

Deep Geologic Repository
Project

Projet de stockage dans des couches
géologiques profondes

Joint Review Panel
Public Hearing

Commission d'examen conjoint
Audience publique

September 17th, 2014

Le 17 septembre 2014

Royal Canadian Legion
219 Lambton Street
Kincardine, Ontario

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Joint Review Panel

Commission d'examen conjoint

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ERRATA / ADDENDA

Volume 30 - September 15, 2014

Page 148, line 25

"mind"
should be
"mining"

Page 153, line 16

"windows"
should be
"wind rose"

Page 160, line 16

"and in the"
should be
"and then the"

Page 163, line 16

"nose"
should be
"noise"

Page 167, line 3

"the Canadian standards"
should be
"that Canadian standards"

Kincardine, Ontario / Kincardine (Ontario)

--- Upon commencing on Wednesday, September 17,
2014 at 9:00 a.m. / L'audience débute le
mercredi 17 septembre 2014 à 9 h 00

OPENING REMARKS

MME MCGEE : Bonjour, Mesdames et
Messieurs. Good morning and welcome to the
Public Hearing of the Deep Geologic Repository
for Low and Intermediate Level Radioactive Waste
Joint Review Panel.

Bienvenue à l'audience publique
de la Commission d'examen conjoint pour le projet
de stockage de déchets radioactifs à faible et
moyenne activité dans les formations géologiques
profondes.

My name is Kelly McGee, I am the
Co-Manager for the Joint Review Panel and I would
like to address certain matters relating to
today's proceedings before we begin the scheduled
presentations.

We have simultaneous translation.
Des appareils de traduction sont disponibles à la
réception. La version française est au poste 2.

The translation devices are available at the reception desk. The English version is on channel 1. Please keep the pace of your speech relatively slow so that the translators can keep up.

A written transcript is being created for these proceedings and will reflect the official language used by each presenter. Transcripts will be posted on the Canadian Environmental Assessment Agency website for the project.

To make the transcripts as meaningful as possible, we would ask everyone to identify themselves before speaking.

As a courtesy to others in the room, please take this opportunity to silence your cell phones and any other electronic devices you have with you.

As a courtesy to our hosts, please make sure you place all of your beverage containers and other garbage in the available recycle bins and garbage containers.

These proceedings are being webcast live. The webcast can be accessed from the Canadian Nuclear Safety Commission homepage

at www.nuclearsafety.gc.ca.

A detailed agenda for all eight days was published on August 26th, 2014 on the website for the project. Daily agendas are also posted for each day on the project website and are available at the reception desk. The daily agendas reflect any necessary last-minute scheduling changes.

The hearing will begin each day at 9:00 a.m. and wrap up at approximately 5:00 p.m.

Emergency exits are located at the back of the room and to my left behind the screen and curtain. In the event of a fire alarm, you are asked to leave the building immediately.

Washrooms are located in the lobby of the main entrance. The wheelchair access and ramp is located in the back parking lot.

If you are scheduled to make a presentation at today's session, please check in with a Member of the Secretariat at the back of the room. Each member of the Secretariat staff is wearing a name tag to help you identify them.

If you are a registered intervener and want to seek the leave of the Chair to propose a question, you are also asked to speak with a member of the Secretariat staff. Your proposed question must be directly related to the matters discussed during today's proceedings.

If you are not scheduled to make a presentation during these hearings, but would like to seek the leave of the Panel to make a brief oral statement, please speak with a member of the Secretariat staff and complete the application form.

An opportunity to make a brief statement is subject to the availability of time at the end of the day and must be for the purpose of addressing one or more of the six permitted hearing subjects.

Opportunities for either a proposed question to a presenter or a brief statement at the end of today's session may be permitted, time permitting and on a first-come first-served basis.

In accordance with the Panel's Rules of Procedure, the resumption of this public

hearing is solely for the purpose of addressing one or more of the six identified hearing subjects. Neither presentations nor questions will be permitted if they do not follow these Rules of Procedure.

Anyone who wishes to take photos or videos during today's session should speak with the Joint Review Panel's Communication Advisor, Ms Lucille Jamault. Lucille is also at the back of the room.

Thank you very much. Madam Chair...?

THE CHAIRPERSON: Good morning.

On behalf of the Joint Review Panel, welcome everyone here in person or those of you who are joining us through the webcast.

My name is Stella Swanson, I am the Chair of the Joint Review Panel for the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Project.

I am going to introduce the other Members of the Joint Review Panel. On my right is Dr. Gunter Muecke and on my left is Dr. Jamie Archibald.

We have already heard from Ms

Kelly McGee, the Co-Manager of the Joint Review Panel, and we also have Mr. Denis Saumure, counsel to the Panel with us on the podium today.

As noted in the published agenda, today we will be hearing presentations from the Saugeen Ojibway Nations and the Historic Saugeen Métis.

I would like to acknowledge that we also have members of the Métis Nation of Ontario with us in the hearing room. Welcome.

We will also be discussing the Panel's questions arising from the new information presented on September 10th, 2014.

The first presentation of this morning is by the Saugeen Ojibway Nations, which is PMD 14-P1.22.

Chief Roote, welcome. Mr. Monem, Mr. Kahgee, the floor is yours.

PRESENTATION BY / PRÉSENTATION PAR:

SAUGEEN OJIBWAY NATIONS

MR. MONEM: Thank you and good morning, Madam Chair and Members of the Panel.

My name is Alex Monem, I am legal

counsel for the Saugeen Ojibway Nations, known as S-O-N or SON. I am joined today by Mr. Randall Kahgee, as you know former Chief of the Saugeen First Nation, as well as current Chief, Chief Roote.

I would like to also acknowledge the members of both communities in the audience today, as well as leadership.

Mr. Kahgee is now representing SON as counsel and as the lead for the SON OPG process to determine SON community support for the project and to address legacy issues. He is here to answer questions you may have on that process or questions more broadly on SON's understanding of its rights and interests in the territory.

We also have on the phone this morning Messrs John Greeves, Dan Mussatti and Stewart Bland. These are technical experts who have been assisting SON in its review of the application and who have contributed to our analyses of the IEG report, as well as other sections of our July 21 submissions.

I will not read out their qualifications, but their bios are contained in

an appendix to our August, 2013 submissions.

Also on the phone is Dr. Steve Crawford, who we met last year, and Dr. Niel Rooney, both of whom are professors at the University of Guelph and have a long-standing -- are long-standing technical advisers to SON and can answer questions you may have respecting aquatics or environmental assessment matters.

Dr. Crawford is actually in Baie du Doré right now collecting samples as part of an SON-sponsored research program, so he will be calling from the water.

I intend to make relatively brief submissions on OPG's revised residual adverse effects analysis, the WIPP, its incidents, the updated geo-scientific verification plan and the plan for DGR expansion to accommodate decommissioning wastes.

I will discuss the alternative means risk assessment and the IEG report in more detail and explain the position of SON, that the decisions made here in respect of this project will inevitably influence the development and review of subsequent projects within SON territory, including possibly a future DGR for

spent fuel.

And for this reason, we must be very cautious about how we characterize and understand some of the issues that have been raised in these proceedings.

I will begin with the significance of the residual adverse effects.

In our written submissions of July 21, we indicate our concern that the renewed analysis provided by OPG in response to Information Request EIS 12-510 fails to adequately address the key concerns identified by Dr. Dunker in his analysis of the original work.

In particular, the renewed analysis still relies too heavily on expert judgment and fails to present data or discussion in support of its conclusions.

Further, we note that OPG's analysis relies too heavily on generalized assumptions and provides insufficient consideration and study of actual local conditions. An example of this is its determination of the 20 to 30 percent threshold for significance of effects on woodlands.

There appears to be little

account taken of local factors that could indicate how a particular patch of mixed wood in this area could contribute to the plant population sustainability and productivity.

There remains a persistent and erroneous assumption about the quality of McPherson Bay and that is, that it is a site of poor quality habitat. To the contrary, there is evidence that it is actually quite good habitat for lake whitefish, a species of central, cultural and economic importance to SON.

We have made submissions on this in the past and Drs. Crawford and Rooney can address this issue further if necessary.

The potential significance of interaction between the DGR project and McPherson Bay is further muddied by uncertainty respecting the ultimate design and performance of the stormwater management pond.

We heard clarified on Monday, and again yesterday, that CNSC has asked OPG to provide an assessment on the necessity of resizing the pond to account for a revised PMP event and to prevent untreated releases into the lake. We will wait for more clarity on this

matter.

The last point to make here is on the assessment of significance in respect to adverse effects on Aboriginal interests. As we say in our July 21 submissions, OPG's analysis has a central problem, it does not take into account the Aboriginal perspective in its analysis.

In its response, OPG acknowledges that:

"...[t]here are no absolute effects thresholds to use when evaluating effects that diminish the quality or value of activities undertaken by Aboriginal peoples at Aboriginal heritage resources."

OPG then relies on professional judgment of the experts who performed the assessment.

The significance of impacts here can only be determined by the Aboriginal people themselves. To understand this any other way, for example, to consider a significance effect to

the resource that Aboriginal people have an interest in rather than consider the significance to the Aboriginal people of the diminished resource is to do nothing more than to repeat the standard analysis without any regard to the Aboriginal interests or concerns.

As Mr. Kahgee stated a year ago, and I quote:

"If our people come to believe that it is no longer right to consume plants, fish or animals for deep or spiritual reasons, this cannot be mitigated by demonstrating that there are no new radiological effects."

(As read)

He went on to give one example, and I quote again:

"Say for example...we have four medicines that we utilize; sweet grass, for example. We use that; it's one of our sacred medicines. We use that for many

different things, in our prayers, in our ceremonies. What does it mean if somehow there's an apprehension or a concern that sweet grass is somehow less pure? And what does that mean in the context of utilizing it for those purposes - for those spiritual purposes? I don't know."

Significance of impacts on Aboriginal interests is not an analysis or an assessment that OPG can be expected to carry out on its own and it is not something easily amenable simply to further and better study. Rather, these kinds of adverse effects are real and can only be addressed through a full engagement with those who are affected.

It is the users of the land, animals and plants, and those whose spiritual and cultural identity is bound up with that land that will have to come to terms with the changes the project could bring and ultimately they will have to be the ones who will choose to accept or

tolerate those changes.

I will turn now to EIS 13-515 and the analysis of the WIPP incident.

The incidents at the WIPP facility are serious and troubling and have the potential to undermine public confidence in the DGR concept generally. We should not try to diminish the significance of this event or these events.

Nobody saw this coming a year ago, nobody came forward to explain the various problems of diminished safety culture at the DOE or problems with contracting out packaging of nuclear wastes, and nobody predicted that these were all accidents waiting to happen.

The fact is, everyone understood WIPP as a well-designed project being carried out by a responsible proponent and overseen by a strong regulator.

Of course, we must all treat this as a learning opportunity, but we submit that the real lessons from WIPP are not yet known and this creates a real timing challenge for us all.

The Phase 2 Report is to identify the root cause of the radiological release event.

From what we have understood so far this may have something to do with problems related to the packaging of waste. If this is so, this should cause us to re-examine and re-focus on the importance of the waste acceptance criteria and the waste inventory verification plan. It will also force us to consider the management chain of packaging wastes, but this is all speculation, because we do not yet have the Phase 2 Report in hand.

We need to understand clearly what the process will be for OPG and CNSC to review and analyze that report and review and revise, as necessary, the relevant aspects of the DGR project proposal. We also need to understand what the opportunities for public input into that process will be and how it will be reviewed.

The other lesson from the WIPP events relates to the degraded safety culture. With respect, this is not a cause, this is a symptom. For our purposes it is necessary to understand what conditions will give rise to a deterioration of the safety culture.

We have no reason to doubt that OPG has a good and reliable safety culture, but

over time companies evolve. In the future OPG could have new shareholders, it could fundamentally restructure its business, it could divest some of its assets, including the DGR. CNSC, too, can evolve.

The DGR project must continue to operate safely for many decades and will need to be carefully decommissioned if the assumptions of the safety case are to remain valid. We now understand that a key component of this will be an intact safety culture, one that must continue to be in place regardless of the underlying changes in the Corporation or the regulation scheme.

It is still not clear to us which of the key aspects of safety culture are required under regulation and which are voluntary. I understood CNSC as stating that it had not yet conducted an analysis to determine whether the incidents at WIPP were due to a failure to comply with applicable legislation, regulation and guidance, whether there was a gap in that regulation or there was a failure to enforce that regulation. We believe this is a necessary exercise.

There seems to be significant overlap in the guidance documents that DOE and the CNSC rely on and we suspect that, more broadly, there is also significant commonality between the regulation that governs the nuclear industries in both the U.S. and Canada.

If the WIPP incident is any way connected to a failure of regulatory oversight, this is a more serious and fundamental problem. For this reason it is critical that we understand exactly what was the cause of the degraded safety culture at the WIPP facility and what steps are required so that we can prevent that from occurring here.

I turn now to the geo-scientific verification plan.

You have our more detailed comments on the revised plan in our July 21 submissions. We do not have our geologists on the phone today, but if -- as we are going to address this subject tomorrow, if it will be helpful we can have them available. But overall, we understand the revised plan to be an improved form of the 2011 version, but still in need of detail and specificity.

In particular, SON would benefit from a clearer discussion and articulation of hold points and triggers for further study and review of modelling and safety case assumptions. We presume this will be addressed in greater detail tomorrow and we will hold off with our more specific questions until then.

A related matter was raised by Dr. Dusseault in his testimony last week, the concept of adaptive engineering. In the worst case to SON this sounds like a euphemism for engineering around problems.

When I asked OPG whether adaptive engineering was part of their development philosophy, Ms Swami thankfully confirmed that they are relying on their existing design. However, we did start to get into a discussion of what was referred to as scenarios. Mr. Derek Wilson started to discuss that OPG had anticipated a number of scenarios that might be encountered during construction and their strategies for dealing with those scenarios.

We hope that this subject will be addressed in more detail tomorrow. It is important for us to have a better understanding

of these scenarios, how they align with the geo-scientific verification plan, whether any of those correspond to the fine holding points and how such situations will be identified, studied and actioned, including how that plan will be reviewed.

On the decommissioning waste expansion plan, as we have said in our written submissions, SON now believes that this project is better described as a phased-in repository for 400,000 cubic meters of operational, refurbishment and decommissioning low and intermediate level nuclear waste.

How this repository will ultimately be used and developed, however, is still an open question. The exact size of the repository and the exact waste streams that it will house will be determined at a later date in a response to future OPG business decisions.

We do understand the material changes to what is proposed in this application will be subject to further regulatory review. However, as we have said before, we remain unclear on which changes will trigger what

regulatory review. We have asked before for an analysis that will clearly set out which future project evolution scenarios would trigger regulatory processes and the precise nature of those processes, including the scope and mandate of the review and the opportunities for public participation.

By future evolutionary scenarios --evolution scenarios -- we mean, for instance, proposed changes to the waste acceptance criteria including changes to the ratio of low and intermediate level wastes or inclusion of the new waste streams. It would also include changes to the physical design of the repository including incremental expansions as well as expansion that amounts to a doubling of capacity.

Our concern is to ensure that we and the Panel are not being asked to sign a blank cheque to give OPG or a successor corporation and the CNSC the authority to develop and review the DGR without environmental review and oversight and public input. But this alone is not sufficient. SON has an abiding concern, expressed many times in these proceedings, that

we do not yet know the full potential for this site as a nuclear waste management site.

From yesterday's discussion we are not satisfied that we have enough information to draw hard limits for potential expansion of the site for increased and diverse nuclear waste disposal or that we fully understand what the drivers for such expansion will be.

This review is our last opportunity to consider the big picture view of the future of this site as a site for permanent nuclear waste disposal. This is the only opportunity we will have to perform a strategic level planning analysis on this question which is the core function of an environmental assessment.

As we've said in the past, future regulatory processes including a full environmental assessment will ask a narrower set of questions or may have more limited opportunity for public engagement and we carried out in the context of an existing and operating DGR onsite or, at a minimum, in the context of a partially-constructed DGR that represents a billion dollar investment on an already disturbed site.

SON submits that we should have a much clearer understanding of what the future evolution scenarios for the DGR project are now before we can make a good and informed decision whether to go down this road.

I will now turn to the alternative means risk assessment and the question of community acceptance. SON has already addressed these two issues in some detail both orally and in written submissions throughout these proceedings. For SON these represent very important aspects of the current application.

First, the SON leadership and its communities care enormously that this project should represent the best and safest way for dealing with what they perceive to be a nuclear waste problem in their territory. And to come to this conclusion, they need assurance that all options have been credibly explored.

But also, this project represents a significant new nuclear project developed in the SON territory and will be viewed as a precedent for the development of future nuclear projects in the territory, including either an expanded DGR for decommissioning wastes which

appears inevitable and potentially a future expansion or new DGR for spent nuclear fuel.

Finally, this project has been developed on the basis of community acceptance and, more specifically, a concept of a willing host community. And the community acceptance language has persisted throughout these proceedings including, in the Panel's most recent request, asking OPG to produce an alternative means risk analysis which includes analysis of community acceptance.

Again, this has potential to become precedent-setting. To my knowledge, this will be the first time a Canadian review panel will consider the concept of "willing host community" and community acceptance more broadly in the context of a proposed new nuclear project. And as the Panel is aware, this is a central concept within the adaptive phase management approach that will lead to Canada's spent nuclear fuel DGR.

It's for these reasons that I will address the issue of alternative means and community acceptance in more detail.

With respect to alternatives it

has been SON's position that there has not been sufficient material available to the public and SON with respect to viable alternatives to this project for the management of low and intermediate-level radioactive wastes.

The Panel in EIS 12-513 required a renewed and updated analysis of the relative risks of siting alternatives and it set out four options to be enhanced surface storage at the Western Waste Management Facility and a granitic DGR in the Canadian Shield. This analysis was to be carried out by independent risk assessment experts.

SON's original position on this matter is unchanged. We do not believe the report of the Independent Expert Group has added any new substantive data or analysis to the alternative means assessment for this project. In our view, the IEG report provides primarily a new way of visualizing the data and analysis that was already on the record in these proceedings.

The report of the IEG does offer a new qualitative determination of relative risk. However, while aspects of its methodology were clearly described, crucially others were missing.

For instance, we have no good understanding of how the expert group assessed each of the risk pathways for the four options, how those were synthesized and how that was translated into the very precise placement of icons.

Members of the IEG described a process of workshopping and coming to a consensus on placement but very little detail was given that would allow a third party to assess the precise methodology or process used in the workshop. We have no ability to judge the methodology employed more generally because it appears to have been developed specifically for this process and there is no literature we can refer back to, to assess its validity, accuracy or for utility.

The IEG acknowledges that given the time constraints and size of the group, it did not consider other methodologies or approaches that might have led to more objective results.

The IEG acknowledges that its results are not reproducible in the sense that another group of experts applying the same

process described by the IEG with the same inputs could come to a different result or different results.

Given all of this, we find it difficult to understand how this new qualitative analysis of relative risk of alternatives contributes materially to our understanding of the actual relative risk of even the four options they considered.

A more fundamental deficiency in the IEG's work is that it did not consider what SON believes to be a representative set of the full range of options for the long term management of low and intermediate-level nuclear waste.

First, the IEG did not consider under the case of enhanced surface storage the possibility of segregation of the longest living ILW for eventual disposal with used fuel. They did not believe it was within their remit to do so. In testimony, Dr. Leiss did clarify that his group does acknowledge this approach being employed in both Spain and France but did not feel it was an option within the Canadian context.

For reasons we have previously explained, SON does not agree with this. We have a siting process for a used fuel repository well underway in Canada and OPG, we understand, is already considering or planning to segregate some long-lived intermediate-level wastes for disposal in that repository.

We believe that the failure to consider a more refined treatment of the longest level -- longest lived intermediate-level wastes constitutes a significant omission from our considerations here.

Another significant omission in the IEG's work is its failure to consider a credible granitic DGR. We have had ample discussion of this already and we set out our position fully in our July 21 submissions. Our position has not changed based on any of the testimony of the IEG that we've heard during these most recent hearings.

However, we do wish to emphasize that not only has the IEG report, to our minds, failed to consider a credible granitic DGR, it also provides a questionable analysis and commentary which could be understood as having

applicability to future DGR projects including a spent fuel DGR.

This is a concern that was also expressed by the CNSC in its review and presentation. It identified in the IEG report misleading statements about the characteristics of granite of the Canadian Shield and their implications for comparison of a Canadian Shield site with the Bruce DGR site. CNSC concludes that -- and I'll quote here from the presentation:

"Out of context statements about rock types could lead to misconceptions about the suitability of requirements for this or other deep geological repository projects." (As read)

We believe the testimony of the IEG in these proceedings has exacerbated this problem. In testimony Dr. Dusseault reiterated and expanded on a number of conclusions about the general characteristics of granitic formations that could influence their perceived suitability for DGRs, including their fracturing tendencies,

unpredictability of such fracturing and the increased difficulty of characterizing such sites relative to those in sedimentary rock formations.

We are not experts in these matters and Dr. Dusseault's comments may or may not be accurate. The problem is that his conclusions have not been explained or justified and they have not been tested and they have not been presented in the context of a full, fair and balanced exploration of these matters.

Still, the work of the IEG including the statements of Dr. Dusseault and their overall assessments of relative risks of granitic and sedimentary DGRs is now on the record as the conclusions of an Independent Expert Group. It is obvious that this has the potential to influence or support future decisions with respect to preferred rock types for DGRs. And, of course, it has been one of SON's consistent concerns that these proceedings and its outcomes could influence the ongoing process for identifying a site for a spent fuel DGR.

