferentially deposited in one organ. This includes lung counters such as pictured in the middle photo.

And lastly, thyroid monitoring, pictured on the right of the slide, is used when nuclear substances taken into the body preferentially accumulate in the thyroid gland.

In vitro monitoring methods are used

to detect intakes when the nuclear substance taken into the body emits alpha or beta radiation that cannot be detected from outside the body. In this case, workers will provide a sample which is measured in order to detect an intake and, if detected, to determine a dose.

In vitro monitoring can be done as either a routine monitoring program when there is an ongoing potential for intakes of nuclear substances or as non-routine monitoring which is triggered by an upset condition.

Routine monitoring involves collecting and analyzing samples at scheduled intervals during normal operations. This approach is proactive and provides timely detection, measurement and confirmation of any intakes that occur on an ongoing basis.

Non-routine monitoring is implemented in response to a particular circumstance such as a known or suspected intake of a nuclear substance.

This slide shows a liquid scintillation counter on the left. This instrument is

used for *in vitro* measurements of beta-emitting nuclear substances and is commonly used to determine doses to workers exposed to tritium.

In this case, a urine sample is mixed with a scintillant solution in a vial. Beta radiation emitted by tritium in the sample transfers energy to the scintillant, causing it to emit visible light which is detected and measured by the instrument.

Another *in vitro* bioassay method involves the analysis of urine or feces for the presence of nuclear substances such as transuranic compounds.

The previous slides have shown several types of instruments used to monitor for the presence of nuclear substances in the body. Once detected, additional monitoring is usually done to collect data used to calculate the dose.

The diagram on the slide shows the four required components in calculating the committed effective dose.

The first box represents the intake. This is the amount of nuclear substances measured in

becquerels that was taken into the body. In some instances, this is a known amount, but more often it is calculated based on the monitoring results.

The fraction of the initial amount of nuclear substances taken into the body and retained in each organ, as well as the fraction excreted over the 50 years following the time of intake must also be established. This information can be determined from the monitoring data as well. It should be noted that this step in the calculation takes a standard approach of assuming that the nuclear substance remains in the body for 50 years.

Then the amount of energy absorbed in each organ due to the radiation emitted by the nuclear substances deposited in each organ and tissue is calculated. The output of this step is called the committed equivalent dose to each organ.

And then lastly, the equivalent dose to each organ is multiplied by its respective tissue weighting factor, and all are summed to obtain the committed effective dose.

Specialized software can be used to

perform the multi-step calculation. Biokinetic and dosimetric models developed by the International Commission on Radiological Protection, or ICRP, are applied by the software for determining the retention and the equivalent dose to each organ.

When entering known data representing any one of the four elements into the software, the other three outputs are calculated. For example, if excretion rates are known, they may be entered into the software and the other elements, specifically the intake, the dose to each organ and the committed effective dose, can be calculated.

For practical reasons, the committed effective dose is assigned in the year in which the intake occurred.

To summarize, we have covered the general concepts of external and internal dosimetry; we have talked about how an external dosimeter result can represent the effective or equivalent dose received by a worker; we have also discussed the types of individual monitoring approaches for detecting intakes of nuclear substances and how those

measurements, combined with health physics calculations, can determine the committed effective dose.

Provided that the licensee has conducted a comprehensive characterization of the hazards found in the workplace and has selected appropriate monitoring methods, the measured doses will be representative of the worker's exposure.

But what happens when the monitoring of a worker is compromised in some way?

This may create a situation in which the results become unreliable and not suitable for assigning a dose.

In this section of the presentation, we will walk through two case studies to illustrate how a dose to a worker can be calculated. Through the case studies, you will see that there are many factors that can influence the magnitude of the calculated dose.

I will pass the presentation to Mr. Estan to begin with the external dose case study.

MR. ESTAN: For the record, my name is

Diego Estan. I am a Radiation Protection Officer with the CNSC.

This case study was selected to illustrate how a licensee could go about calculating a dose to a worker when the dosimetry result is not reliable. The scenario is fictitious and is not based on actual events.

Industrial radiography involves the use of high-activity sealed radioactive sources to examine the structure of welds and building components. This type of work is often carried out in challenging work environments and events have occurred in the past in which the radioactive source gets stuck in the guide tube and cannot be returned to the shielded position inside the device. When this happens, the trained worker must take action to retrieve the unshielded source.

The licensee's emergency procedures require the operator to approach the source, to repair the kink in the guide tube and then retract the source back into the shielded housing as depicted in this slide.

Ordinarily, the worker would be wearing both a passive and an active dosimeter to record their exposures. Unfortunately, under the stress of the situation and the hot working environment, this worker removed their jacket --where both their dosimeters were clipped -- without thinking about it. The worker then proceeded with the source recovery without wearing the required dosimetry.

A dose assessment must now be performed to re-construct the dose.

For the purposes of illustration, we have simplified this scenario to touch on some of the key inputs to a dose calculation. In practice, there are many complexities to a dose reconstruction that we simply do not have the time to get into today.

When calculating an external dose from a characterized source of radiation, there are some standard parameters that are required. These include the nuclear substance in question, the source activity (which is the quantity of the nuclear substance), the exposure time, and the distance from the source. Some of these parameters are known, and some, such as time

and distance, are often estimated based on the recounting of events by the worker.

The calculation also includes the application of published dose coefficients that simplify the calculation of effective dose from external radiation. For this calculation, a gamma ray effective dose rate constant is used to link the source activity to a dose rate.

The nuclear substance for this event is iridium-192 as a sealed source with high energy photon emissions. The known source activity is 4660 gigabequerels.

The worker involved in the event provided the estimate distance from the source as well as the time spent for each step of the recovery.

With this information, a dose rate in millisieverts per hour for each step can be calculated using the equation on the slide. That is, the known activity of the radiography source is multiplied by the gamma ray constant that is known for iridium-192, divided by the square of the distance between the worker and the source.

Of note, more complex calculations are normally carried out with specialized software when needed.

As mentioned, the actions that the worker must take to return the unshielded source to a safe state include preparing for the recovery at a distance of two metres from the source, repair of the guide tube at a working distance of one metre from the source, and then retracting the source back into the shielded housing at a distance of two metres.

On the previous slide, we described how to calculate a dose rate in millisieverts per hour for each source retrieval step. Using the time spent for each step, it is then possible to calculate the dose in millisieverts. The sum of the doses for the three steps results in a total calculated dose of approximately 45 millisieverts.

Please note that this is a very simple example. Although not depicted, the dose calculation would also include the dose the worker receives during the approach and retreat from the source.

Practically speaking, the CNSC would

expect the licensee to use all available radiation protection measures to keep the worker dose below limits and as low as reasonably achievable. In fact, the addition of 3.5 centimetres of lead shielding placed over source during the repair of the guide tube would reduce the dose for that step from 36 millisieverts to 0.1 millisieverts. This would result in an overall reduction in the total calculated dose from 45 to approximately 9 millisieverts.

There will always be some uncertainties in a dose reconstruction, and this is why direct monitoring using personal dosimetry is the best choice. As you can imagine, trying to estimate the time spent and the actual distances after an event can be a challenge. Due to distance versus dose rate relationships, any uncertainties in these parameters can have a significant impact on the dose estimates.

It is expected that licensees will take all reasonable measures to accurately reconstruct the worker's dose. When reviewing dose assessments, CNSC staff will verify the circumstances of the event, the approach taken by the licensee and will check all

of the calculations.

For further guidance, the CNSC's Radionuclide Information Booklet and REGDOC 2.7.2, Volume I, on Ascertaining Occupational Dose are excellent resources for the conduct of dose assessments.

I will now pass the presentation to Mr. Bertrand Thériault.

MR. THÉRIAULT: Thank you.

For the record, I'm Bertrand Thériault and I'm a dosimetry specialist with the CNSC's Radiation Protection Division. I'm going to walk us through an internal dose assessment over the next several slides.

The case study is based on an event that occurred in 2015 at a uranium processing facility. We won't get into the radiation protection aspects that led to the event, but instead we'll focus on the calculation of the internal dose.

The licensee reported to the CNSC that after changing air filters, the worker's post-shift urine sample exceeded an internal trigger level. The

worker was removed from work with nuclear substances and urine samples were collective over the following nine days in order to calculate the dose received by the worker from the inhalation of a uranium compound.

The licensee's assessment of the dose to the worker was documented in a report which accounted for various parameters such as the in vitro urine monitoring results and the chemical characteristics of the uranium compound taken in by the worker.

CNSC staff reviewed the event report and also conducted an independent assessment to ascertain the dose using the data provided by the licensee based on their description of the event.