I'd like to move on now to the question of community acceptance. As is clear

from the record, OPG has moved forward with its application on the basis of having community support. In part, this support is evidenced by an agreement with the Municipality of Kincardine. OPG subsequently made a commitment to SON not to proceed with construction until the SON communities are supportive of the project.

OPG and SON are now developing a process whereby there can be a determination of SON community support as well as an understanding and building of conditions that could lead to community support, including the resolution of broader legacy issues.

SON and OPG are now finalizing a framework agreement that will structure their engagement and implement that commitment. And SON has already done significant internal work to build a process for full culturally-based engagement of its communities and the realization of a true community-driven process.

With respect to this project, it is the position of SON that OPG has taken positive and appropriate steps in regard to seeking and determining SON community support for the DGR project. By its commitment to SON and

through the full implementation of that commitment, OPG is proceeding with SON in a way that fully satisfies our understanding of the requirements of community acceptance with respect to projects like the DGR and those articulated in the adaptive phase management process.

In our submissions we have indicated that the SON/OPG commitment ought to be recognized and reflected within this environmental assessment and subsequent regulatory processes. In keeping with our mutual commitments we have been working with OPG in order to provide the Panel with a common position on how this could be accomplished and we'll make sure that this is done in final submissions. We will also endeavor to remain in contact with CNSC to ensure that what we propose is sound.

I wish now to turn to my final point, and that is to address the process for determining community acceptance not for this project but rather more generally. As I stated earlier, this will have ramifications for the development of other major projects within the SON territory including future DGRs or other significant nuclear developments.

First, as we stated in our August 2013 submissions, SON does not accept that a municipality or municipalities could be host communities for major nuclear projects at the Bruce Nuclear site or otherwise within SON territory while SON is excluded. It is unthinkable to SON and its leadership and, I would submit, inconsistent with law, for a municipal corporation to make decisions on behalf of, or in place of SON, that could materially impact SON's rights and interests. It is SON's fundamental position that it must be considered a host for any major nuclear project within its territory.

Second, community acceptance is not a determination that can be made unilaterally by a proponent, regulator, government or reviewing body. Further, it cannot be determined based on an assessment of risk perception, risk acceptability or any other proxy.

In our written submissions of July 21 we set out in some detail our objection to the use of risk perception as a proxy for community acceptance, and I will not repeat that now.

We agree to an extent with the conclusions of the IEG respecting community acceptance; namely, it's conclusion that it did not have sufficient data to answer any question of community acceptance of the various options it considered and it did not have enough data to draw credible conclusions about the more limited questions of relative risk acceptability or perception relating to the four options.

However, from SON's perspective, it will never be possible to draw conclusions about its community acceptance based on assessments of risk perception or risk acceptability.

As we note in our July 21 submissions the IEG report echoes many of the same ideas that SON has communicated to you, especially in last year's hearings, about how its communities might perceive risk from this or similar projects and how that might impact SON community members' perceptions about their harvesting, spirituality and their cultural identity on the land. And I have repeated some of that here again today.

These perceptions of risk cannot

be dismissed and they are not easily addressed. We heard good suggestions from the IEG on how risk can be better understood, what steps can be taken to increase trust and confidence which might act to mitigate high perceived risks, but we have also heard and we have seen from recent events that risk cannot be reduced to zero and, at the end of the day, those subject or subjected to the risks however small or large they might be, must be willing to accept those risks or at least willing to tolerate those risks.

It does present a real problem if the evidence before this Panel, or its decision, is capable of being understood as supporting the notion that SON community acceptance for a future DGR project can be ascertained solely through a contractual agreement with a municipality or through mere predictions of community acceptance based on risk or perceived risk.

SON states that its acceptance can only be determined through a clear expression of acceptance or support from the SON communities themselves and after a deep engagement process between SON, the proponent and the Crown.

SON believes that a process like

the one committed to by OPG with respect to this DGR project is a full expression of this approach and what is envisioned and required by concepts like willing host community and volunteerism under the adaptive phase management process, as well as what is required under the common law of Aboriginal and treaty rights and international law and declaration.

Those are my submissions. Thank you.

THE CHAIRPERSON: Thank you, Mr. Monem.

We will proceed with questions from the Panel for the Saugueen Ojibway Nations beginning with Dr. Muecke.

MEMBER MUECKE: Mr. Monem, did OPG seek input from the SON into the revised assessment of the significance of adverse environmental effects?

MR. MONEM: Alex Monem, for the record.

I do not believe so.

MEMBER MUECKE: Would OPG care to comment on that?

MS SWAMI: Laurie Swami, for the

record.

Ms Barker will respond to that.

Thank you.

MS BARKER: Diane Barker, for the record.

OPG's environmental impact statement states that the EIS was conducted based on the traditional knowledge that it had available to it at the time. That was largely based on published information.

OPG's understanding of the request for a significance assessment based on context-based reasoning was that it was to provide the rationale -- the textual narrative rationale for the assessment that was included in the EIS.

We didn't seek additional data or information for that.

The IR response acknowledges that the assessment of significance was based on the professional judgment of the experts that conducted the assessment.

MEMBER MUECKE: In terms of the instructions by the Panel of a reassessment using different methodology, do you believe that this

excluded the ability to draw in new data and to enhance the data that goes into -- that went into that decision?

MS BARKER: Diane Barker, for the record.

It was our understanding that the assessment was a reassessment of the data that had already been provided in the environmental impact statement, that it was not to go back and redo the full assessment.

MEMBER MUECKE: The question was not go back and redo the whole assessment, but to draw in new data, if necessary and desirable.

MS BARKER: Diane Barker, for the record.

It was our feeling that to draw in additional data would have required going back and reassessing effects, and it would have been much more than an assessment -- a narrative assessment of the significance assessment that was done in the original EIS.

MEMBER MUECKE: Coming back to the SON submission, in response to one of yesterday's questions about the impact of possible new builds of reactors by DGR on -- and

the impact on the expansion plans of DGR, it was stated by OPG that the 200,000 cubic metres of expansion applied for the foreseeable future.

What is the SON's reaction to this statement?

MR. MONEM: Alex Monem, for the record.

I have to preface this by saying that I'm fully outside my area of expertise, but my understanding of current demand predictions, most recent ones I'm aware of are those conducted by the Ontario Power Authority in its 2007 IS -- IPSP, did not predict a reduced need or reducing trend in base load requirements out until 2027 or -- I think that's -- sorry. I may have gotten that number wrong. It was 2027, actually.

And it predicts, until that point, a continuing need for base load generation in the form of nuclear generation.

There, to my knowledge, is no plans for something that could replace nuclear generation for that kind of base load.

So our position is that the reasonably foreseeable future most certainly includes, or at least reasonably includes, a

continuation of nuclear generation far past the 2050 timeframe that OPG has used in its predictions about the volume that is required for the storage of low and intermediate level wastes.

We raised that to test the assumption of the 200,000 cubic metre volume requirements.

MEMBER MUECKE: Perhaps I could slightly jump ahead to tomorrow.

What level of detail do the SON consider necessary in the geoscience verification plan prior to commencement of construction of the proposed repository?

And secondly, should it -- should the geoscience verification plan remain a document open to the public and for public examination?

MR. MONEM: Alex Monem, for the record.

Again, I'm out of my area of expertise. I can give an answer based on what I believe to be the functional level of detail that would be required in the geoscientific verification plan, and that is for lay people, the public and SON to be able to understand what

kind of conditions might be encountered in the construction of the facility and where the red flags are and the course of action about how those will be identified and addressed, and that this be reviewed or reviewable by SON and, obviously, regulatory authorities.

If I can borrow a concept that Mr. Tom Isaacs raised, was the creation of a safety case, which I think is different in the way we've been using the safety case, but this is a -- for lack of a better term, a plain language description of some of the technical requirements of a facility and also, in this case, of the geoscientific verification plan.

I believe that would be necessary as well if there was going to be any utility in keeping that open to the public for review.

I don't for a minute mean to suggest that there are not also technical details that we should see in a verification plan, but I just cannot answer that. But if you care to have our perspective on that kind of detail and level of detail, we're happy to provide it, possibly tomorrow.

MEMBER MUECKE: Thank you, Mr.

Monem.

THE CHAIRPERSON: Dr. Archibald.

MEMBER ARCHIBALD: I have just one question relating to part of the submission on the SON review of the alternative means document, and this is based upon a statement made on page 28 of the SON submission that no basis exists for the assumption that all wastes would first be shipped to the WWMF prior to eventual transport to the granite DGR.

And this is a question to both CNSC and OPG. Is there a regulatory requirement to have waste shipped to the WWMF or would regulatory approval be sought to ship nuclear station waste of whatever source type directly to a potentially approved DGR facility located elsewhere?

THE CHAIRPERSON: I believe that question actually primarily would be directed at CNSC.

DR. THOMPSON: Patsy Thompson, for the record.

I'll provide a level of response and then, if you'd allow us, Ms Kay Klassen can be here after the break and further respond, if

necessary.

Our understanding is that the --
much of the processing facilities required to
prepare the waste for disposal exists at the
Western Waste Management Facility and that if the
waste was to be sent elsewhere, those types of
facilities would need to be available at that
other location.

But I'm really out of my depth,
so if you'd allow us, Key is upstairs and she
could be here after the break.

THE CHAIRPERSON: Thank you, Dr.
Thompson. Yes, I believe we will need some more
elaboration on that response.

I'm going to call a break. We
will reconvene at 20 minutes past 10:00. Thank
you.

--- Recessed at 0958 / Suspendue à 0958

--- Resumed at 1021 / Reprise à 1021

MS MCGEE: If I could ask
everyone to take their seats, please, the Panel's
questions will resume.

Thank you.

THE CHAIRPERSON: We will begin by returning to the question that was posed immediately prior to the break.

Dr. Thompson?

DR. THOMPSON: Patsy Thompson, for the record.

So Ms Klassen, the project officer for licensing of waste facilities, is here to help respond to the question.

And so the question was whether the IEG assumptions that waste first had to be shipped to the Western Waste Management Facility prior to transport to a granite DGR was a reasonable assumption.

And so after discussions, the assessment we've made is that there is no legal requirement for if the DGR were to be off the Bruce site for waste to be shipped to Western before being shipped to a granitic site.

The processing that OPG is currently doing with incineration, compaction and other things is part of the process that is in place that's being conducted at the Western Waste Management Facility, but if these activities were to take place elsewhere, for example, in

conjunction with a DGR, that would become part of the project that would be assessed through an environmental assessment and a regulatory process.

And I will ask if Ms Klassen has anything to add to this.

MS KLASSEN: Kay Klassen, for the record.

As Patsy has described, that's the general regulatory process. We review the applications into -- in relation to what is proposed. It's assessed to ensure that the workers, the public and the environment are safe and so, in that context, there's nothing to preclude an applicant to propose other activities in relation to a DGR.

THE CHAIRPERSON: Thank you.

Panel Members, I believe we do have a question now to direct to Dr. Dusseault, if he is available by phone.

Dr. Dusseault?

DR. DUSSEAULT: I am here. Thank you.

THE CHAIRPERSON: Thank you.

Dr. Muecke.

MEMBER MUECKE: Good morning.

Dr. Dusseault, could you provide the Panel with the sources used by the IEG to determine what constitutes a, and I quote here, "better than average" or "high quality granite" in the Precambrian Shield with respect to fracture density, regulatory and predictability?

DR. DUSSEAULT: The -- that is a statement of -- rather than saying that it can be attributed to a particular source, that is a statement of professional opinion of mine saying that the hypothetical granite DGR would be located in a better than average granitic pluton based upon widely understood geomechanical knowledge that different igneous rock masses have different degrees of fracture densities, facing aperture, et cetera, and that the preferred type of rock in the range of igneous rocks is granite emplaced as a kind of pluton -- plutonic granite -- because that type of rock, cooled very slowly, and fewer fractures are present in that kind of rock and less heterogenated than, for example, granite shifts or green stones or other types of rocks.

This opinion is substantiated by

studies done in the Atikokan region of Ontario, Pinowa, the Lac du Bonnet granite, Chalk River and, of course, in Finland and Sweden for granite repositories.

But to quote a particular study for that statement, I cannot do that. It is a measured opinion that comes from reading and general sources, and also nuclear waste repository studies in those places.

MEMBER MUECKE: So is the Panel's interpretation correct to say that this opinion is based largely on literature review and not so much on personal experience?

DR. DUSSEAULT: That is correct. I have done a lot of granite mapping in my youth, have walked over a lot of granite in northern Alberta, but -- and I've seen everything from intense fractures to, you know, very intact rock.

I've even done the survey of a quarry, a red granite quarry, for potential high quality building stone because it was so unfractured.

So it is the literature plus personal experience in doing hard rock mapping for four years in Alberta.

MEMBER MUECKE: Thank you, Dr. Dusseault.

THE CHAIRPERSON: Thank you, Dr. Dusseault.

The Panel would appreciate a response also in reaction to what you've just heard from Dr. Dusseault regarding the characterization of "better than average" or "high quality" granite rock with specific reference -- we've now heard Dr. Dusseault expand a little bit on the characteristics of a "better than average" or "high quality" pluton.

DR. THOMPSON: Patsy Thompson, for the record.

I'll provide a first response and then ask Dr. Nguyen if he has anything to add.

When we reviewed the IEG reports, we essentially provided to the Panel our assessment that some of the statements could be misleading, giving the impression that all Cobourg formation or limestones were suitable for a DGR and that all granite formations may not be.

And so the -- our assessment is that for any project that would be considered licensable, I would say, and would be able to

meet the requirements for a safety case with sufficient safety margins, that extensive site characterization would need to be done so that the granitic formation would have to be shown to meet the safety requirements.

And I'll ask if Dr. Nguyen has anything to add.

--- Pause

DR. NGUYEN: Son Nguyen, for the record.

The -- in general, the granitic rock from our experience with the IT coke and our involvement with the Seaborne panel for high level waste in the past with the Lac du Bonnet granite and the IT coke inside and also with our involvement international collaboration with different partners like in Sweden and Finland, in general, we can say that compared to this -- the DGR site for OPG, most granitic rock formation would have a higher frequency of fracturing.

So in general, in Canada, like as evidence from the research and the investigation performed by AECL in the -- in the past, there are exceptions.

For example, the Lac du Bonnet

granite that was investigated at the Whiteshell area is very sparsely fractured. There would be some major fracture zones that would intersect the mass of relatively sparsely fractured rock, but there are exceptions to everything, so in each site which has to be -- which is considered for future geological disposal has to be investigated to the level of detail which provides enough information to develop a safety case.

THE CHAIRPERSON: Dr. Nguyen, given your extensive knowledge of the Whiteshell data set as well as similar data sets with respect to characterization of granite, in the context of considering granite as the host rock for a DGR, in your opinion, would a valid comparison -- what would the most valid comparison, like to like, be with respect to "better than average" or "high quality" with respect to compare and contrast the Bruce geology with a granite geology?

In other words, the Panel would appreciate as clear as possible an understanding of the CNSC's evaluation of whether or not the IEG's characterization of the granitic host site

for a DGR was, in fact, adequately like to like in its comparison in terms of the characteristics of the rock.

DR. NGUYEN: My understanding based on the review of the IEG's report, in particular in the appendix of that report where site was described as an example, that -- the site that was used is, in fact, the hypothetical site which was investigated from the surface, so this site contained many fracture zones.

The properties of that site is a composite picture of data that comes from the Whiteshell area, also from the IT coke investigation.

So I would say that this site is not really a better than average site, but that would be a site where you can expect to encounter in the rock formation from Ontario.

I think the Whiteshell area is very exceptional, and it's much, much better than the average situation.

THE CHAIRPERSON: And Dr. Nguyen, would you also characterize the proposed Bruce DGR site as much better than average?

DR. NGUYEN: I would say so.

THE CHAIRPERSON: Thank you.

Dr. Muecke, did you have any further questions regarding the geology?

Dr. Archibald.

Okay. So we are now going to switch gears a bit back to significance of adverse effects.

And Mr. Monem, you may want to call on your aquatic biology experts. Just giving you a warning on this one.

So can we make sure that either Dr. Crawford or Dr. Rooney are on the phone?

Hello?

MR. MONEM: Madam Chair, there was some confusion about what was going to happen after the break, and Dr. Rooney is not on the line, but we do have Dr. Crawford here.

THE CHAIRPERSON: Excellent. All right.

So Dr. Crawford, you may want to move forward to the microphone.

Would the Saugeen Ojibway Nations provide specific examples of what was referred to in your written submission as "indefensible professional judgments" related to the aquatic

environment, particularly with respect to either small-bodied or large-bodied fish.

Please include specific comments regarding OPG's significance hypotheses around the aquatic environment, which had a spatial scope of the site study area and not the local study area.

DR. CRAWFORD: I believe you are asking two different questions qualitatively. Summarize them please for me?

THE CHAIRPERSON: Yes.

So the first part of the question is, would you provide some specific examples based on your expertise of what was referred to as indefensible professional judgements related to the analysis of the significance of the adverse effects to the aquatic environment, particularly with respect to either small-bodied or large-bodied fish?

DR. CRAWFORD: The central issue here, I believe, relates to interpretation from an ecological perspective of the term significance.

And when you put the string of those four commonly strung terms together,

"significance of adverse residual effects." In order to understand significance of effects from an ecological perspective, you have to have an understanding of the structure and function of the ecosystem.

You have to understand the physical biophysical properties of it. So in an aquatic sense, like substrate in the water currents.

You have to understand the role of the different components of the system. So in terms of populations of species, whether they are primary producers, secondary producers, tertiary animals, so the structure and function of the system. You have to understand the linkages between those components of the system.

So it is reasonable to say that in order to assess ecological significance of effect, you have to understand first the structure and function of the ecosystem. Then you have to be able, with some degree of confidence, predict the consequences of the management action that is being proposed.

In this case, for instance, the construction and/or operation of the deep

geological repository.

The position of the SON technical people, so Dr. Rooney and myself, is that we do not have as a matter of fact not we, I mean we in the capital W sense, we do not have a very good understanding of the structure and function to the ecosystem in the aquatic environment surrounding Douglas Point.

Much of the information that was used in the previous assessments was, well sometimes very good in terms of the data that were collected, it was often dated. Goes back to, in some cases, the most recent information of some kinds goes back to the 1970s and there have been dramatic changes in that ecosystem, as we talked about last time I was here.

In terms of the scope of the information that is available with regards to fish, it is also very incomplete. And I believe that one of the principal issues that we have with the assessment had to do, in two cases, one with MacPherson Bay and one with Baie du Dore.

The MacPherson Bay issue had to do with characterization of the fish fauna in that bay as being relatively poor. And yet when

I reviewed, and I would want to check with Dr. Rooney for his interpretation, when I reviewed the available evidence I saw that, despite a relatively -- I mean, there was a fair degree of diversity in terms of sampling effort that was used over a fairly limited period of time, both seasonally and between years -- and if members serves me well, I think we were up to 13 species in that bay.

And I can tell you from firsthand experience in Inverhuron and Baie du Dore that is pretty good. For an exposed area, rocky substrate, where you have very dramatic dynamic water currents at play. And I don't know if you have been to MacPherson Bay, but it is not that big, and to yield 13 species in that environment is exceptional.

And I think that what Dr. Rooney and I were probably trying to advise SON is that when you go from Sarnia to Chief's Point along the Lake Huron shoreline, Douglas Point stands out as an incredibly different feature. It is, in many regards, we think was and still is an oasis. It is very atypical.

The closest similarities that you

will find are down at Kettle and Stony Point, and Point Clark. And there again, you find different kinds of fish. If you talk to fishermen, it is all about structure. And there is an incredible amount of structure and habitat diversity.

To answer your question specifically with regards to small-bodied fish, there is very little known about what is often referred as fish community structure by those little fish. They get kind of clumped in as bait fish or minnows or whatever.

And one example is that we ran for the first time fike nets in nearshore waters in Inverhuron and Baie du Dore -- or not Baie du Dore, but Inverhuron and Holmes this year. We were finding species not on the record at all.

And when you compare back by things like round gobies, which are a relatively recent invader to these waters. Well, they simply were not here. And yet, we would fully expect them to have a dominant signature on the structure and function of the ecosystem, given the fact that they dominated the catch in our nearshore.

The other surprise in our

nearshore -- this is just one year, so this is the limited kind of preliminary sample -- is that from interviews with local knowledge holders in Inverhuron, in particular there was this one older fellow named Dougal MacKenzie, he fished those bays as a young boy. He is now 70 something. And he was telling us about these perch holes. And there was no record of anybody catching any perch in Inverhuron or Holmes Bay.

And yet, he told us he would even in the old days go up to Baie du Dore. He caught a 3.5 pound perch up there. He showed me the picture of the stringers of yellow perch. And he said, "You only catch them in Inverhuron near the weed beds." We found no weed beds in Inverhuron at all.

So any attempt to kind of characterize the structure and function of the ecosystem would have to take those kinds of things into account.

So large-bodied fish, I suppose I would go back to a comment that I heard just this morning from Bill Thorne, he is the Assistant Superintendent for Inverhuron Provincial Park. And he came across a news article from 1870 or

something, and it described the capture of a 70 pound lake trout. Those fish do not exist anymore.

Now, I am not saying that we necessarily incorporate massive numbers of 70-pound lake trout into a pre and post-assessment. But you definitely have to consider that the structure and function of the ecosystem, and I think Dr. Rooney would support me on this, it is a moving target. It is, in many regards, degraded now and it continues to be degraded.

And it is death by a thousand cuts in many regards, because the cumulative effects over a period of time, even from the construction of the facility until now, it is only people who really -- I mean, the technical reports are very helpful, that is one source of knowledge.

But without accessing the kind of local knowledge, the Dougal MacKenzies and the traditional people that have experience with this area that date back perhaps a little bit further, it is incomplete.

So I think the fairest answer in

that regard is it is not even possible to reasonably assign significance of ecological effect if you do not understand the structure and function of the system. And if you don't do your best, and that includes the very valuable non-written oral tradition of the aboriginal local people in this region.

Because the Dougal MacKenzies and the people in the first nations can tell us something about structure and function that doesn't show up in our technical reports. And we didn't see any evidence of that in the evaluation.

THE CHAIRPERSON: Thank you.

Part B of my question was your comment, please, on OPG's significance hypothesis with respect to the aquatic biota where they limited the spatial extent to the site study area.

DR. CRAWFORD: Specifically with regards to siting, and this is a topic that came up last year as well, we believe that it is inappropriate to focus on MacPherson Bay as being the location, the bounded location of the effects and/or a portion of Baie du Dore.

And when you take a look at the maps that were generated, there is the two different levels; there is the site and then the kind of study region.

And we believe that without incorporating something along the lines of an ecosystem structured model that takes into account, especially from my perspective, things like water current. If you have even a rare discharge event and if you take into account the definition of risk as being the probability of currents and the significance of effect, those two things combined, if you have a discharge in MacPherson Bay it doesn't stay there, those water currents are extremely dynamic, as we mentioned before.

And even something as simple, like when you go through the technical literature, especially some of the good stuff from the 1960s and 1970s, you find out that this prevailing south-to-north water current flow in this part of the lake only occurs for 80 per cent of the time. Twenty per cent of the time, for reasons that nobody can explain, it reverses and it goes north-to-south.

So our fundamental understanding of the kind of dynamics in the aquatic ecosystem, and therefore its effect on what would happen would there be a discharge, for example.

So in terms of the site specificity, we believe that the appropriate scale of analysis needs to be determined by the ecosystem rather than by perhaps what was logistically feasible for the sampling program.

Did I answer that question?

THE CHAIRPERSON: Yes, you did.
Thank you.

So on the same topic, Dr. Crawford, to your knowledge what is the extent of published literature on either the crayfish or the small-bodied fish valued ecosystem component species, such as the redbelly dace, as it pertains to evaluating the significance of adverse effects on these VEC in the aquatic habitats in the study area?

In other words, how much do we know. And in your review of the OPG response, however much we know, was that reflected in the response in terms of citations?

DR. CRAWFORD: I can't speak with

a great deal of familiarity with the assessment of the crayfish in particular or even really in terms of the surface water. Because my area of focus is on the nearshore and offshore aquatic environment around Lake Huron.

So I could guess based on my kind of general scan of those sections, but that is not really me.

THE CHAIRPERSON: Is Dr. Rooney available now? I know we were trying to get a hold of him.

MR. MONEM: I do not believe he is. But I can contact him at the break and see if he can either return with an answer or maybe try to crib down his answer for you.

THE CHAIRPERSON: Thank you very much, we would appreciate that. So after lunch today, that would be great if you can.

The next question arising from the discussion around significance of adverse effects is directed to OPG.

Why was there no revision of the narrative for significance of adverse effects to aboriginal interests given the information provided by the Saugeen Ojibway Nations during

last year's hearing and documented in the transcript?

MR. HEIL: Joe Heil, for the record.

I think it is probably best to explain this sort of from maybe what I would say is a practical engagement with respect to the topic of issue, which was really the burial site, and maybe giving a brief overview of the history of Ontario Hydro's engagement/OPG's engagement of the burial site.

THE CHAIRPERSON: Mr. Heil, we are very clear on the burial site.

MR. HEIL: Right.

THE CHAIRPERSON: The question was why weren't other aboriginal interests included once we had that information readily available to us via the transcripts from last fall?

In other words the SON, both last fall and reiterated here today just a couple of examples of SON's understanding of what their interests are.

And the Panel's understanding is that that extended well beyond the burial site.

So we are asking why you didn't go beyond the burial site when you revisited your narrative for the aboriginal interests?

--- Pause

Just as OPG is conferring, I think, CNSC, you have already anticipated the same question will be asked of you with respect to your sufficiency review.

OPG?

MS SWAMI: Laurie Swami, for the record.

So when we received the information request we interpreted this to be a re-evaluation of the significance of each of the residual adverse effects, as already described in our environmental impact statement.

And so that is the narrow focus that we took to our significance determination that was presented in our response to EIS 12-510.

THE CHAIRPERSON: CNSC, again, the question to you from the Panel is why did your sufficiency review not extend to a broader understanding of aboriginal interests as reflected in the transcripts from last fall?

DR. THOMPSON: Patsy Thompson,

for the record.

We considered the information that was brought forward by the SON in their submissions leading to the hearings last year as well as the discussions during the hearings that related to stigma, essentially tourism and commercial fishery.

In addition to, we didn't really pay specific attention to the burial site because it has been a topic of discussion and there has been arrangements with the SON for quite some time.

We also, in a recent meeting with the SON on August 26, discussed their statements in their current submission that aboriginal interests were not considered appropriately in the assessment.

At that time we requested specific examples. And the SON response that it was important to continue to work on this, and when they had information they would provide it to us.

But essentially, looking at the stigma, tourism and commercial fishery issues that were discussed extensively last fall, and

there was a specific day where our fish expert was present as well, and the two undertakings that were submitted to the Panel, our assessment is that when the proposed project of the DGR with the stormwater management and discharges to MacPherson Bay is that we would not see the types of impacts that could adversely affect populations or communities of aquatic species.

And so our assessment, stemming from the review of the different aspects of the EA, was that we did not identify impacts on aboriginal interests.

THE CHAIRPERSON: Follow-up then to the SON.

Given what we have just heard from Dr. Thompson which, correct me if I am wrong, I think what the Panel heard you say, Dr. Thompson, was the statement from the SON was that the subject of aboriginal interests should be continued, it is a subject that has to be worked on.

Can the SON please help us understand what that means in the context of this process?

MR. KAHGEE: Randall Kahgee, for

the record.

Thank you for the question, Madam Chair. I know we talked at length last year on some of these very issues, and I don't intend to repeat those. But I think to answer your question it is important to have a little bit of context.

As you heard from us last year in the proceedings, both in our oral interventions as well as in our submissions, there is a long long history of exclusion and our people being left on the outside looking in with these particular types of developments, and that weighs heavily on our people.

The first priority for SON leadership in the communities, based on what we had heard over the years from our people, was to empower that voice. Not only to be heard, but to be respected.

And that for a lot of these things the power of those things, the importance of those things, comes from the people themselves. They are the rightholders. I could articulate what I think may be the particular rights and interests, but that may not be

particularly helpful.

So the first priority for SON was to empower that voice. We were able to achieve that through the commitment we have attained through OPG, that this particular project would not move forward without SON support.

The first priority for us now is to develop that integral process within the community. And in many ways the community will be the owners of that process and drive that process, understanding that there are two aspects of this discussion; one is the DGR itself, and the other is that long legacy, those legacy of issues that we have talked to some extent in these proceedings, and also what OPG is committed to resolve. That is going to be a very lengthy process.

Determining the scope of those rights and those interests, understanding the cautions I gave last year, that this is just not a snapshot or a checkbox of whether or not our people can hunt, trap or fish. It is much broader than that.

We spoke to the spiritual connection, the cultural importance of that

relationship, and that understanding in our treaties that our relationship with the territory would be allowed to evolve over the course of time. And the natural expression of that relationship would play out as our people understood it.

In essence, as I said last year, we are not museum pieces.

So understanding what those rights and, more importantly, the expression, that relationship, the lands and the waters, what that will be and what it needs to be now and into the future requires that direction, that understanding from our people.

So over the course of the last several months we had been working hard to figure out how we can do that work. And we have come up with a structure that will be community-drive.

And one of the critical components to that process will be the establishment of an Anishinaabe working group, which the primary responsibility will be to do that type of work. And really will be the foundation on which all of this work now and into the future will be built on.

And it will draw on our elders, it will draw on our youth, it will draw on our scholars. We have some very intelligent people. And we are reminded that in processes like this and in this conversation there is also Anishinaabe law. And we talked about that last year, Anishinaabe Chi-Naaknigewin, our way, and that has its place in this process.

So we are hopeful that through that community process we will be better to articulate these things. And I believe I gave that caution last year, it's not for me to clearly articulate all of those things.

And I'm reminded of what the Elders said last year, the first concept is permission.

THE CHAIRPERSON: Thank you.

As a follow-up to that, would the SON confirm the Panel's understanding that your closing comments will address the topic of inclusion of the OPG/SON commitments and things like we have just heard from Mr. Kahgee vis-à-vis licensing and approvals, and perhaps even more broadly, your ongoing relationship?

Are we clear in that

understanding?

MR. MONEM: Alex Monem.

Yes, Madam Chair, you are.

THE CHAIRPERSON: Thank you.

I would like to return back to aquatic biology again for a minute.

Dr. Crawford, you had discussed earlier why you felt a broader understanding of the ecosystem in the area of the McPherson Bay, Baie du Doré, Douglas Point in particular, was very important in order to set the appropriate basis for understanding significance of adverse effects.

In your experience, have aquatic biologists ever achieved sufficient understanding to be particularly confident in that at this spatial scale and temporal scale?

DR. CRAWFORD: That's a great question.

--- Laughter / Rires

DR. CRAWFORD: The simple answer is yes, we are better than this file reflects. We have years and years and years of outstanding technical and conceptual people that have contributed to ecosystem level assessments.

I mean you go back to the 40s, there was a guy named Bill Ricker, he's a giant in fishery science, he was over at the Mad River on the Nottawasaga Valley. He was doing ecosystem science before there was even a name for it, but he was asking and answering the right kinds of questions.

I think perhaps in this specific case you don't have to go any further than the ruins of the University of Toronto Institute up at Baie du Doré. I mean that dock was built by a visionary in Fred Fry.

You had people who understood the need back in the 70s to do very good work to provide, in this case the Province of Ontario, with good decisions about the engineering and the physics and the water chemistry and biology. But I think what happened was somewhere along the way the practices, best practices maybe gave way a little bit to, I wouldn't say so much the politics, just the money in the -- it's hard work and the lake doesn't let you go out all the time, right.

And I think perhaps most importantly is, we have very good conceptual

tools to support the interface between science, management and knowledge systems -- knowledge systems plural. We have what I would consider to be some classic thinking in terms of adaptive management in the original sense, things by Holling and Walters.

We know how to make good management decisions in the face of uncertainty and we know, more importantly, how to reduce uncertainty through management. There is always going to be uncertainty, this idea has been around for 34 years in that kind of formulation. In its modern context we call it --something in our discipline called structured decision-making, and basically what that says to us is it's all about transparency and accountability.

And not everybody is going to agree with your decision-making, but everybody should agree with you in terms of the evaluation of, do we know enough and/or do we know enough to make the decision now.

There are very reasonable guidelines that already exist and I think perhaps SON's position, at least with the technical people who are advising the political and our

discussions with the traditional people that are as indicated, that is going to explode on us. I would argue that the local knowledge system is equally important in that regard, as I stated.

So structured decision-making dealing responsibly with uncertainty and doing good science like we know we can.

To answer your very specific question, yes, there are examples where people have invested in appropriate ecological baseline assessments and we do understand something about structure and function of ecosystems and we can understand to a level where I think OPG and CNSC and First Nations can make reasonable good decisions.

THE CHAIRPERSON: Thank you.

We are going to switch to the topic of the WIPP incidents and there was a question to CNSC arising out of the SON'S submission and presentation.

To the CNSC, which key aspects of safety culture are in fact required by regulation, if any?

DR. THOMPSON: Patsy Thompson, for the record.

We mentioned I guess last week or earlier -- last week I think, that there is a CSA standard on management systems that identifies safety culture requirements and we are conducting our assessments on the basis of a regulatory document that is currently being developed.

That regulatory document is based on research and assessments of licensees of safety culture that have been done at the CNSC since probably around '94-'95 and more recently with the requirement for self-assessments for licensees.

There is also a lot of international work that is going on in these aspects, particularly following the Fukushima incident, and the CNSC has been at the forefront of a lot of that work.

THE CHAIRPERSON: Dr. Thompson, can you remind me -- I'm sorry...?

DR. THOMPSON: In terms of the specific aspects, I would need to go back to our notes and if needed, Dr. Harrison is watching the webcast and we could talk to her at lunch and perhaps ask her to be here after lunch.

THE CHAIRPERSON: Let me think

about that for a minute.

DR. THOMPSON: But I interrupted you, sorry.

THE CHAIRPERSON: But a couple of clarifications, if you will, before we proceed.

Can you remind the Panel, I know you have told us this, but for ease of access in this transcript, can you remind the Panel the CSA standard number you are referring to?

DR. THOMPSON: CSA N286.

THE CHAIRPERSON: N286?

DR. THOMPSON: "N" for "nuclear", yes.

THE CHAIRPERSON: Thank you.

And you alluded to the fact that CNSC are developing your own regulations. When might we expect those?

DR. THOMPSON: Patsy Thompson, for the record.

So it's a regulatory guidance document to set how the requirement in the CSA N286 standard should be implemented in the compliance verification criteria that the CNSC would use and I can provide you with the proposed schedule after lunch. It's in our regulatory

framework plan, but I can't remember.

THE CHAIRPERSON: Thank you.

So yes, I think after lunch if we had access to your specialist, and I think the specific request to her is to clearly list what you anticipate would be some of the key aspects of safety culture that would appear in your upcoming guidance document.

Thank you.

So over to OPG. Given the strong emphasis on the safety culture issues around the WIPP incidents, and the SON's submission this morning which pointed out that safety culture in this case is going to have to last for a long time, how does OPG build in processes or mechanisms to ensure the maintenance and enhancement of its safety culture over extended periods of time, up to many decades?

Please provide specific examples.

--- Pause

MS SWAMI: Laurie Swami, for the record.

Safety culture is a paramount consideration for OPG. We have an overriding priority on nuclear safety and that's part of our

culture and that goes from the top of our organization right down to every worker with a high regard for nuclear safety.

In order to emphasize that, that is embedded in our governance structure, it is embedded in our nuclear safety policy, which is at the Board level in terms of approval, and reflects the need for all employees, whether management, leadership or workers, to adhere to that policy. So that's one aspect of it.

The second aspect of it is taking the policy considerations, including the traits of a healthy safety culture, nuclear safety culture, we embed that into our various programs, but in particular we have a human performance program for all of our nuclear operations which includes a consideration of a number of those factors documented on how we would implement those within our facilities. So there is the documentation side of it.

On the enforcement or reinforcement side of it, we discuss nuclear safety routinely and regularly to re-emphasize what the traits are, events where good practices are demonstrated or where we need to learn.

If you recall, Ms Morton on the beginning of this session, this series of hearing days, described how we're using the WIPP event as a learning in our nuclear safety program for our waste management staff to review what that looks like and what it means to us in order to ensure that it doesn't happen. So those are embedded practices that we have within OPG.

I think a fundamental and important part of nuclear safety culture is ensuring that all employees have the right to raise issues without fear of retribution. We have heard a lot of discussion over the last number of days about this particular concern and it is something that we always look to ensure that we reinforce the expectation that employees can raise concerns, we take them seriously, we review them and we act on those concerns that are raised; very, very critical to ensuring that the safety culture continues and permeates throughout the organization.

So we reinforce those behaviours regularly. We anticipate that is going to continue.

We have been in existence for

many, many years as Ontario Hydro and then Ontario Power Generation. We have facilities all over Ontario where we are very proud of the safety record, whether nuclear or at our other facilities; it is critical to us, it is part of our very core, if you will, and reinforced on a regular basis.

In OPG's opinion, it would be hard to continue to exist as an entity without a good and a clear safety culture in our business.

THE CHAIRPERSON: Thank you, Ms Swami.

As a follow-up, the Panel would like to know which health and safety certifications does OPG currently possess?

--- Pause

THE CHAIRPERSON: If it helps, by this the Panel means -- the Panel is familiar in various industries with different health and safety certification bodies and in many cases those certifications are sought by industry as an explicit demonstration of your compliance with industry standards, either within your specific industry, in this case nuclear, or across industries. So that's what I'm referring to.

MS SWAMI: Laurie Swami, for the record.

I'm going to have to get the specifics, however, we participate in the Canadian Electrical Association from a health and safety perspective and we would go through the certification programs with respect to the results of our programs.

We are ISO 14001 for the environmental management system programs and we participate in the World Association of Nuclear Operators.

I'm not sure I have described this before, but that is a body that looks at all of the nuclear operators, it is across the world, formed from the Institute of Nuclear Power Operators in the U.S. We belong to the Atlanta Center of that organization and are very affiliated with INPO.

And as part of that program, that's where the traits of a healthy nuclear safety culture come from which we have adopted prior to them being part of the WANO organization.

We participate on peer reviews

and we are peer-reviewed and this is professionals from other utilities and those that are structured within the WANO organization come and evaluate us on a number of components, including nuclear safety, including engineering, there is a broad review.

It is a very detailed review and OPG is proud of the results that we have been receiving from our WANO reviews. Those reviews have demonstrated that OPG has maintained very good performance at our facilities.

So we have had the best recognition at Darlington for two consecutive reviews and Pickering has had the best ever result that we have achieved at Pickering in the last review. So we are very proud of those results.

So that gives us very high standards that we have to maintain because they take the best standards in the U.S. in particular, but worldwide, and they measure us against those standards. They don't measure us against the regulatory requirements, which are different than best standards.

So that is the measurement tool

that they use during their peer reviews and, as I say, we are very proud of the results that we have achieved at our facilities.

I now have the -- I don't have. I thought I had the CEAA result, I'm sorry, I have to get that at the break, of what our classification is within that organization.

THE CHAIRPERSON: Thank you.

This is to CNSC. Again, Mr. Monem made the point this morning in his presentation that it isn't particularly clear, at least to the Saugeen Ojibway Nations, what triggers what regulatory process and under what circumstances.

Would you please help the Panel understand where that information may be readily available? Does that appear on your website?

And notwithstanding where it appears, can you please provide the Panel briefly a description of what triggers (1) a full environmental assessment with public hearings, such as the one we are having now; (2) Canadian Nuclear Safety Commission review and potentially a Commission hearing; and (3) licence amendments which may also, we understand, of course involve

the Commission.

There seems to be some fuzziness with respect to the understanding of what triggers what.

--- Pause

DR. THOMPSON: Patsy Thompson, for the record.

I will talk generally in terms of what constitutes the licence and the licensed activities and what would then be the regulatory process for changes to that framework essentially.

The licences issued by the CNSC make reference to the activities that are identified in the licensee's or a proponent's application. In this case, the licence to prepare the site for example and construct would specify activities that are within the licensed -- there are licence conditions to control those activities and there is a licence condition handbook that would specify the compliance expectations of the CNSC and what our inspectors and our assessments are done against.

That documentation essentially, including the risk assessments that are

performed, the safety assessments that are performed constitute what is referred to as the licensing basis.

There is a document on our website that describes the licensing basis, I can't for the life of me remember what that document is, but we can come back and provide a reference, but it is on our website and it is documented and that is the basis for the licence, the framework of the licence.

The expectation through our reviews is that if, through our compliance and assessment activities and the licensee's own review and oversight, that the activities are going beyond or would go outside of the licensing basis, that there is a requirement to go back to the Commission, that there is no approval within an existing licence to go outside the licensing basis.

So that is the box that the licensees expect to function within.

If the activities would bring, or if there is, for example, an environmental performance that is worse than what we had anticipated and assessed, that would bring the

facility outside of the licensing basis and would require careful consideration by staff and by the Commission and a Commission decision on whether that is acceptable or not. It's not something that is done by staff.

So if we go back to the DGR project, the DGR project -- and assume there has been the movement from site preparation, construction to operation, the project that has been assessed and reviewed is for the emplacement of 200,000 cubic metres of waste and the facility is described as two panels and, you know, all the description that we have and there is a safety case that accompanies that for the different phases.

So there is a safety assessment that is done for site preparation, construction. The expectation is the licensee will stay within that licensing basis. If we were to move to operation and the next stages, the expectation is that the activities would be conducted within that licensing basis.

We have talked about the long-term safety case that would constitute at one point the box, the licensing basis for.

So any desire by OPG to go outside of that licensing basis, that includes the volume of waste, the number of panels that are planned, would be outside of the licensing basis and would require regulatory action. That type of change would be significant enough that we would need to have a licence application and it would trigger a regulatory process with full public involvement.

I have just been told that the document that describes the licensing basis is Info 0795 and is on our CNSC. It's a document dated January, 2010.

THE CHAIRPERSON: Dr. Thompson, I think the key concern the Panel has heard is in the case of an application for a decommissioning, and you referred to, then you would go back into a formal regulatory process.

I think the question in most people's minds is, what does that look like, because I think what I heard -- Mr. Monem, correct me if I'm wrong -- is a concern that it still may be a CNSC process per se rather than, for example, a joint process like we are experiencing right now.

I understand that the CNSC may not be able to completely comment on this, but Mr. Monem, am I reflecting your questions accurately?

MR. MONEM: Alex Monem, for the record.

Madam Chair, you have accurately characterized one part of my concern, which is what does a CNSC regulatory process look like.

However, within the licensing basis it would also be helpful to understand which threshold -- if there are ranges in which changes can be made that would be within the licensing basis and those that are outside.

For instance, we know that it's two panels and 200,000 cubic metres of volume, but if there is a change for instance in the relative ratios of wastes, does that trigger anything and what does it trigger?

Also, I recall, unfortunately from memory last year there was a discussion about certain trigger limits for expansion that would get us into an environmental assessment and those that would not. So there are a range of these kinds of issues that it would be helpful to

have clarity on.