In this event, the urinary excretion rates were measured and reported by the licensee, and so this information could be used to calculate the dose.

However, we need more than just the laboratory results of the urinalysis. We also need to know how soluble the inhaled material is, as this is a key input into the calculation. As required by their

dosimetry processes, the licensee had already determined that the inhaled uranium compounds the worker was exposed to were soluble.

The diagram on the slide illustrates how the inhaled uranium travels through the body. Due to its solubility, the uranium compound will quickly move from the lungs to blood. The blood system then transports and deposits the uranium in the organs and tissues of the body. The organs and tissues will then recycle much of the uranium back into the system for excretion via urine.

Since most of the inhaled uranium is excreted in the urine, in vitro bioassay measurement is the best approach in this case. On the other hand, if the uranium compound had been insoluble, most of the inhaled uranium would have remained in the lungs and in vivo lung monitoring would have been more appropriate for determining the dose.

As discussed earlier in the presentation, software is used to perform complex internal dosimetry calculations. The software can be populated with known input data to calculate the

committed effective dose.

First, the licensee had characterized the workplace to determine the solubility parameters of the uranium compounds handled by workers. This information was documented in the technical basis document for the facility's dosimetry program.

The time of the event leading to the intake of the uranium compound by the worker was known. In vitro monitoring results, including the uranium in urine concentration of each sample, and the sample volumes were provided. In addition, the time each urine sample was submitted by the worker was given so that the time interval between the intake and each sample submission was known.

All of these known data points were entered into the dosimetry software. The calculation approach was to fit the ICRP excretion or biokinetic model to the licensee's urine sample data to obtain the best fit. This allows the software to scale the excretion curve to the bioassay data points in order to calculate the intake that lead to the observed bioassay results.

Once the amount of intake of inhaled uranium has been determined, the equivalent dose to each organ and the committed effective dose are calculated.

This slide shows the excretion graph generated by the dosimetry software. The vertical axis represents the milligrams of uranium excreted per day while the horizontal axis represents days, starting with the date of intake.

The urinalysis data points are shown in blue with the error bars. These error bars reflect the uncertainty in the measurements and they were used for curve-fitting purposes. Two points shown in red were outliers, which means that although they were real measurements, they did not fit the curve. For this reason, these two points were excluded from the dose calculation purposes since including them resulted in a lower dose.

The ICRP excretion model prediction can also be seen as the green curve. The green curve is the best fit of the ICRP model for uranium excretion given the solubility parameters established

by the licensee.

In carrying out the independent dose assessment, CNSC staff ran the model with and without the two outlier points to compare their effect on the dose. By removing them, a more conservative dose was obtained.

The final output from the software can be seen on this slide. On the left panel, we see the committed equivalent dose to each organ from each of the uranium isotopes of natural uranium, namely uranium-234, U-235, and U-238. We can see that while all organs and tissues receive an equivalent dose due to this event, the kidneys and the bone surfaces receive the highest.

The right panel shows the committed effective dose of 2.4 millisieverts. Of note, had the outlier measurements been included in the calculation, the committed effective dose would have been reduced from 2.4 to 0.14 millisieverts.

The CNSC's independent dose assessment confirmed that the licensee's approach was technically sound and staff's results were consistent with that

reported by the licensee.

I will now pass the presentation back to Ms. Purvis for the summary remarks.

MS. PURVIS: Caroline Purvis, for the record.

Today, we discussed some of the commonly used dosimetry methods and dose assessment techniques used by licensees to ascertain worker doses.

Due to the complexity of this topic and some restrictions on time, the information we presented was kept at a high level.

To summarize, I'd like to touch on the following key points. Dosimetry is a cornerstone of a licensee's radiation protection program. Licensees are responsible for selecting dosimetry methods that are suitable for their radiological conditions. Experience has shown that direct monitoring is the most reliable method for ascertaining occupational dose.

Dose assessments depend on accurate information about the circumstances of the exposure

and the results can change significantly depending on the assumptions used in the calculations. And finally, when a dose assessment is conducted by a licensee, CNSC staff will review the approach to ensure that it is technically sound and will verify the calculations are correct.

This slides provides links to some useful resources that interested parties can use when making decisions about dosimetry and for the conduct of dose assessments.

Thank you for the opportunity to present this summary of dosimetry and dose assessment today. We're available to respond to questions the Commission may have.

THE PRESIDENT: Thank you very much for the presentation and those very helpful case studies.

We'll open the floor for questions and, let's see, we'll start with Dr. Demeter.

MEMBER DEMETER: Thank you for that very well-structured report.

Noting that details are hard to pack

into a high-level report, I think one detail that's important when you talked about internal dosimetry and the committed residency period of 50 years, I think it's important to note that that's for adults, and that the models are more conservative for children, that if a one-year-old gets an internal dose, the committed period is 'til they reach age 70 based on the CNSC guidelines. So I just wanted to point out the internal dosimetry is conservative when it comes into children, and 50 years is for 18 and up. I just wanted to point that out. I think it's important for people to know that we're more conservative with children.

THE PRESIDENT: Thank you.

And while we're talking about committed dose, Ms. Purvis, I think I heard you say that the dose is assigned to the year of the intake. If it is committed over, I don't know, five or six years, or we expect it to be delivered over that period of time, is that the most conservative way of assignment?

MS. PURVIS: Caroline Purvis, for the

record.

The methods that were described and the assignment of dose in the year in which it was committed is a standard approach internationally.

For more details I'm going to ask Mr. Thériault to just elaborate a little bit on that and whether that's, you know, the most appropriate approach in terms of conservatism. Thank you.

MR. THERIAULT: Okay, thank you. This is Bertrand Thériault, for the record.

Yes, so that's exactly right. So the committed effective dose on the one hand for persons less than 18 years of age is up to age 70. And adults 50 years, calculated 50 years after the time of intake.

For dose accounting purposes, on the one hand, it's simpler to assign the dose to the year of the intake, which means for short-lived radionuclides or nuclides that clear very rapidly, the dose is received in the same year. So it really makes no difference.

For long-lived nuclides, those that

remain longer in the body, such as long-lived transuranics, plutonium-239, for instance, if a person is assigned a committed effective dose of one millisievert, say, this is one millisievert received over 50 years. But the actual annual dose is about one fiftieth of that. So assigning to the year of intake is conservative. And for tracking dose purposes, it works much better than trying to keep track throughout the person's, you know, following 50 years.

THE PRESIDENT: Thank you.

Anyone with any additional questions? Dr. Lacroix?

MEMBER LACROIX: Yes, well, thank you very much for this presentation. It's always fascinating, interesting, and it's very pragmatic. And I especially enjoy the -- both the two cases that are reported from slide 30.

And this is just a general observation concerning in order to get to the doses on slide 32, I did the calculation just to check. And in order to get those doses, the gamma ray constant on page 31,

the units should be in millisievert metres squared per hour per gigabequerel. So it's for the record that I'm mentioning this.

So if you go to slide 31, yeah, the units of the gamma ray constant, you've mentioned millisieverts per hour per gigabequerel at one metre. It should be millisievert times square metre per hour per gigabequerel, and then you get the right doses.

But I know you already know that. But just for the record, make this correction. Thank you.

THE PRESIDENT: Thank you, Dr. Lacroix.

Anyone else? Ms. Maharaj?

MEMBER MAHARAJ: Thank you, Madam Velshi.

Well, my question is far, far less technical than Dr. Lacroix.

I wanted to understand better the need to measure radiation that's absorbed at the lens of eye. Like I understand -- I can understand sort of the skin measurements, the deep dose measurements. But why is lens of eye so important?

MS. PURVIS: Caroline Purvis, for the record.

So it's the lens of eye dose, it's a sensitive tissue of the body. It's actually a radio-sensitive tissue in the sense that radiation exposures can result in health effects at elevated levels. So there are dose limits in place to control the exposures to workers.

And quite recently, in late 2020, the radiation protection regulations were amended, and one of the key amendments was a reduction in the dose limit to lens of the eye. And this was driven by scientific reviews of health effects that were seen in populations of workers with elevated exposures to the lens.

So in terms of the importance of monitoring for lens of eye dose, it's clearly important to monitor to ensure that the doses to workers are below the limits and are kept as low as reasonably achievable so that we eliminate the possibility of health effects in our worker population.

But that being said, in terms of the methods for ascertaining dose to the lens of the eye, this is a developing field. With the reduction in the dose limit to the lens of the eye, there is now the need to have more precision and determine appropriate monitoring methods for a given radiological scenario. And each scenario or each workplace condition and the types of radiation that the workers are exposed to and how they're exposed to the radiation will have a bearing on how doses to the lens of the eye are ascertained.