THE CHAIRPERSON: Thank you,
Mr. Monem.

--- Pause

DR. THOMPSON: Patsy Thompson,
for the record.

I will provide a bit more, and my assumption is when you referred to decommissioning of the facility, it's not decommissioning of the repository, but decommissioning waste going into the facility?

THE CHAIRPERSON: Yes. We are talking about the potential expansion with decommissioning waste.

DR. THOMPSON: Thank you, that's what I thought.

So I will ask Ms Kiza Francis to speak to the potential EA process as it is now in the *Canadian Environmental Assessment Act*.

But before I do that, with the licence application, the licensing documents and the safety case are based on the waste acceptance criteria, the assessment of the inventory of radionuclides, the volumes of -- so the volumes of waste, the inventory of radionuclides and the

waste acceptance criteria.

I'm not going to talk about the geological aspects of the safety case, but that information feeds into all the safety assessments that have been done, including the amount of radionuclides that are available that would be potentially put into solution and available to go to the biosphere.

That constitutes the licensing basis and so any change in the ratio, the mix of low and intermediate level waste would have an impact on the amount of radionuclides, their physical/chemical characteristics or new radionuclides that through a safety assessment would change the margin of safety and the safety case would be a change to the licensing basis and would require a process by the Commission.

THE CHAIRPERSON: Let me pause there for a minute, Dr. Thompson, because this is something that came up last fall and the Panel needs to be crystal clear on this.

So what we understand you are now saying is, it is not just that the ratio may change, but that if that changed ratio of low to intermediate level waste changes the safety

margin and safety case, so those two conditions are required; is that correct?

DR. THOMPSON: Patsy Thompson, for the record.

That's my understanding, yes.

So it would be outside the licensing basis, so outside the bounds of safety.

Ms Francis will speak to -- I don't think that adds a clarity, so let's keep to the licensing basis or safety case I think are the terms we have used over the last year or so.

Ms Francis will explain the EA process for expansion as it exists now under the *Canadian Environmental Assessment Act 2012*.

MS FRANCIS: Thank you. Kiza Francis, for the record.

So under the *Canadian Environmental Assessment Act 2012*, when you say "a full EA", what we look at is why they are not -- the proposed project is on the designated project list and so right now, as it is today, it does say that:

"...an expansion of existing facility for the long-term management or disposal of the

radiated fuel or nuclear waste that would result in an increase in the area at ground level of the facility at 50 percent or more." (As read)

So what is important to note, though, is that, one, CNSC is delegated as a responsible authority for all nuclear projects, so CNSC would be the one to complete -- to do the decisions on the EA, the Commission itself, but if a project is not on the designated project list CNSC still completes a full assessment on the protection of the environment as it is under our mandate. In fact, we have recently put out a regulatory document for public review and it is going through the final stages called REGDOC 2.9.1 and we talk about the EA under the NSCA or the *Nuclear Safety and Control Act*.

So we are still -- for all decisions that the Commission makes, they are still looking at the protection of the environment and that would be through the licensing process. So when it goes to a Commission hearing there would be the review of

the environment through that at a public Commission hearing, you know, depending on the size of the project.

THE CHAIRPERSON: Ms Francis, again to make sure we are really clear about this, that's interesting that the trigger is for surface expansion and not subsurface.

So the Panel understands that, in fact, because what we have heard from the OPG is the surface facilities are not really expanding to pass that trigger it would not qualify under CEAA 2012 and it would be back to the CNSC's own process which, as you pointed out, still includes environmental assessment but it wouldn't be a CEAA process, it would be a CNSC process; is that correct?

MS FRANCIS: Kiza Francis, for the record.

That is correct, keeping in mind that even under the CEAA process, moving forward, CNSC has been delegated the full authority to be the responsible authority.

THE CHAIRPERSON: Got it, thank you.

Now I'm going to switch gears, we

will let the brains kind of grind into a different gear for a minute. We are going to get back now to the alternative means relative risk analysis and the first question is to the SON.

Do you accept the role of expert professional judgment in a relative risk analysis and, if so, how would you suggest the deliberations in a workshop setting such as the IEG used be documented such that you would be more comfortable with the use of expert professional judgment?

MR. MONEM: Alex Monem, for the record.

Perhaps I can ask if either Messrs Dan Mussatti or John Greeves are on the line?

MR. MUSSATTI: This is Dan Mussatti.

THE CHAIRPERSON: Thank you, Mr. Mussatti. Did you hear the question?

MR. MUSSATTI: Could you repeat it, please, so I make sure I have it down correctly?

THE CHAIRPERSON: Yes. Do you accept the role of expert professional judgment

in relative risk analysis (a); and if so, how would you suggest the deliberations in a workshop-like setting as was used by the independent expert group be documented such that you would be more satisfied with the role of the expert professional judgment in this particular case?

MR. MUSSATTI: I do believe that there is an expert opinion that can be related to the risk assessment process and that if we were to have a public meeting where folks were allowed to provide input into it, the documentation of that needs to be much more accurate and much more comprehensive than what has been done in the past such that when the reports have been -- or the responses have been written down they can be assessed, not just from the aspect of looking at the keywords such as what were done in the word search here where you are looking for specific technical words, but also looking at the context of what was said.

A lot of times you can elicit a lot richer information about what people are concerned about, are interested in by how they say things, not exactly just what they say.

THE CHAIRPERSON: Thank you.

MR. MUSSATTI: Does that answer your question?

THE CHAIRPERSON: Partially.

Well, Mr. Musatti, in your experience -- well, have you seen adequately documented workshop-like proceedings involving expert judgment and what are the salient features of adequate documentation?

MR. MUSSATTI: I have been involved in numerous public processes involving the general community surrounding a nuclear site, asking their opinion and what their concerns are. We use a café process which I'm familiar with, which is basically to break the group into a series of smaller groups, each one addressing a similar problem, and then in sort of like moving from station to station people have an opportunity to sit down and to voice their concerns on a handful of different issues, and as people move around the room you find that generally what happens is that people begin to become more comfortable with voicing their opinions in public and that they actually start providing a lot more eloquent answer as to what

it is that's bothering them or what it is that they are concerned with than, you know, if you just ask them cold to answer a question in front of the room. It becomes more of a collegial atmosphere in what has been going on.

And there is one person that constantly stays at the same table and they are charged with taking very extensive notes as to what people are saying and then confirming the notes with the person that is actually providing the comments to make sure that they have it correct and then reporting back to the group at the end.

It's a very rich process, you get a great deal of information out of it and everyone feels that they have been a part of the process, that they haven't been excluded and that their opinions have been heard.

I would employ some process like that, even in a situation like what's going on up here in the Bruce Peninsula.

THE CHAIRPERSON: So, Mr. Mussatti, what the Panel understands you just described was actually well beyond an expert workshop to involve members of the community.

Our question was, if it were just a group of experts, which it was in this case, which is what the Panel asked for, we asked for a group of experts to meet and develop a relative risk analysis using the four alternatives; what the Panel understands is that the criticism is that the reasoning behind the expert judgment reflected in the IEG's report was not adequately documented.

So our question is, so what would be an adequate documentation of the experts' deliberations?

MR. MUSSATTI: Please excuse me for having misunderstood the intent of the question at first.

I believe that the Panel provided sufficient guidance for the original -- in their original request to get the information that you are trying to elicit.

There is a rich source of documentation out there beyond just what was done for the DGR that could have been accessed, and instead of just a cursory search of it, as I had indicated before, reading it for the context and the sub-text messages to be able to understand

what people were concerned about, I think expanding it to various other nuclear projects in Canada would have been a very rich source for being able to come up with an estimation of the public perceptions in the area where the DGR is proposed.

There is -- Saskatchewan I believe it is, where there was a similar project that was proposed, very similar characteristics to what we have here, except I think it was just a -- it was a nuclear site, I don't remember off the top of my head if it was a nuclear waste disposal site or what, but the public was heavily involved in that and there is a great record on that and there are a handful of others that were recommended by the Panel that should have been accessed as well. Documenting what --

THE CHAIRPERSON: Mr. Mussatti, I think we are still not quite on the same wavelength.

MR. MUSSATTI: Pardon?

THE CHAIRPERSON: I understand that you are expressing an opinion that a wider review of the available literature and experience should have formed part of the basis of the IEG,

but what the Panel would be interested in is, we understood, at least from the written submission from the Saugeen Ojibway Nations, that issue was taken with the extent to which the internal deliberations of the experts themselves as they evaluated each of the pathways of harm and placed the four alternatives in relative risk space on their relative risk diagrams, that process was not adequately documented.

So the Panel would appreciate, if at all possible, an example of where such documentation would be judged to be adequate.

Mr. Monem, perhaps I can turn to you for some assistance here as well.

MR. MONEM: Alex Monem, for the record.

Thank you, Madam Chair. Mr. John Greeves, who also participated in the review of this, again, has left the building and I wonder if I can ask that question of Mr. Greeves as well, if he has some insight into this.

I could give you my opinions, but I don't think they would be very helpful.

THE CHAIRPERSON: Thank you. That would be very much appreciated.

So we are still in the analysis of alternative means, and this is again directed to the SON.

We had a discussion earlier this morning regarding whether or not a Western Waste Management Facility-like facility would actually -- could also be located right at a granite DGR location. So let's imagine that it would.

In the opinion of the SON and your experts, would that have had a substantial effect on the evaluation of the pathways of harm and the relative risk of the DGR relative to the other alternatives?

MR. MONEM: Alex Monem, for the record.

Insofar as there are any risks associated with the transportation of wastes, locating a processing facility at a remote DGR outside of the territory would certainly reduce the risks, those transportation risks within SON territory. It may not reduce the overall transportation risks, but it would reduce the risks to the territory.

THE CHAIRPERSON: Thank you.

That was helpful.

So the Panel will now return to a recurring theme and question with respect to the alternative means analysis, which is the placement of a granite DGR away from a large body of water such as a Great Lake.

We got a pretty clear response from the IEG themselves in terms of why they chose to evaluate it as being close to a large lake, but the Panel is wondering if the SON has had a chance to think that through with your experts and have any further evaluations available for the Panel's consideration?

MR. MONEM: Alex Monem.

To clarify, is the question whether we have had a chance to regroup on the testimony of the expert group with respect to their decision?

THE CHAIRPERSON: It would be the same question as I just asked you actually, so I will rephrase it.

Would the location of a granite DGR away from a large lake, in the opinion of the SON or your experts, have had a substantial effect on the evaluation of the relative risk of

the four alternatives?

MR. MONEM: Alex Monem, for the record.

If I can give you a preliminary response and then circle back with the experts.

Again, insofar as there are risks from the DGR, removing that away from a large body of water would reduce those risks. However, it would have a relatively, let's say, dramatic impact on the relative perception of risks among the four options as I believe is demonstrated by the record here.

THE CHAIRPERSON: Thank you, Mr. Monem.

Now, I'm switching topics again and this is to CNSC.

Mr. Monem returned to his theme from last fall in his oral submission and it is also in the written submission with respect to segregation of long-lived intermediate level waste from the waste stream for a low and intermediate level waste repository.

Is the CNSC considering any initiatives to consider this idea in the Canadian context?

DR. THOMPSON: Patsy Thompson,
for the record.

The answer is no. Essentially it's not the purview of the CNSC to make those policy decisions. My understanding is that the policy in Canada is that the federal government is responsible for used fuel and that is under the NWMO APM project and that licensees are responsible for a low and intermediate level waste.

Our requirements is that best practices be used to minimize the amount of waste that is generated.

My understanding as well, we checked because of the statement that was made by Mr. Monem before the break, that OPG is already considering segregation to put certain intermediate level waste in the NWMO's used fuel repository.

Our understanding is that this is not waste segregation but it is a statement that was made by OPG I believe last year that in relation to cobalt fuel rods where it is a fuel rod, it is heat generating and is within the category of high-level waste that can go into the

NWMO DGR if it is ever built.

THE CHAIRPERSON: Thank you,
Dr. Thompson.

Panel Members, did we have any
further questions?

MEMBER MUECKE: Perhaps one to
CNSC. This is I think an extension of the
previous question by Dr. Swanson.

What trigger points would
initiate a re-examination of the safety case and
will CNSC set these trigger points, and what
would be the public input into the decision as
what are considered trigger points in terms of
re-examination of the safety case?

DR. THOMPSON: Patsy Thompson,
for the record.

We had some discussion with the
SON on August 26 when we met where they indicated
that it would be useful if there was more
information in our presentation on the
geo-scientific verification plan speaking to
those issues, and so we have included some
discussion in our presentation for tomorrow.

There was also a discussion
earlier this morning in terms of the potential

public input and public consultation on the GVP, and so what we had indicated last fall -- and I think it's still something that can be considered -- is having workshops to essentially lay out the safety case in a way that members of the public can see what the different lines of safety are, how the GVP addresses some of those lines and then have a discussion on triggers on developing essentially the GVP.

And so we've had, you know, those types of workshops for follow-up programs, for example, for certain elements and so it's something that can be considered. But at least for tomorrow we can sort of provide high level thinking in terms of how the technical details of the GDP would be developed and potential triggers.

MEMBER MUECKE: Thank you, Dr. Thompson.

THE CHAIRPERSON: Dr. Thompson, I just have a supplementary to that and this is over and above the GVP for tomorrow.

As we have already discussed last fall and during the resumption of the hearings, for two of the disruptive scenarios the safety

case yields doses to the general public that are somewhat in exceedance and sometimes somewhat rather remarkably in exceedance of the 1 milliSievert per year. And it meets the risk criterion when you apply the likelihood. That distinction isn't necessarily particularly transparent to most members of the general public and, in fact, it took the Panel a bit of time to think through that one.

So our question to you is: To what extent would you have to be -- to what extent would the likelihood come into the evaluation of a safety case no longer meeting the CNSC's requirement for the safety case?

In other words, as you know, the likelihood for those two scenarios is a matter of some uncertainty and debate among professional judgment experts. So the Panel would appreciate how close do you have to be to the line with respect to 10 to the -5 to trigger a reevaluation of the safety case?

DR. THOMPSON: If we could, Dr. Swanson, perhaps come back or link this to our presentation tomorrow? It's not something that I can sort of think out loud on.

THE CHAIRPERSON: That would be perfectly fine. Thank you.

Any more questions, Panel Members?

Okay, thank you very much. So we'll be shifting now to the next presentation which will be by the Historic Saugeen Métis. So I'll allow a little bit of time for the shifting of chairs.

--- Pause

THE CHAIRPERSON: Ms McArthur, are you ready to proceed?

MS McARTHUR: Yes, I am.

THE CHAIRPERSON: Thank you.

**PRESENTATION BY /PRÉSENTATION PAR
HISTORIC SAUGEEN MÉTIS**

MS McARTHUR: Ms Swanson and Members of the Board.

President Archie Indoe sends his regrets for being unable to come today.

My name is Patsy McArthur and I'm the Secretary-Treasurer of the Historic Saugeen Métis. Our local Métis community asserts

credible section 35 rights in the Métis Saugeen traditional territory and appreciates this opportunity to respond to Information Request 12-510 with respect to the direction provided by the Joint Review Panel.

Here on behalf of HSM, our senior Ecologist, Dr. Gordon Wichert, SLR Consulting (Canada) Ltd. and HSM Coordinator of Lands, Resources and Consultation, Mr. George Govier. Mr. Govier's previous experience with the environmental assessment process includes 13 years as Executive Director of the Northwest Territory, Mackenzie Valley, Sahtu Land and Water Board.

Now, I will turn it over to Dr. Wichert.

DR. WICHERT: Gordon Wichert, for the record.

We appreciate the opportunity for Saugeen Métis to present our review of OPG's response to Information Request 12-510.

A colleague and I prepared the review and this presentation's comments in consultation with the Historic Saugeen Métis.

We will address four subject

matters from the information response. These include the terrestrial environment, hydrology, water quality and the aquatic environment.

The presentation will include or comprise two parts. The first part will be the basis of our review and then the second part will be the summary of our findings.

So the basis of our review: This is found in the main direction that's given in the information request from the Joint Panel to Ontario Power Generation. And to us it seemed to focus on two issues. One was to provide a narrative of how residual effects on the environment were determined and the second was to provide and characterize implications of the effects determination.

We focused on three points in our evaluation of the narrative review. The first one the point -- the focus was to provide a narrative to avoid arbitrary categories for classification of effects. Here, we were examining the use of contact-sensitive information. In other words, the information presented, could it be understood in relative terms and terms of magnitude, extent, duration,

frequency or irreversibility of effects, et cetera.

And then the second point under this main point was: Are these findings consistent with what would be found in the literature? So are the inclusions supported in the literature?

The second point refers to precision and accuracy. Here, we were looking at a characterization of pre and post impacts --effects. We were looking for an account of measurement error and also looking -- addressing the question: Are changes detectable using standard monitoring methods?

The third focus of our review is with respect to the level of confidence with respect to the precautionary principle. And so here we were looking for potential examples of the use of a planning hierarchy such as efforts to avoid, mitigate and offset effects and then monitoring and adaptive management, characterization of predictions, the consequences if the anticipated effects are wrong and how would contingencies be managed?

Just to summarize the basis of

our review, we feel that the intent of the direction was to increase the defensibility or repeatability of the evaluation process and, for example, to allow the following question to be answered: Given the same information would an independent investigator arrive at similar conclusions?

Now, part two of our presentation is a summary of the findings from the Historic Saugeen Métis review of the OPG response to the information request.

So regarding the terrestrial environment, OPG has justified the independent loss of the eastern white cedar forest on the basis that it is not large enough to compromise the sustainability of the local population, that the attributes are not unique nor are other species dependent upon it and that connectivity will not be disrupted. What is of concern to the interests of the Historic Métis is the issue of cumulative effects to landscape connectivity and incremental habitat loss.

It would be in the interests of the Historic Saugeen Métis to ensure that fencing is installed to prevent accidental intrusions

into the forest to be conserved; to identify opportunities to retain tree cover or rehabilitate suitable habitat prior to or in conjunction with the proposed removals.

Recommended precautionary approaches to minimize the effects of the removal of forest cover include increasing the patch size of key woodlands and invasive plant species controlled to improve biodiversity that would enhance the Huron Fringe Deer yard. Historic Saugeen Métis is interested in participating in the design and implementation of habitat enhancements.

Regarding hydrology, OPG justified the alteration of flow because the anticipated change is within measurement error using standard techniques to estimate flow. In other words, the anticipated alteration would be low.

In support of a precautionary approach, OPG commits to follow-up monitoring to confirm predictions and to redesign drainage features if adverse effects are identified. Here again, the Historic Saugeen Métis is interested in receiving monitoring reports.

Regarding water quality, OPG identified no residual effects, adverse effects, to surface water quality. This determination of significance is based on two concepts. One is a standards-based approach based on guidelines and the other is more ecological and is habitat-protection related, so things such as toxicity testing.

Precautionary principle is supported through the design of the surface water management system that provides the opportunity to hold and test water prior to discharge. So this allows the implementation of tests to standards as well as toxicity testing for the protection of habitat. Here also, the Historic Saugeen Métis are interested in receiving monitoring reports.

Finally regarding the aquatic environment, rationale for the determination of significant adverse effects relate to the long term sustainability of species and populations and to habitat functions that support species of interest. Ontario Power Generation justified the removal of habitat based on its small amount, marginal quality and that available habitat is

found elsewhere in the study area.

In support of the precautionary principle, the OPG response to the information request states that:

"Rehabilitation of the DGR may include both active and passive naturalization of the project area to provide additional suitable habitat similar to that currently provided on the site." (As read)

The Historic Saugeen Métis are interested in sustainable aquatic habitat and maintaining connectivity among habitat components. Here also the Historic Saugeen Métis looks forward to participation in future habitat rehabilitation plans and receiving monitoring reports.

Our overall conclusions based on our review are as follows:

The Historic Saugeen Métis acknowledges that Ontario Power Hydro Generation's response to the information request provides reasoned arguments in the narrative to

explain the significance of the residual effects for the project components discussed above.

The Historic Saugeen Métis acknowledges that Ontario Power Generation's response improves the defensibility and repeatability of the findings.

And finally, Historic Saugeen Métis looks forward to ongoing communication with Ontario Power Generation on monitoring results and participation in discussions on habitat sustainability and rehabilitation.

THE CHAIRPERSON: Thank you.

Panel Members, did we have questions? Dr. Muecke...?

MEMBER MUECKE: Yeah, just one short one I guess to OPG and Historic Saugeen Métis.

Is there an active dialogue between OPG and the Historic Saugeen Métis concerning the issues that you have raised?

MS SWAMI: Laurie Swami, for the record.

I'll ask Mr. Berry to come forward and respond more directly, but we do have an ongoing dialogue with the Historic Saugeen

Métis. But he'll explain in more detail.

MR. BERRY: Scott Berry, for the record.

We do have -- in fact have a very active dialogue through the course of the past number of years. As we've gone through this project we've begun to understand from the Métis cultural perspective this project. There has been a number of issues brought forward and those are within the framework of our participation agreement that permits and allows for that ongoing dialogue to continue.

HSM has expressed a desire and interest to remain an active participant in this process as we go forward, particularly as you heard today with respect to future monitoring and follow up. And our participation agreement provides that kind of a framework for those conversations and for that dialogue to cooperatively continue into the future.

THE CHAIRPERSON: Ms McArthur...?

MR. GOVIER: To Madam Chair and the Panel Members, it was mentioned by OPG that there is a participation agreement between OPG and the Historic Saugeen Métis. It does provide

for regular meetings and it's part of the terms and conditions of that agreement.