All licensees in Canada that are regulated by the CNSC are revisiting their radiation protection programs currently to ensure that they have appropriate monitoring methods to accurately measure the dose to the lens of the eye.

So I hope that helps. And if you want some clarifications, by all means.

MEMBER MAHARAJ: Just a tiny little bit, and maybe I misunderstood, so you know, by all means, tell me that I've made a mistake. But if there is a regulatory limit which has recently been reduced

for radiation to the lens of the eye, I thought I understood you to say that there's no regulatory requirement to measure that dosage. So how do those two items fit together?

MS. PURVIS: I see. I see.

Caroline Purvis, for the record.

So as indicated on that slide about lens of eye dose, there is a regulatory requirement to ascertain dose. There is not a regulatory requirement at this time to use licensed dosimetry to measure the dose to the lens of the eye, partly because we currently have not licensed any specific dosimeters that measure the depth to the lens of the eye.

Previous to the amendment to the dose limit, licensees were able to control exposures to the whole body, and by controlling exposures to the whole body, you could assure that the dose to the lens of the eye was also below limits.

Now, the situation is different. And we will see that in the coming years there will be -- there may be a move to licence dosimeters for lens of eye.

So just to recap, yes, most definitely there has always been and there is now a requirement to ascertain dose; however, there's no current requirement to use licensed dosimetry to do that.

MEMBER MAHARAJ: So is the lack of licensed dosimetries in Canada for measuring dose to the lens of the eye just a function of technology we don't have? Like is there technology in the international marketplace that we are assessing so that we can give this extra level of protection to nuclear energy workers?

MS. PURVIS: Thank you for that.

Caroline Purvis, for the record.

So there are some specific dosimeters that measure dose to the lens of the eye. There are some available in North America. There's some that are available internationally as well. And the radiological conditions that the workers presents themselves in will have a bearing on the type of dosimetry technology that's selected, as we talked about for all types of dosimetry.

The lens of the eye is particularly

curious in that regard, and some of the current technologies that are available have been established and developed for medical applications, for example. So in those cases, they could be used.

We haven't been approached to -- by licensed dosimetry services to license those technologies this point in time, but we are preparing ourselves for that eventuality. And part of that preparation is doing the benchmarking internationally, looking at the standards that are developed internationally on dosimetry. And if I, you know, sort of look ahead a couple of years, I suspect that our regulatory document that deals with licensed dosimetry services will have a new chapter on lens of eye dosimetry.

MEMBER MAHARAJ: Thank you very much. That's really helpful.

THE PRESIDENT: Dr. McKinnon?

MEMBER McKINNON: Yes, thanks for the presentation. It was very interesting, and especially about the multiple methods of taking the measurements, and that in particular made me think of the case we

heard this morning on the Alberta Health Services where, you know, there's really a lot of mystery about how to interpret that one measurement point. And that's the basis of my question.

So when you have one data point and you don't really understand how to interpret it, it's complicated, you don't know what to do. So in general, when designing monitoring programs, what is the general practice in terms of redundancy? Are we using any secondary independent monitoring methods to try and remove that problem?

MS. PURVIS: Caroline Purvis, for the record.

So I think that you've identified sort of a key point there. And I think that what we tried to convey during our presentation is that the choice of dosimetry should be risk-based.

So if we reflect back on some of the regulatory requirements, for example, dosimetry can be done by direct monitoring, so the use of personal dosimetry. It can be done through estimation methods, such as workplace monitoring or software calculations.

And the selection of the approach should be commensurate with the magnitude of the exposure. If it's a higher exposure and there's more need for certainty in terms of the precision and accuracy, then there will be a trigger to use licensed dosimetry. In some high-risk applications that we regulate, for example, industrial radiography, which is one of the case studies that we talked about, there's an obligation to use a passive dosimeter. It's a requirement of the regulations that workers wear the passive dosimeter. But they also must wear an active dosimeter. So in essence, that provides real-time dose information and can be used as a source of information if, for example, the passive dosimeter result is compromised. So that functions in two ways in terms of a redundancy.

We obviously have workplace monitoring requirements, so in some cases, for example, in the workplace if the dosimeter is compromised in some way, we could look at the monitoring in the workplace to provide some key information to input into the dose assessment.

I think I'll stop there. And I just want to be sure that I'm sort of addressing your question.

MEMBER McKINNON: Yes, it was more, you know, whether there would be a general policy that you also look to try and include multiple measurement methods in any given situation. And you're really stating that it's risk-based, and I suppose that would drive how much redundancy and alternate methods that you would use.

Just to follow on that question, though, very briefly, I know from my own experience working with instrumentation, and not of this type, but others, that they don't always agree. (Stream lost / diffusion perdue) resolve that and how do you blend the different measurement types? Because they're obviously measuring different things. That was very clear from your presentation.

MS. PURVIS: Caroline Purvis, for the record.

Yes. So what comes to mind for me when you ask that question is, for example, the

difference between, for example, the passive dose result and the active dosimeter result. So in many cases, we want to see that there are, you know, that they are reasonably comparable and that one can then, you know, act as essentially a replacement dose if it was necessary.

What I'm going to do is I'm going to ask Mr. Estan to just talk a little bit about the differences between those and how we can sort of assure ourselves that one is a reasonable representation of the other, and that has to do with how those instruments are calibrated.

MR. ESTAN: Diego Estan, for the record, Radiation Protection Division.

Yeah, if we're going to look at the example of two different types of dosimeters that measure external dose, like a passive dosimeter and an active dosimeter, it comes down to the calibration. So it is more stringent for the licensed dosimeter, the passive dosimeter. But active dosimeters also must be calibrated against a known dose of radiation. And in fact, for radiography, it's spelled out in the

regulations that the electronic dosimeter must respond plus or minus 20 per cent of the true dose of radiation.

So both dosimeters are calibrated. Obviously, the uncertainties aren't, you know, zero or one or two per cent. There's some uncertainty. But we would expect them to agree more or less and give the same answer more or less.

MEMBER McKINNON: Okay, thank you very much.

THE PRESIDENT: Okay. Thank you again for the presentation today.

We will now take a break for lunch and we will reconvene at 1:20 p.m. We'll see you then. Thank you.

--- Upon recessing at 12:19 p.m. /

Suspension à 12 h 19

--- Upon resuming at 1:20 p.m. / Reprise à 13 h 20

THE PRESIDENT: Welcome back as we resume our Commission meeting.

The next item on the agenda is the Event Initial Report regarding an industrial accident

that occurred on June 14th, 2021 and resulted in a fatality as outlined in CMD 21-M47.

I wish to convey the Commission's condolences to the victim’s family and co-workers on this tragic loss. Accidental death is a rare occurrence in the nuclear industry, which makes this even more tragic.

This fatality is a stark reminder that the safety and security of workers must always be top of mind, and I certainly hope that we never, ever again have to discuss another fatality at a Commission proceeding.

I note that representatives from Kinectrics are joining us remotely and are available for questions.

And before opening the floor for questions, I'll turn to CNSC Staff in case they wish to add anything.

Ms. Murthy, over to you, please.

CMD 21-M47

Written submission from CNSC Staff

MS. MURTHY: Thank you. Good afternoon, President Velshi and Members of the Commission.

For the record, my name is Kavita Murthy and I'm the Director-General of the Directorate of Nuclear Cycle and Facilities Regulation.

CNSC Staff are here today to provide you with an Event Initial Report, or EIR for short, on a workplace fatality at a licensee site as outlined in CMD 21-M47.

Let me also start by extending condolences on behalf of CNSC to Kinectrics and all the people directly and indirectly impacted by this tragic event.

The industrial accident occurred on June 14, 2021 at Kinectrics Incorporated site. Kinectrics has met all of the reporting requirements to the CNSC in regards to this event.

The Ministry of Labour, Training and

Skills Development of Ontario is the responsible authority for occupational health and safety matters in the Province of Quebec -- sorry, in the Province of Ontario.

As their investigation is ongoing, they have told us that they're not in a position to comment on it at this time and are not here today. CNSC Staff have no additional information to provide since the submission of this EIR to the Commission.

We are now available to answer any questions that you may have. Thank you.

THE PRESIDENT: Thank you.

I'll turn the floor to Mr. Batters from Kinectrics if you'd like to add anything or make a statement before we open for questions.

MR. BATTERS: Thank you, Madam President.

This is Steven Batters, Senior Health and Radiation Safety Officer for Kinectrics. I'd like to pass it over to David Harris, the President and CEO of Kinectrics, to make the opening remark.

MR. HARRIS: Thank you very much,

Madam President and everybody else.

David Harris. For the record, David Harris, President and CEO of Kinectrics.

Kinectrics was very saddened by the event and our hearts go out to all the family who were involved. Several of our employees attended the funeral virtually, but the visitation (stream lost / diffusion perdue) to express our condolences to the family. We are really, really saddened by this.

I believed we did everything to try and prevent a fatality and we continue to work every day to ensure that there is not a similar event or another fatality.

I will hand it back for any further questions.

THE PRESIDENT: Thank you.

Well, Mr. Batters, did you want to add anything before opening it up for questions?

I guess not. Then let's start with -- okay.

MR. BATTERS: No, thank you.

THE PRESIDENT: Okay. Thank you.

Let's start with Dr. Demeter, then, please.

MEMBER DEMETER: Thank you.

Also my deepest condolences to all affected, especially friends and family of the individual.

My question's to Kinectrics. Kinectrics sub-contracted this work to Western Mechanical Electric Millwrights, they call them Western. Has Western done this specific task before, and if they haven't done this specific task, was there a mock-up for them to practise to do this before they did it to have familiarity with the task at hand?

MR. BATTERS: Steven Batters, for the record.

So Western do have extensive experience on doing similar work. I don't know for certain they've done work on this exact piece of equipment before, but Kinectrics did hire them based on their qualifications and record working with similar equipment.

MEMBER DEMETER: Okay. And is there

sort of a pre-mock-up training? What's the sort of approach?

This might have been a new task, although they're an experienced company. What's the sort of pre-approach to such a task?

MR. BATTERS: Steven Batters, for the record.

So I don't believe there was a mock-up for this work prior, but there was a work plan and a safety assessment done before the work, so that's reviewed by Kinectrics and the safety assessment is walked through in a pre-job brief before the work starts.

MEMBER DEMETER: Okay. Thank you very much.

THE PRESIDENT: While I see if my colleagues have any questions, do you have a sense of when the Ministry of Labour, Training and Skills Development may complete their investigation?

MR. BATTERS: Steven Batters, for the record.

We don't have a date for that. The

Ministry of Labour said it could be 12 months or more.

THE PRESIDENT: Okay. So it's not imminent.

And can you share with us some of your corrective actions that you have implemented or are planning on implementing as a result of this event?

MR. BATTERS: Steven Batters, for the record.

So Kinectrics has placed increased emphasis on assessment, identification and risk assessment of the seven deadly hazards, so we have increased focus on that. We are also putting increased focus on oversight of any contractual work that occurs in our facilities.

THE PRESIDENT: Okay. Commission Members, last chance.

I don't see any hands up, so thank you for joining us today. We do look forward to getting an update after the Ministry of Labour, Training and Skills Development has completed their investigation and see if there are learnings for other licensees as well as a result.

Thank you.

We'll move to our next agenda item, which is the Event Initial Report regarding the bankruptcy of Mississauga Metals and Alloys, as outlined in CMD 21-M49.

Before opening the floor for questions, I will turn it to CNSC Staff first to see if they have anything to add.

Ms. Murthy?

CMD 21-M49

Written submission from CNSC Staff

MS. MURTHY: Thank you.

For the record, my name is Kavita Murthy, and I am the Director-General for the Directorate of Nuclear Cycle and Facilities Regulation.

I’m here to present CMD 21-M49, Event Initial Report for the bankruptcy of Mississauga Metals and Alloys, or MMA for short. With me are CNSC Staff responsible for the licensing and compliance of

MMA as well as other subject matter experts.

In brief, on August 20th, 2021, MMA was declared bankrupt under the *Bankruptcy and Insolvency Act*. As such, they ceased to have control over their site and assets.

On that same day, CNSC site inspectors visited the site and installed lockout tags on all the locked intermodal containers containing the nuclear substances and confirmed that they were safe and secure.

Since then, CNSC Staff have continued to work having instituted periodic site visits to verify safety and security of the trailers and to make periodic readings to confirm that the radiation fields are around background levels.

CNSC Staff have also notified all requisite local, provincial, federal and international authorities, including the City of Brantford police and fire services, the Ontario Chief -- the Ontario Office of the Fire Marshal, the Canadian Border Services Agency and the International Atomic Energy Agency.

CNSC Staff have held discussions with bankruptcy trustee and key creditors on the bankruptcy.

Since we filed the EIR, we also -- we have also had a discussion with key municipal officials in the City of Brantford.

Moving forward, CNSC Staff will continue to ensure that the nuclear substances remain safe and secure, explore options with all parties regarding the decommissioning and removal of the nuclear substances. We will also come to the Commission with the request that the Commission revoke MMA's waste nuclear substance licence and its export licences, and we will continue to evaluate possible regulatory actions at the designated officer level, which could include an Order which will result in a review, probably, by the Commission.

CNSC Staff conclude that there are no immediate risks to the health and safety of the public and the environment and that we continue to take actions to ensure this.

Thank you. We are now prepared to

answer any questions that you may have.

THE PRESIDENT: Thank you.

Let's open the floor to Commission Members for questions, then.

Dr. Demeter.

MEMBER DEMETER: Thank you for the report and the overview.

The one question I had for Staff was based on -- and I'll read it from the CMD.

> "From a nuclear security perspective, concerns related to the deliberate and targeted theft of nuclear material and/or its deliberate and targeted sabotage, the likelihood of either occurring is assessed to low."

Then it says:

> "However, the site is currently unsecured from access by the public and this remains a concern to CNSC Staff."

So is there an interim measure that we

could secure the site with a contracted service or -- that's a concern that you've raised as Staff and also I also feel it's a concern. So the security of the site from the public, is there a way that we can secure that in an interim fashion?

MS. MURTHY: Kavita Murthy, for the record.

Before I turn it over to Mr. Ali El-Jaby of the Nuclear Security Division, I want to outline what we have done to date.

So we have inspectors from CNSC site offices in that region going to the site every -- twice a week right now to verify that the tags are in good shape. We have had contact with the municipal authorities and they have instituted an initiative to do a fire inspection of the site.

We have had -- also, we are in communication with the Commissionaires of Canada, so there's a contract that is being put in place to have someone do rounds of the site at this point in time.

So with regards to a constant surveillance, based on the activities, the type of

material that's on the site as well as on the situation with regards to the locking of the intermodal containers, we don't feel that in the short term that there is any risk for us and any need for us to have a continuous surveillance. These nuclear substances are not considered high risk.

I'm just looking to see if Mr. Ali El-Jaby has anything to add.

No, Dr. El-Jaby says that he does not have anything more to add, but if you have any more questions, we can definitely take them.

MEMBER DEMETER: Thank you.

I think even just video surveillance to a central location might be a reasonable intermediate, but I'll leave it at that for now. Thank you.

THE PRESIDENT: Okay. Dr. Berube.

MEMBER BERUBE: Yes, thank you.

I have a couple of concerns here. The first concern that I have is that we had this particular company before us a couple of times in the last two years or so, and we've had the opportunity to

basically talk to the CEO, I believe. I remember doing it myself. And yet here we are in a position where the bankruptcy, which was somewhat foreseeable, has now sprung upon us, and one of the things that concerns me, of course, is the adequacy of things like the financial guarantee of 200,000 which now are being expressed as inadequate, maybe woefully inadequate. And that is a concern not just for this particular organization, but other organizations as well, particularly given the financial duress that we've been under due to COVID-19.

Other concern is that, for some reason, this waste has been sitting there since 2007 and has not been addressed. There has been no activity with it, and I'm not sure why that wasn't brought up as a priority sooner than this because we may have had an opportunity to do something about it five years ago. We are certainly going to have to deal with it at this point.

So maybe CNSC Staff, if you could elaborate on what has happened in these particular two instances that has led to this particular -- these two

concerns that we're going to have to deal with at this point.

MS. MURTHY: Kavita Murthy, for the record.

So let me first go to the question of the financial guarantee.

So we did -- we have -- we have noted in the past when we have dealt with this licensee that the amount of financial guarantee was insufficient should they want to dispose of the material in the state that it was in. And unfortunately, the situation we find ourselves in is exactly that.

So the company's finances did -- the company was able to acquire a financial guarantee of $200,000, and that was -- that was the limit to which they were going. Had they gone and done the work they were intending to do to reduce their waste, the amount of financial guarantee would have been enough.

So is this a situation that can happen with other licensee? I do not believe this is a situation that would happen with other licensees. This was a very unique situation.

This was a licensee that existed before the system of financial guarantees for waste nuclear substance licences and all nuclear substance licences in general was in play, so it was not a licensee that arrived when all of the systems we have today were in place.