The objectives of that agreement are discussed at these regular meetings and there is provision in the participation agreement that carries forward for monitoring and to be advised about the site preparation and construction should the project move to that level.

THE CHAIRPERSON: Thank you.

Dr. Archibald?

MEMBER ARCHIBALD: I note that in the presentation by the HSM that recommendations are given that you do definitely wish to participate in the design and implementation of enhancements, for example, of the deer yard, and that there is a notation that you wish to also receive regular monitoring reports.

In light of what I have just heard is there concrete -- a concrete wish by the HSM to actively participate in monitoring efforts of the project, not just to receive reports in a regular fashion through meetings, but does the HSM wish to follow through with active monitoring and are there procedures established in your meeting structure for setting up participation in

a formulated process such as this?

MR. GOVIER: For the record, George Govier speaking.

Yes, that has been discussed in some of the previous meetings with OPG and I believe it is well understood that the offer has been made for site visits.

Also, to answer your question specifically, our primary concern would be to receive the monitoring reports rather than to be involved in the fieldwork by which the monitoring reports could be constructed. But I anticipate there will be occasions when our people, our staff would be invited to attend onsite in the preparation of these monitoring reports.

MEMBER ARCHIBALD: Could I just finish that with a small follow up?

In order that your organization and all of the experts participate in the decision-making process, will there be any efforts made for training of your groups or your people?

MR. GOVIER: For the record, George Govier.

There is provision in our

participation agreement for training and, as a matter of interest to the Panel, there has been some training by our environmental monitor already established to date and we would be hopeful to see that carry on, particularly on this DGR project.

MEMBER ARCHIBALD: And just one last portion of that, would this be internal training or would this be provided through OPG?

MR. GOVIER: In the past, as part of our agreement, the training has been provided by external sources. It's also been provided to some extent through the meetings held with OPG and their staff; both.

MEMBER ARCHIBALD: Thank you.

THE CHAIRPERSON: I have a question following up on the theme of monitoring as well as rehabilitation which is the term the Historic Saugeen Métis have applied in their presentation.

To what extent has OPG considered and/or committed to rehabilitation prior to or during site preparation and construction such as habitat enhancements? And we heard from the HSM specific reference to the tree communities or

crayfish habitat.

--- Pause

MS SWAMI: Laurie Swami, for the record.

It was not part of the formal Environmental Impact Statement as described, but it's certainly something that OPG would consider going forward.

THE CHAIRPERSON: Thank you.

This question is for Dr. Wichert and it's related to some comments made by Dr. Crawford this morning on behalf of the Saugeen Ojibway Nations where Dr. Crawford provided us with some information regarding his opinion of the need for a broader understanding of the aquatic ecosystem around particularly MacPherson Bay, Baie du Doré and Douglas Point. The Panel would appreciate your comments and opinions regarding that vis-à-vis the defensibility of the narrative for the aquatic environment.

DR. WICHERT: Gordon Wichert, for the record.

Yes, I appreciated Dr. Crawford's narrative about the conditions along Lake Erie and so on -- or, sorry, Lake Huron.

I also followed in the footsteps of some of the giants that he mentioned and so Bill Ricker; Fred Fry. I'd also add Dr. Henry Regier to that list. As a matter of fact I did my grad studies in the same office that had been formerly occupied by Fred Fry, so possibly some of his ideas permeated my mind also.

Defining boundaries for studies of a scientific nature are notoriously difficult. It's probably where some of the most judgment is applied in the exercise. One of the things that helped me, and I learned this through Drs. Fry and Regier was the application of a stress response approach. And so this was what we applied to this project. And thinking of the specific potential stresses or effects of this project and then transferring them to the ecosystem context, we focused primarily on some of the local effects. These include things like project footprint and associated potential habitat losses as well as things such as groundwater-surface water interactions. And this is where a sensitive species like a crayfish comes to play.

They're highly sensitive to even

small fluctuations in surface water or groundwater levels, fluctuations of the water table.

This leads to the concept of uncertainty that Dr. Crawford also mentioned. And one of the ways we think this can be dealt with through the precautionary principle is through monitoring and then adaptive management as required.

OPG has committed to monitoring water table levels during the construction and parts of the operation of this project. If those results reveal potential effects that weren't anticipated to species such as the crayfish, we would anticipate that appropriate management would occur.

So it's the basis on that sort of thinking and approach that our opinion might differ somewhat from that of the other group.

THE CHAIRPERSON: Thank you, Dr. Wichert.

Following on on that, then, is the Panel correct in its understanding that in your analysis because you focus on this stress response that the stressors that may reach as far

as McPherson Bay, for example, and we have been discussing some particularly upset scenarios because of high rainfall events where you get a release from the stormwater management pond that may have elevated total suspended solids, is it your opinion that the nature and extent of that stress as it reaches McPherson Bay is still insufficient to change your judgment on the significance of a potential adverse effect in McPherson Bay?

DR. WICHERT: Gordon Wichert, for the record.

My first response is it's really difficult to plan for infrequent events. Having said that, stormwater management is not a new concept. And the other issue that I would raise is performance objectives, and so OPG has already stated performance objectives. And from the protection of the environment perspective, issues of water quality might come to mind.

And so there's provisions in the design to test and only release water when it meets appropriate standards.

In terms of an unexpected large event, stormwater management facilities can be

sized appropriately. In our experience, that usually happens in a detailed design process, not at this level.

Should an event occur, I'm trying to imagine one that that would extend beyond, say, the effects of a very large storm or something like that.

Here again, I -- if such an event would occur, I would anticipate that there would be monitoring and a follow-up management and if mitigation and offset is required, that that would be in place as part of the commitments.

THE CHAIRPERSON: Thank you, Dr. Wichert.

And further to that, you heard Dr. Crawford mention the very strong currents, south to north or occasionally north to south, depending on. And we heard a fair bit about this last fall as well.

The Panel would be interested in your opinion regarding the relevance of an understanding around currents vis à vis any release to McPherson Bay from the stormwater management discharge.

DR. WICHERT: Gordon Wichert, for

the record.

I'm not an expert in the longshore currents of Lake Huron, so I would reserve comment.

THE CHAIRPERSON: Perhaps if I rephrase it in the context of the stress response context that you had explained to us earlier.

So the Panel would be interested in whether or not you felt the particular stressor in this case we really have been focusing on total suspended solids should be or could be evaluated more thoroughly in the context of strong currents, and I -- the Panel understood from Dr. Crawford's information is that he was talking about that in the context of farther field transport of said suspended solids.

DR. WICHERT: So Gordon Wichert, for the record.

If such studies were undertaken, I think maybe the first screening would be to look at a potential discharge based on drainage area and so on in the context of the disturbance called by storm events of particular magnitudes. And if it looks like the sediment release from the catchment or the drainage area would be

outside the natural variation of a storm event, then further investigations would be warranted.

THE CHAIRPERSON: Thank you.

Panel Members, did we have any further questions? No?

Thank you very much to the Historic Saugeen Métis.

MS McARTHUR: Excuse me. I do have a closing.

THE CHAIRPERSON: Oh, certainly.

MS McARTHUR: It's Patsy McArthur, for the record.

In closing, Historic Saugeen Métis thank the panel, Dr. Wichert, George Govier and others, for the contributions over the past year on behalf of the Historic Saugeen Métis community.

Previously, HSM has expressed conditional support for the DGR project as we recognize and accept that there is a nuclear waste issue that must be addressed. We acknowledge the collective responsibility to develop a safe storage option for nuclear waste created in the territory.

The HSM expect to be involved in

monitoring the DGR as the project goes forward, and given the significance of unknown impact on our Constitutionally protected Section 35 Aboriginal rights, we require a high degree of consultation. Thus, a clear and formalized understanding of the way that HSM's concerns will be considered and integrated into long-term decision-making processes will need to be developed.

Local Aboriginal involvement in the DGR going forward must not be a piecemeal technical or administration process in isolation from historical or community context. Métis find scientific assessments without the most important elements that deal with cultural and societal connections to the land and resources would be most problematic, particularly when it comes to the possibility of community partnerships in the project and protection of the community's Aboriginal rights and distinctive identity.

Thank you, Madam Chair, for this opportunity to contribute.

THE CHAIRPERSON: Thank you, Ms McArthur.

This is an appropriate place to

stop for lunch break. We'll resume today's hearing at 2:00 p.m. where we will, first of all, hear back regarding a couple of the questions that arose this morning, and then we will proceed with the -- dealing with the new information presented on September 10th.

--- Upon recessing at 12:20 p.m. /

Suspension à 12 h 20

--- Upon resuming at 2:02 p.m. /

Reprise à 14 h 02

MS MCGEE: Good afternoon. If I could ask everyone to take their seats. Thank you very much. We will resume.

THE CHAIRPERSON: The Panel understands that the CNSC staff have some information for us arising from questions this morning.

DR. THOMPSON: Patsy Thompson, for the record.

Dr. Swanson, the Panel had questions about certain aspects of safety culture.

One of the questions was on the

timing for the CNSC Regulatory Document. And so what we mentioned this morning, the Canadian Standards Association Document N286 makes reference to safety culture, and the CNSC is developing a Regulatory Document to take that aspect of the CSA standard and clarify our expectations.

And so the document is under development, and the expectation is that it will be issued for public review in 2015.

We have on the phone Dr. Felicity Harrison, who was here last week, to deal with questions you ask about key aspects of safety culture.

And so Dr. Swanson had mentioned -- Dr. Harrison had mentioned some of the key aspects of safety culture that CNSC staff look for in assessments, and she's prepared to speak to some of those issues.

And she also has one of her colleagues, Mr. Victor Goebel, who's also there to supplement what Dr. Harrison may have to -- information to respond to your question.

THE CHAIRPERSON: Thank you.

Dr. Harrison, are you there?

DR. HARRISON: Yes, hello.

Felicity Harrison here, for the record.

THE CHAIRPERSON: Please proceed with the -- some of the key safety culture aspects?

DR. HARRISON: Yes, thank you.

In general, the CNSC views safety culture as a continual responsibility for improvement in learning across the whole of a licensee's organization as well as for its workers. Therefore, we have a general expectation for licensees to conduct self-assessments of safety culture and, having done that, to identify corrective actions and also to implement the corrective actions.

This, then, is a key aspect of continual improvement and the building of a learning organization.

So we will be considering this expectation for inclusion in the upcoming Reg Doc that was just mentioned.

Now, in terms of the compliance measures that we would look at, I mentioned last week that Ontario Power Generation uses the INPO trait for helping nuclear safety officers as the

framework for --

THE CHAIRPERSON: Dr. Harrison, may I interrupt, please?

There was a tremendous amount of static just then when you started talking about compliance, so could you start over again beginning with compliance, please?

DR. HARRISON: Yes.

In terms of compliance, given that Ontario Power Generation is using the INPO framework, the framework from the Institute of Nuclear Power Operations, they have a framework that identifies the traits for a healthy nuclear safety culture. And there are 10 traits, and I'll just list them quickly.

Personal accountability, questioning attitude, effective safety communications, leadership safety values and actions, decision-making, respectful work environment, continuous learning, problem identification resolution, an environment for raising concerns and having in place appropriate work processes.

Now, what we would do when they do their self-assessments is we would look at the

results of their self-assessments and look at some of the attributes as identified through the INPO method to see that the traits that are identified in this method are being met.

So some examples of the actual behavioural attributes could be things, for example, in the area of personal accountability, that individuals understand their personal responsibility to raise nuclear safety issues, including those identified by others.

In terms of questioning attitude, that executives and senior managers challenge other managers to ensure that the degraded conditions are fully understood and appropriately resolved, especially those involving equipment important to nuclear safety.

And there are others in various areas. For each of these traits, there are a number of sub-categories, and within those, there are behavioural attributes.

So those are the kinds of things that we would look at in terms of determining compliance of licensees to our expectations for safety culture.

THE CHAIRPERSON: Thank you.

Panel Members, did you have any supplemental questions you had for Dr. Harrison?

Thank you very much.

I believe, CNSC, the answer to the question on the likelihood question we asked this morning will be at a -- will be tomorrow?

DR. THOMPSON: Patsy Thompson, for the record.

We suggested and you agreed this morning that we would link and build it into our presentation on the -- with the geologic verification program -- the geoscientific verification program; sorry.

THE CHAIRPERSON: Thank you.
Yes.

OPG, I understand you'll be ready after the break on one of the questions.

Did you have other answers to provide to us at this time?

By break, I mean this afternoon's coffee break.

MS SWAMI: Laurie Swami, for the record.

We'll have the answer with respect to worker health and safety programs that

you asked this morning. We do have another question that you asked yesterday, but I would recommend we wait until after the presentations, if that's acceptable.

THE CHAIRPERSON: Yes, that would be fine.

And also, there is a leftover question from September 9th. I understand you did have an answer ready for us, and perhaps we can do that after the coffee break as well, which is the frequency of fire drills at WIPP.

So the next carry-over from this morning is -- was a question we directed to the Saugeen Ojibway Nations regarding a question around the extent of information on crayfish, and also, if possible, on the small-bodied fish.

Mr. Monem?

MR. MONEM: Alex Monem, for the record.

Thank you, Madam Chair. I believe we do now have Dr. Neil Rooney on the phone.

DR. ROONEY: Hi, I'm here.

THE CHAIRPERSON: Hello, Dr. Rooney. So I will repeat the question from this

morning.

So the question was, what is the extent of published literature on crayfish and the small-bodied fish species that were identified as valued ecosystem components such as the red-bellied bass as it pertains to evaluating the significance of adverse effects on these VEC in the aquatic habitats in the site and local study area?

DR. ROONEY: Okay. So Neil Rooney, for the record, here.

The peer-reviewed scientific literature pertaining to crayfish and small-bodied fish tends to be very general in nature. There's very little peer-reviewed literature about the populations the vicinity of the site.

The peer-reviewed literature would generally speak to general ecological characteristics of the species and what types of physical, chemical and biological habitat that the species are -- tend to live in and thrive in.

So in terms of any specific peer-reviewed literature that pertains directly to this site, there's very little. But general

ecological papers that have been peer reviewed could be cited as supporting information in such a document.

THE CHAIRPERSON: Thank you, Dr. Rooney.

And as a follow-up to some information provided to the Panel by Dr. Wichert this morning, specifically with respect to the burrowing crayfish, Dr. Wichert pointed out that this species is actually quite sensitive to changes in the near surface groundwater to surface water regime.

Would you concur?

DR. ROONEY: Yes, I would concur. It's a sensitive species.

THE CHAIRPERSON: Thank you.

Thank you very much, Mr. Monem. Thank you, Dr. Rooney.

I believe that brings to an end the questions carried over from this morning and previous days for now. As I said, we will return to some of them again after the coffee break this afternoon.

We will now proceed with consideration of the new information arising on

September 10 with respect to the waste inventory.

We will begin with a brief presentation by both the Canadian Nuclear Safety Commission and OPG. And then the Panel will begin its questions following both presentations.

Ms Swami, please proceed.

PRESENTATION BY / PRÉSENTATION PAR:

ONTARIO POWER GENERATION

MS SWAMI: Good afternoon, my name is Laurie Swami, and I am the Senior Vice-President of Decommissioning and Nuclear Waste Management.

On September 10 Dr. Frank Greening introduced new information to the Panel that questioned some of the assumptions and calculations in OPG's safety assessment for the DGR for low and intermediate-level radioactive waste.

The Panel reviewed the new information and allowed it as a late submission for the record.

This presentation will address seven topics where the Panel requested further

information to and upon Dr. Greening's September 10 presentation.

In our responses we have indicated the page in the transcripts from September 10 for context.

We will now discuss our responses on: RWOS 1 Operations; the justifications for correlations and scaling factors; chlorine-36 inventory values; chlorine-36 from resins; iodine-131 emissions from the Western Waste Management Facility; the possible ignition of calandria tubes; and the characterization of the WIPP incident, specifically the implication of nitrates in OPG's waste stream.

After careful study and review of these topics, we conclude that our assessment is appropriate and there is no impact on the DGR safety case.

The Radioactive Waste Operations Site, or RWOS 1, was the original radioactive waste site at the Bruce Nuclear Power Development and received waste mostly from the Douglas Point Nuclear Generating Station.

Of note, RWOS 1 still has a CNSC licence and remains under regulatory oversight.

With respect to groundwater, OPG installed a groundwater monitoring network around RWOS 1 in 1989 in order to monitor for any impact from the stored wastes.

Elevated tritium levels were detected at one of the groundwater wells in the late 1990s. OPG investigated the potential source of the tritium and concluded it was the wastes in the tile hole structures.

These wastes were removed between 2001 and 2002, over packed and relocated to the Western Waste Management Facility.

Since then tritium levels at RWOS 1 have been steadily decreasing and are currently stabilized around 150 to 200 becquerels per litre.

The justification for scaling factors was questioned. Scaling factors are correlations between the amounts of easy-to-measure and hard-to-measure radionuclides. For example, for every 2 becquerels of an easy-to-measure radionuclide, like cobalt-60 in a waste package, we might expect 1 becquerel of another radionuclide like nickel-63 to also be present.

In general, these correlations simply reflect mass balances in a steady state system. If there is a steady production rate of radionuclides within a reactor and a steady production of wastes, then the amounts of radionuclides in the wastes may be correlated.

In cases where the radionuclides have similar sources and move in similar ways within the reactor, the correlation is very direct and can be calculated.

In some cases the correlation may simply be observed empirically to hold true. In other cases, there is no useful correlation. In all cases, the use of scaling factors must be verified through experimental evidence, i.e. that a useful correlation exists.

We note that the use of scaling factors is consistent with international practice. There are IAEA and ISO references that describe the use of scaling factors.

In developing our reference waste inventory, we use a number of approaches, from direct measurement to scaling factors based on measurements to calculations.

We have been asked about the

justification for some specific scaling factors. The justification is specific to each scaling factor in each waste type. Several important scaling factors were discussed in the OPG response to IR EIS-01-06, including carbon-14, chlorine-36 and iodine-129.

With respect to the tritium inventory in ion-exchange resins, we note that the reference inventory value derived from scaling factors is consistent with our measured data for tritium on ion-exchange resins.

The accuracy of chlorine-36 inventory on the primary heat transport resins was questioned. First, the most important source of chlorine-36 in the whole inventory is in the pressure tubes. Other retube components, such as calandria tubes, are also important.

The amount of chlorine-36 in resins is orders of magnitude lower. The chlorine-36 inventory on moderator resins is based on measured data. OPG also has several measurements of chlorine-36 on heat transport resins. In all cases, the amount of chlorine-36 was so low that it was below the detection limit.

Consequently, rather than using

zero, the value we used was based on a calculated value. Until we get a more precise measurement, it will be uncertain.

Even if a value of 1,000 times higher than our reference value on heat transport resins were correct, it would be a low inventory.

In particular, the chlorine-36 inventory would change from 0.004 to 4 gigabecquerels in heat transport resins, and not change the 1,400 gigabecquerel projected total DGR inventory. Based on this, we have a good estimate of chlorine-36 inventory values for the DGR safety case.

Next, the rate of release of chlorine-36 from resin degradation was questioned. The DGR safety assessment includes degradation of the resins. The rate is dependant on conditions, aerobic or anaerobic, and whether it is wet or dry.

Dr. Greening has claimed that our release rate of chlorine-36 in the DGR does not exceed 50 becquerels per year. In fact, in our assessment, early release rates of chlorine-36 within the DGR are typically estimated to be at least one order of magnitude more than this.

Therefore, the DGR safety assessment includes chlorine-36 release from both resins and other waste streams as well as from pressure tube corrosion.

The iodine-131 and 129 inventory on resins was questioned. Iodine-131 is a short-lived radioisotope. The claims for iodine-131 inventory on resins are not correct, because resins are stored at stations for long periods of time, sometimes years, before being transferred to the Western Waste Management Facility.

Therefore, the iodine-131 inventory in stored resins at the Western Waste Management Facility is negligible. In addition, OPG reports all of its emissions to the CNSC, including iodine-131 emissions.

OPG committed at last year's hearings to publish the emission information from the Western Waste Management Facility on our website. All information was published on the OPG website July 1, 2014.

These iodine-131 emissions are measured at the incinerator stack and the waste volume reduction building ventilation stack.

These are from low-level waste that has freshly arrived at the Western Waste Management Facility.

For Q1 of 2014 the Western Waste Management Facility iodine-131 releases were approximately 3.0×10^4 becquerels. If that quarterly result is extrapolated for the entire year, that would equate to approximately 1.2×10^5 becquerels per year. Typical annual release rates are in the order of 10^4 to 10^5 becquerels per year. Therefore, emissions of iodine-131 are typically 7 orders of magnitude below the approved release limit of 1.9×10^{12} becquerels per year.

As part of the radiological environmental monitoring program impacts of any releases are incorporated into the public dose calculations.

With respect to iodine-129 releases from resins at the DGR and similar to our previous comments on chlorine-36, iodine-129 releases from resin is included in our analysis, and the inventory is reported in the reference inventory report.

Next, the combustibility of calandria tubes was questioned. Calandria tubes

are a similar material as pressure tubes, only thinner. Pressure tubes are about 4 millimetres thick and calandria tubes are about 1.4 millimetres thick.

The reference, Cooper 1984, Review of Zirconium Zircaloy Pyrophoricity quoted by Dr. Greening with respect to combustibility of zirconium has information on the ignition temperature as a function of sample size. It is a simple exercise to calculate that a pressure tube coupon has to be heated beyond 1,100°C consistent with our simple test as shown in the video presented on September 10.

The same reference indicates a calandria tube coupon would need at least 900°C.

We also note that this reference reports on tests, where thin zirconium tubing did not ignite even with 8 times more zirconium powder than metal. Recall OPG stored waste has about 0.1 per cent weight of zirconium powder.