So if we go back to MMA and look at whether that sort of a licensee would be able to acquire a licence, I would say no, they would not be able to get a licence.

So some of this is legacy, some of this, because this licensee has -- had acquired the material before they became a waste nuclear substance licensee and the material dates back to 1998. It was a situation that we had to deal with as best we could at that time.

So that's the first question that you asked.

And then -- I'm sorry. Can you repeat the second question, please?

MEMBER DEMETER: The second question is that the material we're talking about has been in

containers since 2007 and that it's been allowed to sit there that long without actually being addressed. And I'm just wondering why that has not happened.

Obviously they came for relicensing in that timeframe and it wasn't actually dealt with at a point, so maybe you can elaborate as to why this was left as it was and why it hasn't been addressed with the potential of foreseeing that this bankruptcy was en route.

MS. MURTHY: Okay. Thank you very much for repeating the question.

So firstly, the material has not been sitting since 2007 without any action. So they were -- in 2010, they were -- they were not allowed to import any more material or increase their inventory in any shape or form since 2007, but they were allowed in their licence to reduce their inventory. So they were allowed to process the assets they had in place to reduce the amount.

And they were doing that maybe not at a fast enough pace to get rid of a lot of the material, but they were incrementally getting rid of

their waste. So that activity was going on until 2017 when there was a fire on the site and everything then came to a standstill because all of the equipment they had in order to do that was affected by the fire.

So their commercial activities as well as their activities related to the nuclear substances came to a standstill in 2017 and then, once the COVID situation happened, then they were not able to get -- even though they had started up their commercial, the non-nuclear side of it, post the fire, all of that again came to a complete standstill once COVID happened and they were not able to import any material non-nuclear metals that they used to that was the core of their business came to a standstill.

So going back to the question of why was this material there, the material was at the -- at every point in time when we had concerns about it, we were focusing on the fact that they were doing -- some of the volume reduction was actually happening and that what was in their inventory was actually being stored in a way that met our requirements.

THE PRESIDENT: Ms. Maharaj?

MEMBER MAHARAJ: I have some follow-up questions to Dr. Berube's inquiries. Those were my two key areas as well of concern.

And I'll try not to sort of dig into the -- dig into the financial guarantee situation from a commercial point of view, but I think it's -- what I'm having some difficulty understanding with the financial guarantee is how is it actually assessed and evergreened on a regular basis by staff? Because I can see on page 5 of your report that the licensing fees alone exceed the amount of the current financial guarantee regardless of whether or not there would have been a need to potentially apply that guarantee to decommissioning and site security measures.

MS. MURTHY: Kavita Murthy, for the record.

So the financial guarantees are completely separate from the licensing fees so that we cannot touch the financial guarantees to do anything other than, as you said, take steps towards decommissioning the activity.

Financial guarantees are assessed by

CNSC Staff on the basis of the activities that the licensee will need to undertake in order to decommission a given site or to get the materials, nuclear substances, in this case, disposed of.

So the amount is arrived upon by estimating the costs associated with the type of material, where the material can be shipped to, and so that's an independent assessment and it hasn't -- it isn't tied to the fees in any way.

I hope I got to the gist of your question.

MEMBER MAHARAJ: Yes, thank you.

So with respect to the fees, then, that are outstanding to CNSC, I assume that we're a creditor in that bankruptcy, the Commissioner is a creditor in that bankruptcy to the extent of the fees. But what is this particular trustee's expertise, or do you know what this particular trustee's expertise is with respect to the environmental impact and the environmental concerns that could be raised by decommissioning those nuclear materials?

MS. MURTHY: Kavita Murthy, for the

record.

So on the question of the trustee's expertise in decommissioning, we don't believe that they have any expertise. They are a bankruptcy trustee and, as we understand it, their interest is in making sure that the creditors are dealt with in bankruptcy law, which obviously --

MEMBER MAHARAJ: Right.

MS. MURTHY: -- I'm not an expert in.

MEMBER MAHARAJ: That was part of my concern, Ms. Murthy, you know, having kind of done a little bit of work in the bankruptcy field in my other life.

And so my question, then, is do you have or are you confident you have sufficient authority, access and control of the nuclear materials which the trustee obviously does not or does not have the expertise in your assessment to manage?

MS. MURTHY: So the situation with bankruptcy trustees having had -- having given the responsibility of nuclear substances has happened in the past, and in those situations the trustees have

stepped forward and obtained the services of a licensed entity who has then taken the responsibility to manage the site or manage the nuclear substances.

I believe Ramzi -- Mr. Ramzi Jammal has something to add to that, so I'll let him go first and then I'll see if I have anything more to add.

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

I'd just like to complement Ms. Murthy's discussion with respect to the trustees. And Commissioner Maharaj, you asked the question, "Do we have the powers in order to get control?".

We're going to go through the regulatory process that we have in place from taking possession of the substance if we need to or order any entity in order to carry out the decommissioning. So we do have the power under the Act and we did exercise it before, that we have the powers to order licensee or any other entity in order to carry out the decommissioning.

What I'm trying to say here is the regulatory decision in order for us to move forward is

still under consideration, so for us to determine what is the best way to proceed.

We are working hand in hand with our legal colleagues at the CNSC in order to determine who will be a responsible entity that we will be issuing the Order to, but it's -- we're not waiting for a long period of time. But we need to determine who will be the entity and we have all the powers to order any other individuals in order to do the clean-up and they will pay for it.

With respect to the licensee themselves, Dr. Berube, as Ms. Murthy said, this is unique licensee. It's one thing I would like to reiterate and make it very, very clear that staff took licensing actions against this licensee by stopping and ordering them no more processing to take place. At the end, for the last few years, was nothing but maintenance and care of the substance on the promises to start to decrease their inventory.

So the fact that we had similar situations with other licensees where we took regulatory actions by controlling the licensed

activity to start to match their either inventory or the work that they are doing, the CNSC successfully was able to put in place controls so that the financial guarantee was built up.

Unfortunately, with this licensee, situation has changed and things were progressing in a manner that was not favourable from our perspective.

So in conclusion, the licensee for the last few years was not allowed to carry any licence activity other than storage and disposal, so that's what the licence stated on the licensee is care and maintenance and disposal, and we applied the graduated actions with our regulatory oversight.

Over to you Kavita, if you want to add anything else.

MS. MURTHY: Thank you, Ramzi.

No, I do not have anything further to add, but the short answer to your question, Ms. Maharaj, is yes, we have all of the authority we need in the *Nuclear Safety and Control Act* and the powers to the designated officer and the inspector to take any actions that we may need to take to go and resolve

this matter.

MEMBER MAHARAJ: Thank you.

THE PRESIDENT: Ms. Murthy, maybe a couple of things from me, maybe a suggestion for consideration and then some questions.

I think in your planned action a lessons learned would be appropriate. I recognize this is a unique licensee, but having a financial guarantee that is insufficient and also really, to this date, not knowing what is our exposure, I'm sure there are a number of other lessons to be learned, should be added to the list.

The bit about the revoking of the licence, what's your timeline that you expect for that?

MS. MURTHY: Kavita Murthy, for the record. So with respect to revoking the licence, we know today that no activity is taking place, we have concentrated in the last few weeks on getting matters related to the materials in order. Before the end of this fiscal year we expect to come to you with a request to revoke the licence.

As far as the activities are concerned, the licensed activities have ceased, we have informed the Canada Border Services Agency as well, so that we know that they are on alert. So there's not any risk in terms of the actual licence of anything taking place on that site that would escape our scrutiny.

And with respect, Ms. Velshi, to the lessons learned, yes, absolutely, this has been -- this will, probably in our next, you will hear about the DO program and the DO community forums, so this will definitely be something we will be talking with the community at large as well as internally within our own directorates and in our own walls.

Thank you so much.

THE PRESIDENT: Thank you. Thanks very much for the presentation and the update.

So let's move on to our next item, which is a status update regarding the CNSC Staff's ongoing regulatory oversight report review process as outlined in CMD 21-M45.

And, Dr. Ducros, I understand that you

don't have a formal presentation, but would like to provide verbal remarks. So over to you please.

CMD 21-M45

Written submission from CNSC Staff

DR. DUCROS: Thank you. Good afternoon. I am Dr. Caroline Ducros and I am the Director General of the Directorate of Regulatory Improvement and Major Projects Management.

I'm here to provide an update on our Regulatory Oversight Reports, CMD 21-M45.

Regulatory Oversight Reports (RORs) have been presented by CNSC Staff to the Commission since 2010. CNSC Staff present RORs that report on the oversight of high-risk, high-interest activities annually, and every 20 years for lower-risk, lower interest activities.

In January 2018 Staff launched a review of the ROR process and established a multi-directorate ROR review team to review ROR reporting frequency to the Commission. The scope of the review

was expanded to include looking at the content of the RORs and to include a consultation period to gain insight and feedback from the public, Indigenous groups, and stakeholders.

At the October 3rd, 2018 Commission meeting the Commission requested that Staff present the results of the Staff review of the ROR process and the proposed path forward. We're here today to present a status update on the ROR review process.

Firstly, I would like to go over with a broad brush the timelines and key decisions that have been taken.

In March 2019 CNSC Staff developed an initial draft discussion paper to seek feedback on the RORs and the ROR process. It was first reviewed internally and we received over 400 comments. Consequently, Staff developed four fundamental questions based on the following themes: the audience; the purpose; the frequency; and, public consultation.

In June 2019 Operations Management Committee (OMC) made decisions on fundamental

questions pertaining to the RORs including who is the audience of the ROR? Where it was decided that they are prepared for the Commission with opportunity for public to participate. What the purpose of the RORs are, which is to provide a summary of CNSC Staff compliance verification activities and the performance results associated with those activities.

That the frequency of ROR presentation to the Commission should be annually for high-risk, high-interest activities, for medium risk every two years, and for low risk every three years. And it was determined that public consultation is a necessary and critical step, particularly in terms of transparency and trust.

Between 2019 and 2021 Staff developed a revised public discussion paper on the following themes: the frequency; the scope; and, the ratings. The projects was disrupted during the time of the COVID pandemic, which delayed publication of the discussion paper for the public consultation period until 2021.

In 2021 the public consultation on the

CNSC's Regulatory Oversight Report Review discussion paper, which is E-DOC 6302440, was published on our website. It outlined the current process presenting RORs to the Commission and sought comments for improvement. The consultation period ran from June 7th, 2021 to June 23rd, 2021, and 72 comments were received.

The comments received were posted on the CNSC's website and no additional comments on comments were received.

The next steps are to present the results of the Staff review of the ROR process to Management Committee on October 27th, 2021, and then to have CNSC Staff return to the Commission with the final results of the ROR review, including short-term and long-term improvement plans once that is endorsed by senior and executive management.

The anticipated timeline for the update is the January 27, 2022 Commission meeting, and to publish the What We Heard Report on the CNSC website.

Thank you.

THE PRESIDENT: Thank you very much for that. So let me open the floor for questions from Commission Members.

THE PRESIDENT: So, Dr. Ducros, the next cycle we'll still be using the old format. This timeline that you're proposing, will that change then for the 2021 report that will happen in 2022, or is there still another year after that that you would expect whatever the recommendations and final decisions are to be implemented?

DR. DUCROS: Caroline Ducros, for the record. Some changes will be implemented for the 2020 RORs, and those are ones that we've heard directly back from the Commission about from last year and previous years.

But more fundamental changes, I expect to happen in the 2021 RORs, which is why we are hoping to go in January, before all the ROR preparations occur.

THE PRESIDENT: And can you give us a taste of some of the feed back that you've received from the different reviewers?

DR. DUCROS: Caroline Ducros, for the record. At a high level there is a large interest in having a plain language summary at the start of the RORs, having links to live datasets so that reviewers can see the fullness of the data, and to have perhaps a shorter document instead of the more fulsome reports there's some contradictory comments, but a shorter document at the front with more in the appendices, and some people want a larger document.

From Staff's point of view and from what we're hearing there, the interest is to have as much readily available and transparently available to the public and maybe start engaging more with the open government concepts of having dashboards and that type of thing instead of [indiscernible] reports.

And commentators all agreed that the RORs were valuable, but there was not a lot from external commentators about -- there was not a lot given for change in the format, it was just a general agreement that they are a valuable tool with some tweaks.

I would say more of the comments came

internally in terms of ways to reduce the workload that's associated with the documents in the state that they are in now.

THE PRESIDENT: Thank you. And anything on the rating system and given that the last year was so, you know, we've come with a more simplified on, any feedback on that?

DR. DUCROS: Caroline Ducros, for the record. Yes, there was concurrence that it was a good idea to remove the fully satisfactory rating. And there is proposals for more clarity on the rating system being presented to Management Committee later this month.

THE PRESIDENT: Okay. I don't see any hands up, so I think everybody's just eagerly awaiting for when you come back in January with recommendations.

So thank you very much --

MR. LEBLANC: I think Dr. Demeter had his hand up, Madame la Presidente.

THE PRESIDENT: Dr. Demeter, sorry, I didn't see your hand up.

MEMBER DEMETER: It's all right, I had it up briefly.

You know, throughout the hearings when we're talking about the length of licences and as they grow one of the rationales we've always been hearing is that the RORs will fill in for shorter licence periods relative to oversight for safety.

And I hadn't seen that in this document or heard it in the discussion currently. But that would seem to be one of the driving forces of the RORs is to ensure that there was oversight by the Commission relative to the safety case.

How is that figured out? Has that come through with the comments and the direction from Staff and commentors?

DR. DUCROS: Caroline Ducros for the record. We're hearing more about that from Staff than we are externally. Externally, there weren't many comments on frequency. But internally, there is quite a drive to have more publicly-accessible information on the website and then perhaps drawing from that for a document that can be presented more readily to the

Commission. But the frequency not necessarily decided upon just yet.

MEMBER DEMETER: Okay, thank you. Yeah, I like the graphics on the dashboard and it's a bit more user-friendly. Yeah, thank you.

THE PRESIDENT: Okay, very good. Thanks, Dr. Ducros, for the presentation today.

We'll now move then to the final item on the agenda today, which is on the status of the designated officer program for 2020 as outlined in CMD 21-M28.

I'll turn the floor to Mr. Michael Young for this presentation. Mr. Young, please proceed.

CMD 21-M28

Presentation from CNSC Staff

MR. YOUNG: Good afternoon, President Velshi and Members of the Commission. My name is Michael Young, I am the Lead Commission Technical Officer with the CNSC Secretariat.

With me is Daniel MacDonald, Commission Technical Support Officer, also in the Secretariat. Today, we will be presenting the report on the Status of the Designated Officer Program for 2020. Designated Officers are also referred to as DOs in this presentation.

Also with us today and available to answer your questions are Senior Staff from the CNSC's Technical Support Branch and Regulatory Operations Branch, as well as Designated Officers from several directorates in these branches.

The next few slides will provide some background on the CNSC DO Program.

The implementation of the DO program is a collaborative undertaking between the Directorate of Regulatory Improvements and Major Projects Management which coordinates the operational aspects of the DO Program, Legal Services and Secretariat.

The DO Program was first established in 2000 with the coming into force of the *Nuclear Safety and Control Act*, also referred to as the *NSCA*.

Subsection 37(1) of the *NSCA*

authorizes the Commission to designate DOs, and subsection 37(2) lists the duties that the Commission may authorize a DO to carryout.

In addition, with respect to administrative monetary penalties, the Commission may designate DOs under section 65.01 of the *NSCA*.

The next slide provides more information on these duties, which are also referred to as DO Authorities.

Designated Officer Authorities include licensing, certification, and compliance decisions. DOs may be authorized to make licensing decisions for the use of nuclear substances and radiation devices, the operation of a Class 2 nuclear facility, the transport of nuclear substances, as well as the import and export of controlled nuclear substances, equipment or information and risk significant radioactive sealed sources.

The Commission, having considered the risk profile of licensing decisions, has not authorized DOs to carry out licensing activities for Class 1 nuclear facilities or uranium mines and mills.

This authority remains solely with the Commission.

DOs may also be authorized to certify and decertify persons as well as prescribed equipment and transport packages. In addition, DOs can make compliance decisions including making any order that an inspector can make, confirming, amending, revoking, or replacing an inspector's order and issuing and reviewing notices of violation associated with administrative monetary penalties.

More information on these authorities can be found in Appendix A of this presentation.

It is important to recognize that the decisions of DOs are equivalent to those made directly by the Commission. A DO carrying out any authorized activity has the same responsibilities and obligations as the Commission, including independent decision making and ensuring procedural fairness and impartiality.

As with decisions made by the Commission, before making some decisions such as in cases where a licence is refused or revoked, a DO is required to offer an opportunity to be heard as

defined in subsection 39(1) of the *NSCA*.

An opportunity to be heard allows an applicant or a licensee to present information to the DO for consideration, either in person or in writing. In addition, as defined in Section 43 of the *NSCA*, DO decisions may be appealed to the Commission or redetermined by the Commission on application or on the Commission's own initiative.