Consistent with the discussion on September 10 regarding the ignition of pressure tube coupons in retube containers, calandria tube coupons will not spontaneously ignite.

With respect to WIPP, the

relevance of nitrate salts in OPG's resins was questioned. The topic of gadolinium nitrate absorbed on OPG resins was addressed last week by Dr. Evans.

Gadolinium nitrate is used in CANDU reactors in low concentrations. This results in very low nitrate content in resins at about 2 per cent. Chemical reaction from gadolinium nitrate is not a risk.

We also discussed on September 9 more generally the content of our waste packages with respect to chemical hazards and concluded that strong chemical reactions are not likely to occur because of their chemical content, and as confirmed through 40 years of waste management at OPG. Therefore, there is no impact on the safety case.

In summary, we have reviewed and responded to the questions accepted by the Panel. Based on our analysis, our conclusions remain valid. The DGR safety case is not affected. Our experts are available here and on the phone to answer any questions you may have.

THE CHAIRPERSON: Thank you, Ms Swami.

We will now proceed directly to the presentation by CNSC.

**PRESENTATION BY PRÉSENTATION PAR:
CANADIAN NUCLEAR SAFETY COMMISSION**

DR. THOMPSON: Thank you, Madam Chair, Members of the Joint Review Panel. My name is Patsy Thompson, I am the Director General of the Directorate of Environmental and Radiation Protection and Assessment with the Canadian Nuclear Safety Commission.

With me this afternoon are Ms Kay Klassen, Senior Project Officer for Licensing of Waste Management Facilities, and Ms Kiza Francis, an Environmental Assessment Specialist on the DGR project, and Dr. Son Nguyen, Geoscience Specialist who was involved in reviewing the safety case.

CNSC staff would like to present information relating to several issues raised in presentations of PMD 14-P1.10A by Dr. Greening at last Wednesday's hearing on September 10.

CNSC staff would like to respond to comments on: releases of radioactivity from

the Radioactive Waste management Operations Site 1, RWOS 1, to the aquifer; the theoretical justification for the correlation between C-14, carbon-14, chlorine-36, and iodine-129 and the cobalt-60 content of the DGR containers; the use of scaling factors; the reference to a major problem with the chlorine-36 inventory; emissions of iodine-131 from the Western Waste Management Facility; issues related to calandria and zirconium; and comments regarding the incidents at the WIPP.

With respect to statements at the Radioactive Waste Operation Site 1, we have the following to provide.

RWOS 1 was originally developed by Atomic Energy of Canada Limited in 1968 to receive waste from the Douglas Point Nuclear Generating Station.

The facility included in-ground concrete trench and tile hole structures. It received some of the waste from the very early operations of Bruce A and was closed in November 1976.

At that time the Radioactive Waste Operation Site 2, known as Western Waste

Management Facility, began operations by Ontario Hydro. This site has never been abandoned following Atomic Energy of Canada's operations. Ontario Hydro and currently Ontario Power Generation has been responsible under licences issued by the Atomic Energy Control Board, and now by the Canadian Nuclear Safety Commission.

In the early 1990s groundwater monitoring indicated possible problems with concrete structures. Investigations began and remedial actions were taken by Ontario Power Generation, then Ontario Hydro.

Beginning in the mid-1990s wastes were removed from a number of the concrete vaults and the tile hole removal was completed in the early-2000s.

From 2000 onwards OPG's groundwater monitoring has demonstrated a general downward trend in tritium. Over the five-year period, 2008 to 2013, tritium concentration measurements have not exceeded 2,500 becquerels per litre, and that is at one monitoring well. And gross beta/gamma -- gross beta concentrations were less than 1.2 becquerels per litre.

The tritium concentration

measurements have stabilized generally at around 200 becquerels per litre.

For context, the tritium concentrate measurements are less than the drinking water guideline for tritium, which is 7,000 becquerels per litre. It should be noted though that the groundwater on the Bruce site around this facility is not a source of potable water. So we are providing this for context.

The groundwater discharges to a small low-land area on-site and reports to the bay beside Bruce A. There is no off-site release of this groundwater to Inverhuron Provincial Park or to the Inverhuron community beyond the park.

In terms of waste characterization, which was one of the issues raised by Dr. Greening --
--- Technical difficulties

THE CHAIRPERSON: We will wait until the sound problems are addressed.

MS MCGEE: We just want to advise that there has been a significant loss of power, so the Panel is going to take a break. And once the matter is resolve, we will resume.

So I would ask that you not go

too far. We don't know how long it will take,
5-10 minutes apparently to fix the problem.

Thank you.

--- Upon recessing at 2:33 p.m. /

Suspendue à 14 h 33

--- Upon resuming at 2:47 p.m. /

Reprise à 14 h 47

THE CHAIRPERSON: Okay. Thank
you to staff for rapidly responding to that.

So CNSC, we can continue.

DR. THOMPSON: Thank you, Dr.
Swanson.

If I could go back to the slide
that I had finished before the system went down.
I had mentioned that the groundwater on the Bruce
site around the RWOS 1 was discharging to a small
low land area on site and reports to the bay
beside Bruce A and I should have said Bruce B.

So it is a bay beside Bruce B and
there is no off-site release of this groundwater
to Inverhuron Provincial Park or to the
Inverhuron community beyond the park.

Moving to the next subject, which

was the subject of waste characterization where there were issues raised in relation to the theoretical justification for the correlation between difficult to measure radionuclides, the use of scaling factors and the use of possible major problems with chlorine-36 inventory.

CNSC staff want to note that staff's review and assessment of the inventory and use of scaling factors is based on the needs for long-term safety assessment. The guidance on how safety assessment can be conducted is described in CNSC's Regulatory Guidance Document G320.

Contrary to statements made by Dr. Greening last week, the Guide G320 does not stipulate the use of measured values of radionuclide inventories in safety assessments. The guide does, however, discuss the use of data and how data variability and data uncertainties can be approached in the bounding of a safety assessment.

With respect to concerns with correlations between carbon-14 and cobalt-60, chlorine-36 and cobalt-60 and iodine-129 and cesium-137 and developing inventories in waste

containers, these scaling factors are applied worldwide. It is convenient to use scaling factors with gamma measurements for cobalt-16 and cesium 137 to estimate other radionuclide activities in the waste rather than measure all radionuclides in all past, present and future wastes which would increase the doses to workers handling those wastes.

In addition, after a certain number of samples are taken, additional measurements are no longer required because the average in the 95th percentile of the measurements will remain essentially unchanged, hence, scaling factors are used to estimate difficult to measure radionuclides to allow for proper labelling of containers entering the waste management facility and to provide the data needed to refine the safety assessments.

The ISO Standard 21238 indicates that when using scaling factors it is important to understand the nucleotide production mechanisms, the physical/chemical behaviour of nucleotides and observe radio chemical analysis data.

Statistical calculations of

correlation coefficients is a supplemental technique to group radiological data and provide relative accuracy of the correlation between cobalt-60 or cesium-137 and the difficult to measure radionuclides of interest in the safety case.

A general rule of thumb is that if correlation coefficients are above the value of 0.6, then they may be used to determine levels of the activity of radionuclides in waste containers. However, the lower the correlation coefficient, the more samples to accurately determine statistical measures such as the 95th percentile will be required.

OPG has described the use of scaling factors, the data and the validation of scaling factors in responses to several Information Requests made by the Panel. These include EIS 01-5, 6, 8, 20 and 33 and EIS 06-262 and 264.

CNSC staff reviewed this information and assessed it in relation to the ISO Standard as well as considered the use of the associated data, its variability and the associated uncertainties for its use in the

safety assessment.

Though CNSC staff were satisfied with how the inventory data were used and the variabilities and uncertainties addressed in the safety assessment, and with the conservatism built into the safety case, CNSC staff expected that the development of an updated inventory to support the licence application for an operations licence would be fully addressed using the international best practices such as the ISO Standard.

Of note, OPG has committed to updating -- they have sent a revised proposal for the radioactive inventory accounting for the requirements of the ISO Standard.

With respect to the chlorine-36 inventory in the ion exchange resins -- or in the resins, Dr. Greening noted a possible 1,000 time increase in chlorine-36 in the inventory and that this would create problems.

CNSC staff were not able to verify the COG documents referenced by Dr. Greening. However, on the assumption that the statement made by Dr. Greening is true, then we looked at what its impact on the safety case

would be.

For the projected waste volume in 2062, the increase, using Dr. Greening's assertions, would be 7.4 -- it would increase to 7.4 times 10^{10} to 10^{11} becquerels instead of the current 7.4 times 10^8 to 10^8 becquerels of chlorine-36.

The effect of this increase on the total inventory of chlorine-36 in all the wastes, which is 1.4 times 10^{10} to 10^{12} becquerels remains small.

The effect of this small change was assessed within the variance included in the normal evolution scenario and the peak dose calculated would continue to be several orders of magnitude below the criterion of 0.3 mSv.

So there may be continued issues identified by Dr. Greening with the inventory report, but it remains CNSC staff's conclusion that we were not satisfied with the 2010 reference waste inventory and that is the reason why CNSC staff made recommendation No. 2 to the Joint Review Panel.

CNSC staff recommended to the Panel at that time that OPG update their

inventory verification plan using the IEA and the ISO Standard which we have been discussing and that would lead to a derivation of the 95th percentile value for all important radionuclides for the safety case.

In response to this request from the JRP, OPG provided an inventory verification program to address that recommendation, reduce uncertainties and provide representative values for different waste streams from the different CANDU power reactors and over extended periods of time.

With this program in place, an accurate inventory will be available for use in an updated safety case to support future licensing.

In relation to emissions of iodine-131, I would like to say that airborne nuclear substances released from the Western Waste Management Facility are monitored as per regulatory requirement. They are measured for the various facility stacks, including the incinerator. Radionuclides that are monitored include tritium, carbon-14, particulates and radioactive iodine-131.

CNSC staff would point out that the annual iodine-131 releases from the stacks have ranged from 6.38 times 10 to the 4 to 9.7 times 10 to the 4 becquerels over the last four years. This is a small fraction, less than 0.0 percent of the annual derived release limit for iodine-131, which is 1.9 times 10 to the 12.

Dr. Greening pointed that the actual emissions of 1.9 were in the range of 10 times 10 to the 12. This is actually the release limit, the actual releases are much less.

Dr. Greening's presentation made statements about calandria tubes, zirconium and the risks of zirconium in accidents and malfunctions. In particular, there was concern with the thinner calandria tubes and small coupons and cutting debris igniting and causing fires.

To put the use of zirconium alloy into perspective, zirconium alloys of varying thickness are used in CANDU reactors for different purposes. The thickest of them is the pressure tube which has a wall thickness of approximately 4 mm. The calandria tube wall thickness is approximately 1.4 mm and then comes

the fuel cladding, which is approximately 0.4 mm thick.

CNSC staff would like to point out that the reference to fuel cladding is misleading, as OPG's DGR is for low and intermediate level radioactive wastes and not for fuel waste.

As OPG has clarified, on September 10th hearing, the volume reduction process for the re-tube waste does not generate more than 0.05 per cent of the total mass as dust. OPG also calculated the dust expected to be present in re-tube waste containers to be approximately 500 grams. OPG also assumed the dust particles to be in the size range of 3 microns.

Even under this worst-case scenario there is not enough material or enough critical mass to sustain combustion. OPG provided evidence demonstrating the difficulty of igniting a pressure tube coupon.

CNSC staff agrees with OPG's statements. The external experts that we have consulted are also in agreement with CNSC staff. These experts are Mr. Richard Bowes and Patrick

Brousseau respectively from Natural Resources Canada and Defence Research Centre of Canada who were here last week and are available today on the phone.

For thinner zirconium materials, a demonstration by scientists from the University of California at Berkeley applying a blowtorch to zirconium fuel cladding, which is much thinner, showed that even after heating to 2,000 degrees centigrade it did not catch fire. This can be viewed on a YouTube video.

In relation to the recent incidents at the WIPP, and in particular to the statements made about the possible timing for re-opening, CNSC staff have reviewed the information available on the WIPP website and have confirmed that, regardless of speculative statements, the U.S. DOE plans are to, until the source of the February 14 event is isolated and mitigated, it is premature to say when the shipments can resume. The WIPP will open only when it is safe to do so.

The U.S. DOE has also indicated that it is committed to planning and implementing recovery and corrective actions in order that

operations resume as quickly when it is safe to do so.

CNSC staff will continue to monitor the results of the investigations for regulatory lessons learned.

This ends our presentation.

THE CHAIRPERSON: Thank you, Dr. Thompson.

Dr. Muecke, did you have some questions?

MEMBER MUECKE: Our first question we would like to address to OPG and CNSC.

Dr. Greening has stated that the tritium to cobalt-60 ratios in ion exchange resins can vary from .00017 to larger than 135, roughly speaking a 10th of a million.

Can CNSC and OPG confirm that such variations exist?

--- Pause

DR. GIERSZEWSKI: Paul Gierszweski, for the record.

I was just bringing up the data.

--- Pause

DR. GIERSZEWSKI: So within the

range of data it is possible that that would be the extreme range, but in fact most of our data is in a much narrower range.

I just want to again comment that the mean of the data that we have is consistent with the value that we have used in the reference inventory report.

MEMBER MUECKE: The follow-up to that question would be: how can such variability be incorporated into a scaling factor and what are the confidence levels that you would assign to the scaling factor, considering that such large variability does exist?

DR. GIERSZEWSKI: Paul Gierszweski, for the record.

I just again want to emphasize that the tritium values that we are working from are measured, they are not -- they are used to help derive the scaling factors, but ultimately they are measured and the values that we use in the reference inventory at this point are consistent with the measurements.

More generally, if you have a large range in data, then the processes that were mentioned in the CNSC presentation about looking

to test the correlation coefficient with the data would be appropriate. But again, I am just affirming that we have data on tritium, on the resins and the values that we are using in the reference inventory report are consistent with the data.

THE CHAIRPERSON: Could we have CNSC respond to the same two questions, please?

DR. THOMPSON: Patsy Thompson, for the record.

As we mentioned last week when we addressed this issue in more detail, CNSC's initial review identified gaps and that was the basis for the recommendation as well as the assessment we requested from our independent expert.

We also reviewed the information provided by OPG in subsequent Information Requests and we would agree that the measurements of tritium that are available align with the information that was used in the inventory for the safety assessment.

MEMBER MUECKE: Another question to OPG regarding ion exchange resins.

Could you comment on the

homogeneity of ion exchange resins as stored in their containers, particularly with respect to gadolinium nitrate?

MS SWAMI: Laurie Swami, for the record.

I would ask that Dr. Brett or Dr. Evans, who should be on the phone, could respond to that question. I know there was some technical difficulty at their end, so if they are not there we will send them an e-mail.

THE CHAIRPERSON: Dr. Brett or Dr. Evans, are you there?

MR. BRETT: Michael Brett from OPG.

THE CHAIRPERSON: If you could speak up a little bit, otherwise I think we can hear you relatively well.

MR. BRETT: Sure. Michael Brett, OPG.

MR. EVANS: Dave Evans, OPG.

THE CHAIRPERSON: Good, we have you both.

Did you need Dr. Muecke to repeat his question?

MR. BRETT: Yes, please.

MEMBER MUECKE: Could you comment or inform the Panel about the homogeneity of ion exchange resins in their storage containers, particularly with respect to gadolinium nitrate?

--- Pause

THE CHAIRPERSON: Dr. Evans?

MR. EVANS: Dave Evans, for the record.

Ion exchange resins are actually a physical mixture of a cation and an anion component, so there is some inherent inhomogeneity in the mixed bed resins to start with, so I would not -- and because of the way the resins are generated and stored, I would not expect it to be a perfectly homogeneous material.

We can know from process knowledge, though, based on the use that we put the gadolinium nitrate removal resins to what the maximum theoretical loading can be because we have a finite amount of gadolinium nitrate in the moderator and it is removed typically on to ion exchange columns.

So we know the total loading or average loading on those columns with some accuracy. Those resins are also mixed in the

course of -- in the spent resin storage tanks with resins used for normal purification of the moderator system, so they are further diluted, if that's the correct word.

So ion exchange resin is not a perfectly homogeneous material, but with respect to the gadolinium nitrate inventory on it, we can estimate that and set an upper limit with some accuracy.

MEMBER MUECKE: Thank you for that.

What is the density of gadolinium nitrate relative to the other components of the ion exchange resins?

MR. EVANS: Dave Evans, for the record.

The gadolinium nitrate that is present is in an ionic form. It has little effect on the bulk density of the resin or the true density of the resin.

By way of putting this in perspective, the total gadolinium nitrate inventory in the over poison moderator is on the order of a few kilograms and that's removed typically on 200-litre ion exchange resin

vessels, so it has little effect on the density, final density of the material.

MEMBER MUECKE: It wasn't so much the final density of the material we were interested in as the density difference between the gadolinium nitrate and the rest of the components of the ion exchange resins leading to a question about the possibility of the material settling with time in the containers.

MR. EVANS: Dave Evans, for the record.

In my experience, ion exchange resins under certain conditions can stratify, but that is typically in hydraulic backwash situations.

There is an inherent density difference between the cation and anion components, too, so if they were subjected to conditions designed to separate them, which occurs in normal water treatment plants, they can be separated.

We actually strive in our case for less separable resins for chemical reasons that we don't want gadolinium to precipitate in the ion exchange column during service, but in

terms of once the resins are in the storage tank, there is virtually no driver for stratification or when the resins are in the resin storage liners, there is no driver for further stratification of those resins.

MEMBER MUECKE: If these containers are transferred and sit in an environment where you have low-frequency vibrations, would that be a possible mechanism for separation?

MR. EVANS: Dave Evans, for the record.

It is a possible mechanism for separation under some circumstances. In this case, though, the resins are de-watered, they tend not to separate in that condition. You need to do something quite active to them such as hydraulic backwash.

New resins in transport, there is some potential for separation by vibration occurring during transport, but we have never observed that in resins we have received.

I would also add that samples have been taken from the ion exchange resin liners at the Bruce site and there is not strong

evidence for stratification of the resins. These are core samples taken through the vertical height of the resin bed in the storage liners.

MEMBER MUECKE: Would there be any experimental evidence of somebody using a vibration as a separator in the literature?

MR. EVAS: Dave Evans.

I would be surprised if it hasn't been tested in the context of shipping resins where people want a mixed bed to stay in the mixed bed condition. I am not directly aware of such tests.

DR. MUECKE: Thank you very much.

THE CHAIRPERSON: Dr. Archibald, did you have some questions?

MEMBER ARCHIBALD: Yes, I do.
Thank you.

This is based upon Dr. Greening's testimony from the transcript on pages 117 and 118 where:

"Radiation leaking from RWOS 1 into the ground has accumulated and OPG, with this mountain of radioactive waste, wants to bury it in a

deep hole, this meaning the
DGR." (As read)

I would pose my question to OPG.
Would OPG confirm that this waste consists of
contaminated earth or tile waste material
separate from the low and intermediate level
waste inventory or will it be part of the actual
inventory described in the EIS and which is
required to be placed in the proposed repository?
--- Pause

MS SWAMI: Laurie Swami, for the
record.

You know, I have two different
answers to that question, so I think we don't
have the question right. Could you repeat it,
please?

MEMBER ARCHIBALD: There is some
ambiguity about the mountain of radioactive waste
existing at RWOS 1 and we had heard of a tritium
leak into the ground, tile bed, concrete
structures.

The question here is: Does the
form of this waste actually comprise radioactive
ground or tailings or earth materials, is it
simply tile material or some other product and

will it, in fact, be planned to be stored in the proposed DGR?

MS SWAMI: Laurie Swami, for the record.

The waste is the waste material that is described in the inventory report and does include the material from the RWOS facility as part of the DGR inventory going forward.

THE CHAIRPERSON: Dr. Archibald, if I could ask a clarification, because I think there is still a bit of confusion regarding what you are getting at.

I think the Panel heard "mountain of waste material", so we simply need some clarification regarding that phrase.

So in addition to the tiles that you referred to, which we understand were re-packaged or overpacked and sent to the Western Waste Management Facility and we understand that definitely would go into the proposed DGR; was there anything else, soil, or any other materials that had to be removed?

Is that correct, Dr. Archibald?

MEMBER ARCHIBALD: Yes. Just to be clear, the statement was that radiation

leaking into the ground has accumulated and so that led to the suspicion that possibly it was tailings or earth or other materials.

--- Pause

MS SWAMI: Laurie Swami, for the record.

Ms Morton is going to respond to this question. Thank you.

MS MORTON: Lise Morton, for the record.

Once again I apologize, I feel like every time I answer I wonder if I'm answering enough questions, so I will try to address everything I think I heard.

With respect to a "mountain of waste", so to be clear, there were two significant campaigns at RWOS 1 where waste was removed.

In approximately 1997-'98 the majority of wastes from the trench structures was removed, overpacked and relocated to the WWMF.

Then in 2002, the tile hole structures were again removed and that was done by an extraction method where they were concrete tile holes, if you will, and so they were

overpacked. I believe that methodology involved taking a bit of very local soil out with the extraction, but other than that there was no soil extracted. That waste was also relocated to the WWMF.

There remains a small volume of waste at RWOS 1 in one -- I believe one more trench section and in the lined tile holes, approximately 600 cubic metres of waste remains at RWOS 1.

The remaining part of the question with respect to what's captured in the inventory, the waste that was relocated to the WWMF is captured in the reference waste inventory.

MEMBER ARCHIBALD: Thank you very much. That's exactly what I was looking for.