Certain DO decisions shall be reported to the Commission as defined in subsection 37(5) of the *NSCA*.

The next slides provide some details on the number and distribution of DO positions at the CNSC.

As shown by the graphic in this slide, DO positions at the CNSC are allocated in a pyramid style ensuring the continuity of operations. Should an individual DO be unavailable, then the DO in a more senior position already has the same authorities.

For example, Vice-Presidents have all of the DO authorities of the Directors General in their branch, the Directors General have all of the

authorities of Directors in their Directorate, and so on.

Generally, the scope of a DO's authorities reflects the seniority and responsibilities of the designated position. DO authorities are designated by title of office and are not transferrable to another person or position.

Before carrying out authorized activities upon appointment to a designated position, DOs must be issued an individual certificate that is signed by the President. The Secretariat maintains a record of the designated positions, the status of certification, and the statutory authorities that the Commission has granted DOs to carry out. The Secretariat also maintains DO training records.

A summary of the Commission-designated positions and their authorities is available in Appendix B of this presentation.

The Commission has designated 35 CNSC staff positions by title of office to make DO decisions. Twenty-three of these DO positions are in the Regulatory Operations Branch and 12 DO positions

are in the Technical Support Branch. These positions span seven CNSC directorates, as shown in this chart.

The Directorate of Nuclear Substance Regulation has the most DOs at 14, as the majority of licensing activities in this directorate are of low risk. This directorate carries our many of the licensing and compliance activities for medical and research facility licensees, nuclear substance and radiation device licensees and transport licensees.

The next slide covers changes to DO positions in 2020.

There were nine staffing changes in DO positions in 2020. In addition, the Commission designated one further DO in the Non-proliferation and Export Controls Division, this was due to a higher volume of applications requiring DO approval and also to allow for flexibility when certain DOs are unavailable.

For context, the bulk of the 35 current DO positions were defined in 2014 when the Commission designated 31 positions across the CNSC. In 2019 three more DO positions were added.

The next slide describes DO qualifications and training.

As the DOs authorities designated by the Commission are tied to specific positions, the DOs qualifications are those required for appointment to their position. DOs also participate in training specific to the DO Program.

When a new DO is appointed to a designated position they're required to undertake the CNSC's DO Training and Assistance Program which includes the following: self-directed learning; a briefing with the CNSC Senior General Counsel on the legal considerations in DO decision making and applicable legislation; a briefing with the Commission Secretary on the DO's authorities; a briefing with a DO Program representative from the Directorate of Regulatory Improvements and Major Projects Management on DO training activities, tools and resources; on-the-job training; and, mentorship and peer consultations with more experienced DOs.

In addition, DOs with the authority to issue orders receive training specific to DO orders.

I will now pass the presentation over to Daniel MacDonald who will provide an overview of the activities of the DO Program in 2020.

MR. MacDONALD: Good afternoon, President Velshi and Members of the Commission. My name is Daniel MacDonald and I am a Commission Technical Support Officer with the Secretariat.

The next slides provide a summary of the DO authorities carried out in 2020.

DO activities are tracked either by the DO themselves or by the associated division or directorate and submitted to Secretariat annually. This table provides an overview of the DO authorities carried out under subsection 37(2) and section 65.05 of the *NSCA* during 2020. Each column represents a different DO duty and each row represents a different position or division.

White cells contain the number of times a specific duty was carried out by a particular position or division. Green cells are authorized duties not exercised in 2020. Grey cells are duties for which that particular designated position or

division is not authorized. And the blue cells provide a total for the applicable row or column.

In total, DOs carried out 3,347 authorities in 2020. As mentioned earlier, details about the specific authorities provided for by the *NSCA* and for which duties specific designated positions are authorized can be found in Appendix A and B respectively.

Further breakdowns for previous years can be found in Appendix C of this presentation.

On this table you will find a comparison of DO authorities carried out for each of the last four years, from 2017 to 2020. It is important to note that these totals reflect industry activities, and given the number of licensees no meaningful trending can be inferred.

Each row represents a position or division and each column is the number of DO duties carried out for a particular with the totals at the bottom in blue.

Please note that the Canadian Nuclear Laboratories Regulatory Program Division, the

Operations Inspection Division, and the Directorate of Regulatory Improvement and Major Projects Management are omitted from this chart, as they have no reported activity during the 2017 to 2020 time period.

These graphs present the same yearly data that was introduced on the previous slide, but sorted only by Directorate.

The two graphs have different scales as the Directorate of Nuclear Substance Regulation, or DNSR, the Directorate of Security and Safeguards, or DSS, and the Directorate of Safety Management, or DSM, carried out the majority of DO authorities in 2020, with 3,307. The five remaining Directorates and Branches carried out 40 authorities in 2020.

It is important to recognize that DO authorities are unique to the expertise of the staff in each Directorate, such as return to work authorizations by the Radiation Protection Division. It is the specialized expertise of each Directorate, and not necessarily the number of authorities, that determines their need for DOs.

The next slides look at specific DO

authorities that are reportable to the Commission.

DO decisions reportable to the Commission pursuant to subsection 37(5) of the *NSCA*, an excerpt of which is included on this slide, are those that deal with safety significant issues, have a substantive impact on the proponent, or give rise to an opportunity to be heard or an appeal. This presentation is intended to meet the reporting requirements for DO decisions made during 2020.

Going forward, the Commission will receive quarterly memos to fulfil the requirements of subsection 37(5) of the *NSCA* in a more timely manner. Summaries of these decisions will continue to be included in annual reports similar to this presentation.

This slide provides a breakdown of the reportable DO decisions made in 2020. DO decisions that fall under paragraph 37(5)(a), (c), and (d) will necessarily result in the DO providing an opportunity to be heard to the licensee or applicant.

DOs made 89 decisions reportable to the Commission in 2020. Specifically:

- DOs within the Directorate of Security and Safeguards refused to issue four export licences on the basis that the proposed export would be inconsistent with Canada's international obligations on nuclear non-proliferation;

- DOs in the Directorate of Nuclear Substance Regulation issued 79 licences with a financial guarantee; and finally,

- DOs made six inspection order confirmations or amendments -- the Directorate of Nuclear Substance Regulation confirmed four inspector orders and amended one, while the Directorate of Nuclear Cycle and Facilities Regulation confirmed one inspector order.

More information on these decisions is available in Appendix D of this presentation.

Some DOs are authorized to issue notices of violation and associated administrative monetary penalties, or AMPs, to persons who commit a violation. AMPs can be issued to an individual or a corporation and are due within 30 days of receipt of the notice of violation. The Commission has

authorized Director General and Vice President DOs to issue AMPs.

The table indicates the total number of AMPs issued each year since 2017. In 2020, two AMPs were issued by CNSC DOs, both from the Directorate of Nuclear Substance Regulation.

The CNSC's public website has a comprehensive "regulatory action" page which provides the public with details in regard to the issuance of AMPs.

The next slides will focus on the CNSC's DO Community Forum.

The annual DO Community Forum supports continuous improvement in DO activities, knowledge management and collaboration.

These forums provide DOs with legal, procedural and resource refreshers, as well as an opportunity to share experiences and discuss best practices with one another.

The third annual DO Forum was held October 22nd and 23rd, 2020. The agenda for the 2020 DO Community Forum is included in Appendix E.

The 2020 Forum was the first held virtually and gave DOs an opportunity to discuss topics relevant to the community. These included impartial decision-making, the process for conducting an opportunity to be heard, knowledge management and the role of CNSC's finance team with respect to DO authorities.

The forum also offered an opportunity to provide DOs with updated information on program roles and resources.

Following the forum, attendees provided feedback to contribute to continuous improvement of the DO program.

DOs reported that the virtual format was very successful and that they were still able to actively share experiences. The majority of respondents also highlighted the benefit of the open floor discussion, which they found allowed for an exchange of ideas amongst DOs, and expressed interest in the inclusion of more case studies. In order to avoid virtual burnout, shorter sessions were also suggested for future forums.

Based on this constructive feedback, a shorter forum was held June 4th, 2021, with a focus on case studies and open group discussions.

I will now pass the presentation back to Michael Young for some concluding remarks.

MR. YOUNG: To summarize, the DO Program has seen recent improvements.

As mentioned earlier, quarterly memos summarizing reportable DO decisions provide timelier information to the Commission.

The virtual DO Forums have worked well. The DO program will continue to make the most of the virtual environment and reduce fatigue associated with virtual meetings by continuing to hold half-day sessions. This also allows for the possibility of more frequent forums to discuss even more recent information.

DO training has been held virtually since the beginning of the pandemic. Refinements continue, and virtual briefings and training will remain a part of the program for the foreseeable future.

As you know, 2020 also saw big changes to the way CNSC staff conduct their work, as all CNSC staff, including DOs, were required to work remotely.

All CNSC staff have the tools to work effectively from home. DO authorities are now carried out electronically and the support of Legal Services, the Commission Secretariat, and the Directorate of Regulatory Improvements and Major Projects Management continues to be available as before.

DOs continue to carry out their authorities in accordance with the designations granted by the Commission and the standards of impartiality, independence and fairness required of them.

To conclude, the 35 CNSC DOs carried out a total of 3,347 authorities in 2020. Appendix A and B detail the CNSC DO positions and Appendix C provides an overview of the DO authorities carried out from 2017 to 2020.

Eighty-nine of the DO decisions made in 2020 were reportable to the Commission as per subsection 37(5) of the *NSCA*. These are detailed in

Appendix D.

The DO Program continues to be an effective and key component of the CNSC's licensing and compliance framework.

Thank you. CNSC staff are available to answer any questions you may have.

THE PRESIDENT: Thank you very much for the presentation and let me open it up to Commission Members for any questions they may have.

Dr. Berube...?

MEMBER BERUBE: Yes. Thank you for your presentation.

One of the questions I have has to do with actually recruiting of DOs. I am curious to know how you go about that process. Do you just ask everybody in the room to stick up their hand if they want to be a DO or do you actually, you know, groom people for it or preselect? I don't know how you do this, so it's kind of interesting. They have a lot of authority. So just walk me through that process, if you could. Thank you.

MR. YOUNG: Michael Young, for the

record.

The DO positions were assigned by the Commission through the process described earlier in the presentation. Essentially they are senior positions within the CNSC, so the requirements for those individuals to hold those positions include the authorities that the DO would have ultimately. I wouldn't say they are groomed to be DOs necessarily, but in order to hold that position they must be able to fulfil the responsibilities of the DO.

MEMBER BERUBE: Thank you. That's good.

MR. YOUNG: That answer --

MEMBER BERUBE: That will do.

THE PRESIDENT: Okay.

Dr. Demeter...?

MEMBER DEMETER: Thank you for that very informative presentation. I really appreciated the appendices because they provided a lot of granularity.

The question I had was, of these 3,347 DO orders or decisions for 2020, in some fashion how

many of the people that they were focused on or agencies were challenged? What sort of pushback do you get from this that you would expect? Is it like 1 percent, is it 10 percent challenged, I want to be heard, I want to appeal, I want to challenge the decision? What is the sort of pushback you get with this, out of these 3,000 or so orders?

MR. YOUNG: Michael Young, for the record.

I will ask this to go to Mr. MacDonald in the Secretariat and then perhaps to some of the operations groups.

MR. MacDONALD: Daniel MacDonald, for the record.

So the intention of the reportable to the Commission Designated Officer decisions is really to capture the ones that might be more sensitive and, as the presentation outlined, there were 89 decisions that were reportable to the Commission. This includes six order confirmations as well as four licence refusals.

We have further staff who are

Designated Officers available to answer more specific questions.

MEMBER DEMETER: Yes. I saw the ones that go to the Commission and the Commission either approves, modifies or strikes the order. Of the ones that don't come to the Commission, is there a path for a licensee to challenge or appeal the decision?

MR. YOUNG: Michael Young, for the record.

Yes. This is part of the framework of the legislation under which the CNSC works.

Perhaps I will ask Pascale Bourassa to provide some views from her perspective as a DO.

MS. BOURASSA: Thank you.

I am Pascale Bourassa. I am the Director of the Non-Proliferation and Export Controls Division.

As Michael Young has reported, last year in 2020 we denied four licences to the applicants based on the information that was provided to us.

In our assessment of the application we have a non-proliferation officer that makes an

assessment and then makes a recommendation -- I'm sorry, a second person will make a recommendation and if that person will lean towards recommending a denial of a licence, we reach out to the applicant and we give them the information on the basis of why we would be recommending the denial of the licence and they know that they will get an opportunity to be heard. So if you want, this is the first, you know, door that is opening for them to provide more information. Then the recommendation goes to the DO to deny a licence. The DO formally sends an e-mail -- sorry, a letter to the applicant providing the basis for why that recommendation to deny a licence is being made, giving them an opportunity to be heard. In our situation we give these opportunities to be heard in writing and we set a timeline and we negotiate that timeline with them to see what would be appropriate for them to return with more information. So then we set that timeline and they can take that opportunity to be heard then. And in some cases we have some applicants who will withdraw their application at that point. Others will provide additional information and we will

consider that among all the information that is on the file to make our decision.

MEMBER DEMETER: Okay, yes. Good. Thank you. I appreciate the process and the iterative sort of back and forth before you get to that final decision. Thank you.

THE PRESIDENT: Ms. Owen-Whitred, you wanted to add something to that.

MS. OWEN-WHITRED: Yes, thank you.

Karen Owen-Whitred, for the record. I am the Director General of the Directorate of Nuclear Substances Regulation.

Just speaking to the number of instances where we would see a request for an opportunity to be heard, in our case out of I think it was six or seven enforcement actions over the course of the year, there was only one instance in which the affected licensee requested an opportunity to be heard. So it's not common, I would say.

THE PRESIDENT: Thank you.

Ms. Maharaj...?

MEMBER MAHARAJ: Thank you, Madam

Velshi.

I just wanted to ask a question about the balance of DOs based on the amount of the number of orders that seem to be -- or authorities that seem to be carried out. When I take a look at slide 9 for example, it seems as though far and away the bulk of the DO work lands in the Directorate of Nuclear Substance Regulation and Security and Safeguards. Could somebody just clarify how many DOs are in each of those particular Directorates? Like is the balance and the spread of DOs reflected by or correlated to the number of authorities that seem to be asked of that Division or is there some other way that the balance is achieved?

MR. YOUNG: Michael Young, for the record.

That is the case, that there are more positions holding DO positions in the groups that would have more of those activities to carry out.

I would ask perhaps Ms. Owen-Whitred to provide additional information with respect to her group in DNSR.

Thank you.

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

So in our case, as you have noted, we have the majority of DO decisions in any given year and we do have a number of DO positions that are commensurate with that volume. So we have four Divisions, each of the Directors of those Divisions have certain DO authorities, but then in each case there are senior staff as well who are able to -- who are DOs themselves. And therefore, within each group and each type of DO decision that is required there is a sufficient number of personnel in order to be able to make those decisions.

MEMBER MAHARAJ: So if there was a Division that all of a sudden saw an increase, a significant increase in the number of authorities they were being asked to consider, is there a process for assigning additional or appointing additional DOs for that Division or is it quite prescribed, the number of DOs for each Directorate?

MR. YOUNG: Michael Young, for the

record.

I will ask the Directorate of Regulatory Improvement and Major Projects Management to add to this, but essentially, yes, there is such a process in addition to the number of DOs being reviewed periodically to confirm that there is a sufficient number. They can be added upon need or request. As was reported, there was one added to the Import and Export Controls Division this year.

I will ask the Directorate of Regulatory Improvement and Major Projects Management to add to that.

Thank you.

DR. DUCROS: Caroline Ducros, for the record.

Indeed, the DO authorities are based on the mandate of the Directorate and the expertise of the Directorate staff and we will continue to look at the authorities and the mandate and the types of DO questions that -- or decisions that come to us.

The last big redefinement of a number of DOs took place in 2014 when the Commission

designated 31 positions across the CNSC and that reduced the number of DOs from 47 positions.

But since then several changes to the DO positions have happened and that's based on the operational requirements. So, for example, for the reporting period that we are here with there were nine staffing changes in DO positions and one additional DO was designated in the Non-Proliferation and Export Controls Division and that was in order to address the higher volume of applications requiring DO approval and to allow for flexibility when certain DOs are not in the office.

So as part of the continuous improvement, CNSC staff will continue to reassess DO positions based on the operational requirements and periodically assess the DO positions at the CNSC.

MEMBER MAHARAJ: Thank you.

THE PRESIDENT: Thank you very much.

Let's see. Maybe if we can just take this slide off, I just want to see if there are any other hands up.

Okay. Seeing none, then, again, thank

you very much for the presentation today and for the discussion.

Closing of the meeting

THE PRESIDENT: This concludes the public meeting of the Commission.

Thank you all for your participation. Stay safe, stay well.

Bonne fin de journée.

Thank you.

--- Whereupon the meeting concluded at 2:32 p.m. /

La réunion se termine à 14 h 32