On pages 127 and 128, Dr. Greening has made the statement that:

"OPG has an unfounded assumption that ion exchange resin waste is chemically equivalent to municipal waste." (As read)

And further states that:

"These wastes should be classified as hazardous wastes due to their ignitability, reactivity and toxicity." (As read)

My question is to OPG: Can you confirm that -- and ignoring the nitrate concentration levels that was very well explained last week, can OPG confirm that the chemical equivalents in terms of ignitability, reactivity and toxicity would be equivalent to that of municipal waste?

--- Pause

DR. GIERSZEWSKI: Paul Gierszewski, for the record.

I would just like to go back again to some of the original comments by Dr. Greening that may set some context for this and the response I provided last week, just to be clear.

In 2009 we did a general assessment on the chemical hazards in smoke. It was not specific to resins, we considered -- it was a general consideration, we said what could burn could be resins, it could be low-level

waste, it could be vehicles and tires; we did a general assessment on the hazard of smoke and we looked at two particular compounds that are commonly present in smoke, carbon monoxide and benzene. It was not a detailed analysis.

And in coming up with those carbon monoxide and benzene numbers, we did use numbers from an EPA reference for municipal waste. It was not intended to say that resins, in particular, were the same as municipal waste.

So I wonder whether in part we are getting down that line from sort of a misunderstanding of what was done in that particular assessment. The point of that was to just understand the chemical hazards of smoke more generally and the results did say that smoke is chemically hazardous and the appropriate way to respond from the design point of view was to prevent or mitigate fires in the first place and we have already had discussion on that topic.

I may just ask whether Dave Evans on the phone has any further comments, though, on the general nature of the hazard that resins might represent. I don't know if he has any points to comment.

MR. EVANS: Dave Evans, for the record.

Just going from past experience, the usual practice with ion exchange resins in water treatment plant applications and so on, was that they were treated as regular "garbage", recognizing, though, that the sulfur content is relatively high, especially with the cation resins.

I don't believe that is still practised, a lot of them are taken back by the vendors and reprocessed now, but certainly in the past the practice had been to handle them as "garbage" barring the presence of a specific toxic heavy metals like lead or mercury on the resins.

MEMBER ARCHIBALD: That's good. Thank you very much.

Could I continue on to page 134, please, and again a question to OPG. This is just a matter for clarification.

Dr. Greening has mentioned that airborne release -- this is in the malevolent act Scenario D that was referenced in his presentation:

"The airborne release and respirable fractions associated with the detonation described in this scenario would be closer to unity." (As read)

I'm asking OPG for clarification, please. Does this factor value of unity only apply if 100 percent of the contains zirconium metal, scrap essentially, were reduced to restorable size under this scenario activity?

DR. GIERSZEWSKI: Paul Gierszewski, for the record.

That's correct. That's the implication.

MEMBER ARCHIBALD: Then we will leave all the zirconium aside. Oh yes, I have one little question. There seemed to be an incongruency between the two presentations made.

Ms Swami, on your slide No. 8, the statement was made that at 900 degrees Celsius the calandria tubes would ignite. This is from testing.

And Dr. Thompson, in her presentation on slide 15, mentioned that there

was a university of California video showing fuel cladding, I believe it was, ignition at 2,000 degrees Celsius.

There seems to be a large discrepancy in temperature values here between thinner substrates.

Dr. Thompson, this was when you were mentioning the three different sizes or thicknesses of cladding and you verbally mentioned an ignition temperature of 2,000 degrees Celsius. Would there seem to be a large discrepancy in ignition temperature?

DR. THOMPSON: Patsy Thompson, for the record.

Perhaps, Dr. Archibald, we could come back after the break. Our expert, Ram Kameswaran, could provide us the information source. He has prepared these slides.

MEMBER ARCHIBALD: Yes, that would be advisable, thank you.

MS SWAMI: Laurie Swami, for the record.

It might be helpful if Dr. Gierszewski responded to this issue because I believe he has the information you are looking

for.

MEMBER ARCHIBALD: Please.

DR. GIERSZEWSKI: Paul

Gierszewski, for the record.

Maybe a little bit further information. So the reference on the ignition temperature as a function of material size is the Cooper 94 reference and you can do it. There is a graph in there and you can use it to estimate the ignition temperature. When you apply it to the pressure tube coupons you come up with a number like 1,100 degrees C, when you apply it to the calandria tube coupons you come up with a number of approximately 900 degrees C. So that's a theoretical or semi-empirical based support for it.

In the actual field, as I think I observed last week. when we did try to heat the pressure tube coupons at 1,100 degrees C they did not ignite, it was somewhere well above that that we were able to get -- see some burn, but it was not a sustained burn, something in the range of 1,500 to 1,700 degrees C.

MEMBER ARCHIBALD: And would these be 100 percent zirconium coupons, say, or

would they be combined with some other metal structure such as the cladding on top of the inner wall?

DR. GIERSZEWSKI: Paul Gierszewski, for the record.

These estimates I believe are for straight zirconium alloy and as we would have the waste in our containers, there is just the zirconium components. Whether they are the pressure tube or the calandria tubes, they are not pure zirconium, they are slight alloying elements depending on the particular source, but I don't believe that the amount of alloying is significant on this particular point.

MEMBER ARCHIBALD: Thank you.

To my next question on page 134, the statement was made by Dr. Greening that:

"...nor does OPG intend to precondition or stabilize any of its intermediate level wastes as is practised in most countries worldwide."

(As read)

The question to OPG is: What methods of preconditioning or stabilization by

example, by short example, if you know of any, are practised internationally and are such methods applied to waste materials in Canada?

--- Pause

MS SWAMI: Laurie Swami, for the record.

I would ask Dr. Evans to respond to your question, please.

MR. EVANS: It's Dave Evans, for the record.

I had taken a look at this some years ago when I was wearing a somewhat different hat, when I was involved in the space management of resins. The practices around the world vary widely from hot isostatic pressing of resins, burning of resins, vitrification of resin. The driver in most cases is minimization of waste volume.

The resins from the CANDU program present some special challenges because of the carbon-14 component, so a lot of the waste volume reduction processes that are practised elsewhere are not suitable for resins with high C-14 content.

To capture that C-14, say in an

incineration process, would generate more secondary waste than the resins it comprised to start with.

So we had taken a good look at a number of waste volume reduction technologies for resin, including visiting a vitrification plant at Oak Ridge and realized that the stumbling block to adopting a lot of those was the carbon-14 content of the resins from the CANDU program.

MEMBER ARCHIBALD: I believe, therefore, that there are no such practices in place in Canada in any way, shape or form then?

MR. EVANS: To the best of my knowledge, no.

MEMBER ARCHIBALD: Thank you very much.

On page 135, and this is the comment, and I realize that the Phase 2 DOE report is not yet available, Dr. Greening, in his presentation stated that:

"At the WIPP one of the drums spontaneously ignited and ruptured, sending clouds of radioactive material to the

surface." (As read)

To both OPG and CNSC: does any evidence exist to validate ignition as a source and that clouds or large volumes of emissions were created, in your opinion? And it is only an opinion because the report is not yet available.

DR. THOMPSON: So Patsy Thompson, for the record.

I would say at this stage we don't have an opinion, we haven't looked at those sources of information.

MS SWAMI: Laurie Swami, for the record.

Based on the evidence, the pictures from the site, we can see that as well as anyone else, but in terms of the final root cause we are awaiting that report to fully understand the event.

MEMBER ARCHIBALD: Thank you.

Then to continue, on page 136 Dr. Greening had mentioned that:

"The Department of Energy's unusual occurrence reporting system indicates that events such as" ... and by way of

example ... "spontaneous ignition of pyrophoric material such as zirconium scrap and reactions involving nitrate rich materials have occurred." (As read)

To CNSC and OPG separately: To your knowledge, have events such as those stated, and these specifically being spontaneous ignition in the nitrate rich material reactions, occurred at the WIPP itself or are these reportable incidents based on stored waste at various source sites before being packaged for shipment and storage at the WIPP?

I would take an answer from CNSC first, please.

DR. THOMPSON: Patsy Thompson, for the record.

We haven't investigated the event reports, either at the WIPP or from the facilities from which they receive the waste.

MEMBER ARCHIBALD: Would OPG be able to respond?

MS SWAMI: Laurie Swami, for the record.

We are not aware of these additional events that Dr. Greening has pointed out from our review of the material so far.

MEMBER ARCHIBALD: None of these events would have been reported through OpX ventures at all?

MS SWAMI: Laurie swami, for the record.

We are not aware of these reports. It's a different system for Department of Energy than it would be through the Nuclear Power Plant program, although we have taken an approach in this case of searching for this information to the extent it is available to us.

MEMBER ARCHIBALD: Then I will just lead on to one last question on page 141 where Dr. Greening said that:

"I do know that in the U.S. there are recommendations for storing that kind of waste, zirconium. The subject has been brought up." (As read)

Do OPG or CNSC have any knowledge of special reactive waste storage criteria for zirconium, for example, in Canada and/or the

United States?

The follow-up question, and I believe you answered this last week: Are these criteria used for current storage of such materials at the Western Waste Management Facility?

--- Pause

MS SWAMI: Laurie Swami, for the record.

We are not aware of any particular special storage arrangements for zirconium powder because the form of our waste storage is not in the powder form.

We do go through an assessment of appropriateness of our packages for a number of safety considerations, but that is not included in it.

MEMBER ARCHIBALD: Therefore, the indication is that for your zirconium scrap there is no special regulatory storage requirement for that material other than what you have chosen to use?

MS SWAMI: Laurie Swami, for the record.

Not quite, because the storage

packages and the transportation of the material would require regulatory oversight, of course.

MEMBER ARCHIBALD: That would be for radiologic concerns then?

MS SWAMI: That's correct.

MEMBER ARCHIBALD: To CNSC then?

DR. THOMPSON: Patsy Thompson, for the record.

We were trying to think of where this -- for what facilities and licensees the use of zirconium would generate waste that would need to be managed. The only licensees we could think about are the licensees that fabricate fuel bundles where they do use zirconium.

We are not aware of any special requirements for storage of zirconium waste products or chippings or things like that.

We could follow up with the division responsible for licensing those facilities, if you would like.

MEMBER ARCHIBALD: No, that would be fine, but I would like to see if CNSC could provide to the Panel any unusual occurrence reporting incidents for zirconium metal and/or possibly fires relating to nitrate rich materials

at the WIPP, either prior to or stored at the WIPP.

DR. THOMPSON: Patsy Thompson, for the record.

I don't think we are able to get information in relation to the WIPP. What we could look at is from the CNSC licensees, if there are any events reported in relation to zirconium.

MEMBER ARCHIBALD: That would be fine. Thank you.

THE CHAIRPERSON: Dr. Muecke, did you have any additional questions?

Okay, that I think brings the Panel questions to a close on the new information raised by Dr. Greening.

Prior to the actual scheduled break, I would like to return to some of the questions that have been carried forward to today.

So starting with OPG and then moving on to Environment Canada.

So OPG, what I have noted here is you will address frequency of fire drills at WIPP as well as the techniques used to determine the

suitability of till.

Or no, wait a minute, I think I have just made a mistake. You wanted me to wait until after the break for the health and safety certification. So just let me know what the status of that is and I will cancel that. We will take a break and we will come back.

--- Pause

MS SWAMI: Laurie Swami, for the record.

So we have those three questions that we can answer. So I will do the two on the WIPP fire drills. I will do the health and safety and Mr. Wilson will answer the question with respect to the Waste Rock Management Area and the till.

We would also like to just give a little bit more information on the stormwater management pond, if that's acceptable as well?

THE CHAIRPERSON: Yes.

MS SWAMI: So Mr. Wilson will do that when I'm finished these very short questions.

So the question, as I understand it from September 9th, was to identify what the

drill program was at the WIPP facility.

We looked at the WIPP website, so this is just what's publicly available. And when we look at that it's Rev. 30 which we believe is a 2012, I believe, document but it may be earlier than that. There is:

"A full-participation exercise is conducted annually to demonstrate an integrated emergency response capability. These annual exercises are designed to validate all elements of the Emergency Management Program over a five-year period."

So that's their words. My interpretation of that is that that would be a 20 percent test of their emergency plan held once a year. That's just my interpretation of it.

--- Pause

MS SWAMI: Sorry. Passwords are always a good thing.

So we talked earlier about any certifications to our health and safety program and from 2005 to 2010, OPG was the recipient of

the Infrastructure, Health and Safety Association's Platinum Award for sustaining a high standard in health and safety management system and health and safety culture. So this was the participation that we had. We were the first to receive that recognition in 2005 and then for a five-year period we participated and that did include audits of our system.

In 2010 the organization that provided that standard changed their processes and they no longer have that available for OPG to participate in. So that's one aspect of it.

The second thing, we have a management system for health and safety that's aligned with the British Standard Institute 18001 Occupational Health and Safety Assessment Series. We have not registered to that because we were following this other program of the Infrastructure Health and Safety Association.

We are now waiting to see which one would be more appropriate, but what's important here is that we follow the elements of the 18001 program.

What I mentioned this morning was the Canadian Electrical Association program that

we participate as a member of that. We have achieved top quartile in accident severity rate and all injury rate for similar-sized organizations to us. So our performance is recognized as very good in this forum.

With that I'll ask Mr. Wilson to answer the other two parts.

MR. WILSON: Derek Wilson, for the record.

And before I start with the Waste Rock Management Area I have to apologize for my confusion yesterday when I confused resistivity lines with nuclear densometers and came up with x-ray techniques.

--- Laughter / Rires

MR. WILSON: So let me start over.

The investigations conducted to date on the site supporting our till liner consists of in excess of 600 boreholes in test pits in the OPG-retained lands area which identified the DGR project site was underlain by a dense till layer.

And we discussed in the July session as well as in last year's hearings the

field investigation program that we really focused to confirm the results of that previous characterization, consisting of continuous cord wells, monitoring wells, test pits and resistivity lines. The resistivity lines themselves and some of the wells were located in the vicinity of the waste rock management area and the stormwater management pond to confirm thickness and homogeneity in the 10 to 15-metre thick range.

The monitoring well network was installed, downgrading the waste rock management areas so that we could get some baseline data on the existing conditions as well as the installation of piezometers to understand the flow.

Modelling underground water velocity that's also within the till layer have demonstrated in the order of centimetres a year of movement within the till lens.

During the site preparation the waste rock management area will be prepared and graded and the grading will require the removal of portions of the upper weather till as well as the potential for placement of compacted till in

other areas to establish appropriate grades to ensure that the water does not pond underneath the pile.

It is not anticipated that any permeable lenses occur within the till sheet. As part of the waste rock management preparation, field monitoring will also be undertaken to verify the expected conditions.

Ms Swami discussed at a very high level potential mitigation options should there be connection of the waste rock management area to the groundwater system. But the verification methods that I'm going to speak to now are during the site preparation and are required as part of the project construction quality plan and the field inspection and testing requirements. And these would include confirmation of shallow densities in the -- upwards of 300 millimetres using nuclear densometers according to ASTM standard D6938 which is the standard used both in Canada and in the U.S.

In areas of observed weathered till, we would conduct mapping of weathered and weathered horizons and desiccation fractures through continuous cord shallow boreholes to a

depth of approximately 5 metres so as to not -- so as to not provide connectivity to the groundwater system but to go deep enough to confirm the lack of permeable intervening glacial sediments in the till as well as conducting, as required, permeability testing in grain size analysis of the core samples as required.

And the timing, if we recall, about the installation of the waste rock management area is such that it is prepared as part of site preparation. The actual placement of materials into the main waste rock management area would be some 18 months to 24 months beyond that period because we have to get through the shafts and that will be in the temporary stockpiles. And so again, if we have -- if we have time to do proper investigations of the site as we are constructing it and to provide confidence that we have those.

Similar activities will be undertaken in the stormwater management pond as well, but a bit of a different situation in that particular case because we're actually extracting into the tills. So we'll have a good demonstration of the homogeneity as we are going

through and extracting for the construction of the stormwater management pond.

As Ms Swami mentioned, we thought it might be helpful to try to tie some of the basis between evidence that has been provided from July at a technical information session at last year's hearings and some of the discussions that we've had in the last few days with respect to the stormwater management pond.

Just to recap on the design basis, again, the pond will provide a minimum retention period of 24 hours for the six-hour, 25 millimetres storm event. Under normal operating conditions the total suspended solid effluent discharge will not exceed 40 milligrams per litre.

The design of the pond is consistent with MOE's Stormwater Management and Design Manual and the modelling of effluent discharge that we've used to date is according to the USEPA stormwater management model.

The capacity of the stormwater management pond is approximately 15,800 cubic metres at the overflow structure. The pond will be designed with a sediment forebay to address

total suspended solid sediment. And under normal operating conditions the pond discharge will be passive with the ability to stop the discharge flow as required. The pond will be designed to safely pass the one in 100 year storm event and direct the discharge to the ditch system and interconnecting road.

So some of the impacts of the DGR phases on the stormwater management pond were also discussed. So the stormwater management pond and the associated site drainage network will be established during the site preparation phase.

The effluent modelling of the site preparation, construction and operations phases were undertaken and a technical memorandum of these concentrations were provided in CEAA 954 for a variety of storm events. The highest total suspended solid concentrations in a storm event occurred during the site preparation phase which is expected to be limited to a six to nine-month period, of which a portion of this time is for the development of the stormwater management pond and associated drainage network.

The construction phase discharge

assumed an extremely conservative unmitigated underground discharge concentration of 5,000 milligrams per litre with a particle size of less than 100 microns. However, should the total suspended solid concentrations from the underground discharge be limited to 300 milligrams per litre, the discharge target of 40 milligrams per litre would be met and, therefore, we would require mitigation.

During the operations phase, given the insignificant contribution from the repository, the modelling shows that the discharge criteria would be met for all modelled storm events including the one in 100 year event.

As discussed in these hearing days there is no specific guidance on the potential for climate change and the influence of that on the stormwater management pond related to future storm event frequency and severity and such that we would be undertaking that with the CNSC.

I also wanted to just comment a bit on some of the OPG commitments already specific to total suspended solid management. Again, under normal operating conditions TSS

effluent discharge will not exceed 40 milligrams per litre.

And commitments specific to stormwater management and related systems are located in Sections 12.1, 12.2 and 12.3 of Table 1 of the Commitments List, Revision Number 2. And I'll just point out a couple or some of the specific examples of the many that are in that commitments report:

Modifications to the interconnecting ditch to accommodate increased flows so as to not overtop or create obstruction of flow.

During construction the temporary settling pond will be used to settle out any excess solids in water pumped from underground before discharge into the ditch system leading to the stormwater management pond. And this could be either at surface for different phases and then also reflects the use of the underground sump system during the lateral development and operations phases.

OPG will review the design basis of the stormwater management pond, recognizing the likelihood of large storm events and

potential consequences and will submit the results of this review to the CNSC and will increase the size of the stormwater management pond, if appropriate, as part of finalizing the DGR design.

A temporary water treatment plan provided by a selected contractor will be located in the vicinity of the shafts to receive water pumped from underground in the event there are abnormally high concentrations of oil, grease and/or grit in the water. It, however, will not be used to treat water in the stormwater management pond in the unlikely event of contaminated concentrations in the water exceed the discharge limits established through permitting processes.

This pre-treatment of total suspended solids during construction, if needed, is one of the items that we will have as part of the contracting strategy going into the selection of the shaft-seeking contractor and the lateral development contractor to have these contingency options identified.

And, lastly, in the event that they do not have one, i.e. a readily available

system to pre-treat the total suspended solids, then the accommodations will be for a contingency option to have one sourced and available.

So I hope this provides a bit of continuity between the various activities that we've undertaken with respect to the stormwater management pond.

THE CHAIRPERSON: Thank you very much, Mr. Wilson. You've saved the Panel some work in cobbling all of that together so that was very helpful.

I now know that, or I hope, that Environment Canada is available.

Oh, Dr. Muecke, did you have a follow-up question based on that?

MEMBER MUECKE: If I could follow-up on part of your presentation, the Panel has a question.

In your characterization of the till cover, which of the methods that you are using are suitable and sensitive to the detection of fracturing in the tills?

MR. WILSON: Derek Wilson, for the record.

I'll provide a preliminary

statement and then perhaps I'll ask Mark Jensen if he has anything to add.

What we had considered is with respect to the fracturing. We were looking at the continuous cord shell of bedrock or, sorry, boreholes in close proximity to be able to identify the potential for the connectivity of lateral features but also to be able to characterize the various weathered and un-weathered connections within the depth of the drilling.

But perhaps I'll put it over to Mr. Jensen to see if there is anything else he'd like to add.

MR. JENSEN: Mark Jensen, for the record.

The continuous coring and test pitting would provide us information on the depth of any fractures, desiccation fractures or other in the till sheet beneath the rock waste management area.

MEMBER MUECKE: Coring of tills involves a drill. These tills are clay rich. Does that -- is that suitable for the detection of any fractures and, in terms of conductivity,

how would the conductivity be affected with a smearing of the clays on the walls of the boreholes seals up the fractures?

MR. WILSON: Derek Wilson, for the record.

In the site investigation programs, in the history that we've had on the Bruce site with respect to these tills, coring of the tills has actually been quite successful for us. It's such a dense and competent till that we've actually had very good core results out of the work that we did in 2011.

And again, perhaps Mr. Jensen can provide some comments with respect to his experience prior to that with the more extensive borehole testing program that was done on the entire Bruce site and specifically the 600 boreholes in test pits that were done in the area of the OPG-retained lands.

But again we had very good results both -- the test pitting we had some difficulty specifically in the areas where the waste rock management area and the stormwater management pond would be because we just didn't have the equipment to get through the tills. It

was that intact and that homogeneous.

But perhaps Mr. Jensen can also add.

MR. JENSEN: Mark Jensen, for the record.

Yes, our experience with coring and the test pitting has been successful. But I think it's also helpful to remind ourselves of the historic work that has been done primarily at the Western Waste Management Facility in the late seventies and early eighties when the University of Waterloo did extensive hydrogeologic studies in this area and defined these weathered and unweathered units and provided estimates of hydraulic conductivity for each.

The continuous coring and test pitting will allow us to define these horizons and better understand the distribution of hydraulic conductivities within the till sheet.

MEMBER MUECKE: Do you have any expert opinions on the detection, the message necessary for the detection of fractures in tills?

MR. JENSEN: Mark Jensen, for the record.

Dr. John Sykes was here in September last year and commented on this.

THE CHAIRPERSON: Thank you.

So I think we are now ready to turn to Environment Canada. By my count we have four questions carried over from previous days for Environment Canada to address.

Ms Ali and Mr. Leonardelli, are you there?

MS ALI: Yes, we are here.

Nardia Ali, Environment Canada, for the record.

So we actually had five different items.

THE CHAIRPERSON: Okay.

MS ALI: I'm going to address the first one and then I will pass to Sandro Leonardelli to address the other four.

The first one was on Monday where you had asked Mr. Leonardelli if the further analysis required with regard to the design of the stormwater management pond, if Environment Canada meant that that could happen at the licensing phase should we get into that phase. So the answer to that is, yes, Environment Canada would be comfortable with the further analysis

occurring at the licensing phase.

Environment Canada has a Memorandum of Understanding with the Canadian Nuclear Safety Commission which commits both agencies to cooperate to achieve non-duplicative regulation on environmental protection for the nuclear industry. Through this arrangement, CNSC consults with Environment Canada for relevant expertise when reviewing analysis and reports associated with the licensing phase.

So we would be comfortable with further analysis happening at licensing phase because we would have opportunity to review and input. Thank you.

I will now pass to Sandro.

MR. LEONARDELLI: Actually, we'll just take a pause here if you have any questions?

THE CHAIRPERSON: No, we don't, thank you. So you can proceed.

MR. LEONARDELLI: Okay. So, Sandro Leonardelli, for the record.

I have four of the follow-up items here to address. Now, I've paraphrased the questions that we were asked to try to make them easier to understand.

So the first one had to do with climate change. And the question was does EC have or is developing guidance on designing mitigation for climate change?

So Environment Canada has no responsibility or mandate for development of infrastructure codes and standards. However, we do provide expert advice and data to the groups such as the Canadian Commission on Building and Fire Codes who do develop these codes and standards.

In regards to stormwater facilities, provincial ministries develop design standards and guidance. Environment Canada does develop federal policy on adaptation to climate change, but not on a site-specific or situation-specific basis.

Environment Canada also publishes rainfall intensity; duration; frequency analyses which are based on historical climate information which are used to inform local stormwater and other infrastructure design. However, we are not involved in any initiatives to alter these intensity/duration/frequency curves to reflect the influence of climate change.

And in the context of our advice and environmental assessments, Environment Canada does recommend that project proponents factor additional stormwater capacity to account for climate change when they design their facilities, particularly in situations where there is a long term operational period and where the release of effluent may be deleterious to fish.

So I'll just pause now for any questions.

THE CHAIRPERSON: So Mr. Leonardelli, if the Panel has understood correctly, Environment Canada provides guidance but you do not get involved in such as you have just stated, general guidance advising proponents that they need to plan for climate change. But you don't get into the specifics of individual projects.

So supplementary to that, would that then be the -- for example, agencies such as the Ontario Ministry of Environment and climate change?

MR. LEONARDELLI: What I can answer to that is that they do have the standards and guidance for stormwater facilities.

But I would emphasize again that the stormwater management pond that's the name for this effluent holding pond but because of the process effluents that are going into it. It's not strictly speaking a stormwater management pond.

THE CHAIRPERSON: Yes, thank you, Mr. Leonardelli, and your written submissions have been very clear on that point. Thank you for that.

Okay. Dr. Archibald, Dr. Muecke, did you have any other questions on that topic?

All right. So let's proceed to the next question, please.

MR. LEONARDELLI: Okay. So Sandro Leonardelli, for the record.

The other had to do with sustainability criteria, and the question was:

"Could you provide any feedback to the Panel with respect to those sustainability criteria originally appearing in IR EIS-03.44. The Panel is interested in the extent to

which this requirement within the terms of reference to use sustainability has actually been followed and reviewed by the appropriate regulatory agencies."

So our answer to that is that the EIS guidelines requirements regarding sustainability included a focus on two topics, biodiversity and the capacity of renewable resources.

Environment Canada did not specifically use those sustainability criteria as guiding principles to our review. However, we feel that EC's -- that Environment Canada's review of the project and its effects did encompass those criteria to a certain degree.

Looking at the criteria now in the context of our prior review, we can say that our review did address bio diversity in that we addressed impacts on migratory birds and several species at risk.

We also reviewed the ecological risk assessment and context of -- sorry, in context of impacts on those species.

As for capacity of renewable resources, during the course of our technical review, we did consider the importance of commercial, subsistence and recreational facilities in the local and regional study areas.

Sorry. The importance of commercial, subsistence and recreational fisheries in the local and regional study areas.

Our review of water quality impacts was with respect to the federal *Fisheries Act*, which targets protection of Canadian fisheries waters, and this is demonstrated by the in-depth analysis and recommendations regarding water quality that are contained in Environment Canada's departmental submission dated July 23, 2013.

That's the end of that answer, and I'll pause for questions.

THE CHAIRPERSON: It does not appear that we have any questions, Mr. Leonardelli, so you can proceed to the next one.

MR. LEONARDELLI: Okay. Thank you.

Sandro Leonardelli, for the record.

There was a question about the Canada-wide standard for PM-2.5. That's particular matter.

The question was:

"What level of protection to human health is afforded by the Canada-wide standard for PM-2.5?"

PM-2.5 -- sorry, our answer.

I'll start on the answer here.

PM-2.5 is regarded as a population level non-threshold pollutant, which means that there are no safe levels for the population as a whole. The lower the concentration, the less impact on health and environment.

The Canada-wide standard for PM-2.5 was set to provide protection for human health, but also to recognize economic and technical feasibility of achieving it.

Canada now has more stringent and more comprehensive Canadian ambient air quality standards for PM-2.5 that replaces the Canada-wide standard for PM-2.5.

Health Canada can be contacted

for any additional information about the level of protection afforded by the Canada-wide standard or the Canadian ambient air quality standards for PM-2.5.

And that's -- that ends that answer.

THE CHAIRPERSON: Thank you very much.

I think we can now proceed to the final question. Thank you.

MR. LEONARDELLI: Okay. So the last question that we had on our list was in regards to the NPRI. The question was:

"Would the DGR have to report to the NPRI?"

So just a little bit of background.

The NPRI is an inventory of pollution releases, disposals and recycling from various industries. If a facility meets the reporting criteria, they are legally obligated to report.

The determination on whether reporting is required considers many different types of information against the reporting

criteria. In very simple terms, we would need to consider the number of employee hours worked at the facility in a given year, what substances are on site and what is occurring with them and/or what amounts are being released, disposed or recycled.

So for example, the substances manufactured, processed or otherwise used or released must be compared to quantity thresholds.

Different categories of substances have different thresholds, so it's not a simple exercise.

At this point, we do not have enough information to be able to determine if OPG would be required to report for the DGR. OPF would need to identify the NPRI substances at the DGR site, calculate quantities of the substances, then compare these to the quantity thresholds to determine if they trigger reporting.

How they use these substances is an important factor in that determination.

Once the information -- once the necessary information is prepared, OPG can contact Environment Canada's NPRI program staff for further assistance in determining whether

they are required to report.

And that ends our answer on that.

THE CHAIRPERSON: Thank you, Mr. Leonardelli.

Based on that response, the Panel does have a question to OPG.

So for the current Western Waste Management Facility, have you actually gone through the exercise just described by Mr. Leonardelli and, if so, what were the results?

MS MORTON: Lise Morton, for the record.

So the process that Mr. Leonardelli describes is exactly what we do with respect to NPRI, so on an annual basis, we do exactly that assessment. We do report under NPRI and, for example -- I always seem to be going by memory here, but last year, I know, for example, dioxins and furans get reported out through that emissions report.

We could certainly obtain the NPRI, our latest NPRI report, if that's of use to the Panel.

THE CHAIRPERSON: Yes, please. That would be of use to the Panel, just the

latest one to give us an idea.

Panel Members, did we have any further questions?

Dr. Muecke?

MEMBER MUECKE: Other than that in terms of the DGR and the same exercise would be followed?

MS SWAMI: Laurie Swami, for the record.

Of course, we would follow the same exercise so that we would meet regulatory requirements.

THE CHAIRPERSON: Thank you very much, Mr. Leonardelli and Ms Ali.

I believe we've come to the end of questions from the Panel regarding your additional information.

We are now going to take a break. When we come back from the break, the -- I will entertain proposed questions from registered participants. And finally, the Panel will deal with written submissions.

So we will reconvene at 25 minutes past 4:00.

--- Recessed at 1608 / Suspendue à 1608

--- Resumed at 1625 / Reprise à 1625

MS MCGEE: Good afternoon. If I could ask everyone to take their seats so that we can resume.

Thank you.

THE CHAIRPERSON: Before we proceed with questions from registered participants, the Panel has one more question as a follow-up from Dr. Muecke regarding the issue of the nitrates, I believe it is.

MEMBER MUECKE: This Panel question is directed at both CNSC and OPG.

Could you provide the Panel with information on the possible interaction between nitrates and the ion exchange resin containers that they'll be placed into the DGR?

MS SWAMI: Laurie Swami, for the record.

I'm going to ask Dr. Evans to reply to that, and perhaps he will need a little bit more time, so if he's -- just to give him a hint, if he needs more time, we'll come back tomorrow, but hopefully, he'll be able to address that right away.

DR. EVANS: Dr. Evans, for the

record here.

The -- we've recognized for some time that the resins themselves, the hydrogen formed cation resin, is inherently acidic regardless of the -- of whether nitrates are involved or not.

In the case of gadolinium nitrate, we're pulling what is effectively a slightly acidic salt that largely -- so cation loading on the gadolinium on the cation resin, nitrate loading on the anion portion of the resin.

But as I say, cation resin in its unexhausted form, in the hydrogen form, which is the starting form, is inherently acidic, so problems were identified with some of the first generation spent resin liners. And Dr. Gierszewski could probably speak to that better than myself, or Ms Morton.

But as a result of that, we realized that there were some defects in the internal coding of some of these carbon steel epoxy-coated resin liners that had led to internal corrosion of those, mostly because of contact with the unexhausted hydrogen formed

cation resin rather than any specific issue with respect to nitrate forms.

As a result, any of those containers which were found to have wall thinning were over-packed, to the best of my knowledge, and we have also switched the design to a stainless steel resin liner to avoid similar problems developing in the future.

MEMBER MUECKE: Thank you.

Is there any -- or could there be reactions which are biogenic in nature if the material is not properly [technical difficulties]?

DR. EVANS: Dave Evans, for the record.

The resins we recognize are not held under sterile conditions. There is some low level of microbial activity present in the resins, probably starting from their discharge to the spent resin storage tanks in the station.

We haven't seen evidence of high levels of biological activity. There have been -- has been some minor evidence of gases which may be of biological origin. It is certainly not unknown in spent media containers

that biological activity can exist.

The resins themselves are not a particularly fertile medium for proliferation of microbial activity where waste media problems have developed in the nuclear sector. They've largely been traced to the use of cellulosic materials rather than the ionic exchange resins themselves.

MEMBER MUECKE: Taking the resins in combination with a nitrate, would that produce a more fertile environment for microbes?

DR. EVANS: Not being a microbiologist, I would hesitate to pronounce on that, so I would -- I would defer to a microbiology expert on that score.

I don't know if that is an assumable form for microbial activity.

THE CHAIRPERSON: Dr. Muecke, did you want CNSC to respond to any part of those questions?

MEMBER MUECKE: Yes, please.

DR. THOMPSON: Patsy Thompson, for the record.

In terms of the explanations that OPG have given in terms of the over-packing of

the original carbon steel containers and switching to stainless steel containers, that's the information we have as well, so we can confirm that that is, indeed, how it was done.

In terms of the potential level of microbial activity in gas production, the CNSC looked at it in two ways.

In terms of the assessment that was conducted for the safety assessment and the safety case, the safety case doesn't rely on the integrity of the containers, so the assumption is that the containers fail and that all the material that is available for gas production produces gas, and that was the -- essentially the conservative assumptions done for the bounding safety case.

The CNSC had a workshop, I believe, in January 2012 with experts in microbial activity in Deep Geologic environments and looking at, essentially, the information that was available for the proposed site, some of the characteristics of the waste. And the judgment of the experts was that the assessment was conservative and bounding, and recommended some additional research moving forward, which we've

incorporated in some of the other recommendations we've made and the way we will be reviewing the geoscientific verification plan.

THE CHAIRPERSON: Dr. Thompson, as a quick follow-up, the Panel would be interested in CNSC's assessment of the pre-closure safety case in this regard.

DR. THOMPSON: Patsy Thompson, for the record.

I would hate to say that if -- but I still have to say it. Could we come back tomorrow morning with this?

THE CHAIRPERSON: Yeah, you can.

DR. THOMPSON: Thank you.

THE CHAIRPERSON: All right. We now have time for questions from registered participants.

Participants are reminded that questions must relate to today's presentations, and access to the microphone is not to be used to make a statement.

I understand from secretariat staff that we have eight people who have asked for leave to present a proposed question.

Dr. Greening, please proceed with

your question.

DR. GREENING: Thank you. Good afternoon. For the record, I'm Frank Greening.

And my question is really directed to OPG, but maybe CNSC could also comment.

In OPG's presentation on the RWOS operations, on slide number 3, they have a bullet that says "tritium levels are currently stable at 150 to 200 Becquerels a litre".

Now, I have in my mind here a graph from the Nuclear Waste Management Organization DGR TR-2011-06 entitled "Radiation and Radioactivity Technical Support Document". And it shows on -- in Figure 5.9.2 measurements of tritium in a well, Well 231, which is adjacent to the RWOS site, which shows levels of surpassing 40,000 Becquerels per litre in 2007, continuing to rise ever since, hitting 75,000 Becquerels per litre in 2010 when the graph ends. But I do believe I've seen data to show that the upward trend is continuing.

So I'd like to ask OPG to explain why they say tritium levels are currently stable at 150 to 200 Becquerels a litre. Thank you.

THE CHAIRPERSON: OPG?

MS SWAMI: Laurie Swami, for the record.

I am going to ask Ms Morton to provide more detail on this. But if you recall, last year we had a lot of discussion about the results that Dr. Greening is referring to. And in this morning's presentation we were referring to the results that he presented earlier, and that was the response.

However, I know Ms Morton has much more detail on this, if that is helpful.

MS MORTON: Lise Morton, for the record.

The slides in the discussion that both ourselves and the CNSC presented about an hour ago related to comments that had been made with respect to Rad Waste Operations Site 1. And the tritium levels at Rad Waste Operations Site 1 have stabilized at about 150 to 200 becquerels per litre.

Water Sample Hole 231 is located at what used to be called Rad Waste Operations Site 2, not the WWMF.

These two sites are quite

distinct from each other geographically.

So Water Sample Hole 231 -- again, and I believe we discussed this last year, it is certainly public record -- Water Sample Hole 231 adjacent to the WWMF has exhibited some high tritium levels.

We mentioned earlier as well that we committed to putting the emissions data on our website. That emissions data is there and the Water Sample Hole 231 information is included in that emissions data on the website.

With respect to where Water Sample Hole 231 is currently at and, sorry, I didn't catch the data that Dr. Greening referred to in 2011, but there have certainly been fluctuations that go as high as, and I believe we reported this last year as well, the peak was 80,000 becquerels per litre in approximately 2009.

And it fluctuates quite a bit, and for the last several years has been stabilizing at approximately 40,000 becquerels per litre.

I also want to point out that Water Sample Hole 231, as a result of this, is

sampled on a higher frequency than our other water sample holes. So we actually sample it monthly and report those results on that basis as well to the CNSC.

THE CHAIRPERSON: Thank you, Ms Morton. And, as you correctly point out, we had a considerable discussion about this last fall. And so the Panel doesn't require any further detail at this time.

Dr. Greening?

DR. GREENING: Thank you. My second question is directed to both OPG and the CNSC, because both of these organizations have insisted that an accident such as the one at the WIPP facility in the U.S. could not happen in a Canadian nuclear facility because we have a superior safety culture here in Canada.

Now, I would like to point out that I was part of the alpha recovery team that investigated the root cause of the 2009 Bruce alpha contamination event.

And in the course of that work, which went -- I was there for over a year, I spoke to many health physicists about the causes of the alpha contamination event and they

admitted that they knew there was a serious airborne alpha contamination problem by mid-December 2009, but allowed work to continue because of production pressures.

And I have a quote from a senior health physicist who said to me, "I guess I could have shown more resistance to production pressures, but that would have made me very unpopular with the restart engineers I work with."

So I would like to ask the CNSC that does this situation not represent credible evidence of a serious degraded safety culture in a Canadian nuclear facility? And I should add that that facility had nine CNSC inspectors on site throughout the alpha event.

And I would add that if a degraded safety culture could develop at Bruce Power, one of this magnitude where 550 workers were contaminated, why could this not develop in the proposed DGR?

Thank you.

THE CHAIRPERSON: CNSC, you did provide the Panel with a statement regarding the response to the "alpha" incident the other day.

Is there anything else you would like to add, particularly with respect to DR. Greening's assertion around safety culture?

DR. THOMPSON: Patsy Thompson, for the record.

I will try to provide perhaps a little bit more background information. I am not able to comment on the statements Dr. Greening has just made in terms of conversations he has had with health physicists from Bruce Power. I am not privy to that information and I haven't seen it.

CNSC, through our work with the Nuclear Energy Agency and there is a working group called the -- it essentially looks at exposures from workers in the nuclear industry and trends doses in the industry looking at best practices for -- ALARA practices to manage and reduce exposures to workers.

From that work and the work of WANO had identified potential issues with the way that the alpha risk had been managed at CANDU reactors.

And so last week I spoke to a ratio that had been used for protection of

workers. And so historically, the ratio of beta radiation to alpha radiation had been studied and was used as a basis that if workers were protected for beta radiation the level of alpha exposure were lower and, therefore, workers were protected for alpha.

And so that manner of doing things had been through self-assessments conducted under WANO, had been questioned, and there was some work that had been initiated by Canada Nuclear Power Plant licensees to review that basis for their radiation protection programs.

While that work had been initiated by CNSC licensees, the alpha event at Bruce Power occurred during the refurbishment of Unit 1.

Retrospective assessment indicated that essentially the shutdown units undergoing refurbishment had also indicated some historical uptakes of alpha which had occurred in certain areas. So it confirmed essentially the assumption that if workers were protected for beta contamination, they were also protected for alpha. And we essentially determined that that

assumption wasn't valid in certain cases.

When the event happened at Bruce Power they immediately notified the CNSC, work was stopped in the affected area until cleanup of alpha contamination was completed. Workers potentially affected by the incident were removed from other radioactive work until bioassay results were obtained, assessed, and their doses confirmed.

CNSC staff, on January 22, 2010, conducted a reactive inspection, so an unplanned inspection to confirm that the licensee had taken all the required actions under their Radiation Protection Program and verified that, moving forward, this issue would be addressed.

There was also, following the inspections and additional work, there was no indication that alpha contamination had spread outside of the Unit 1 vault and there was no indication of risk to the public and the environment.

This event was initially reported to the CNSC during a public meeting on February 18, 2010 and there were a number of other reports to the Commission, and the follow-up inspections

by the CNSC in May 2010.

There was a lot of work done in relation to this. We reviewed essentially Bruce Power's reaction in terms of modifications to their Radiation Protection Program, the measures they were putting in place for moving forward to make sure this even didn't happen.

The CNSC looked at best practices that were in place in other places and developed a series of requirements that were sent as precautionary measures to all the CNSC NPP licensees as well as to Chalk River who also handled this kind of material.

The licensees, this was done through a 12(2) request. All licensees responded, did retrospective assessments to ensure that if workers had potentially been impacted by previous work, that they had been identified and bioassays were being conducted.

The work of Bruce Power was also geared towards the workers, informing them of the risk, what was being done through the bioassays measurements. There was information provided to families. This was essentially a very serious even that caused essentially reactions and review

by licensees and by the CNSC in terms of our regulatory requirements.

Through that event we found that Bruce Power had acted responsibly towards the workers. The measures that are currently in place, have addressed the root causes of the problem and other factors. There was also work done by the Radiation Safety Institute of Canada to review for Bruce Power the events.

They also had several meetings with workers to make sure they understood what the concerns were from the workers and addressing them.

That is all I can say. We found, through that event, that the reactions of the licensees, reporting to the CNSC, addressing concerns and issues with workers, removing them from additional work until we had a good idea of what their exposures were was appropriate.

The CNSC did a lot of work to make sure that the bioassays that were being done, because they are not routine bioassays, we reviewed all the technical requirements for bioassays.

There was a limited number of

laboratories in Canada that could do the bioassays. So we also worked to make sure that the samples that were being sent to the States, for example, responded to the CNSC quality assurance requirements.

And when I was struggling with the NEA committees, the International Systems on Occupational Exposure that the CNSC participates in.

And I am being corrected, that when I said WANO, I should have said the World Association of Nuclear Operators.

THE CHAIRPERSON: Thank you, because I was going to ask you about that.

A quick confirmation from OPG in terms of your corporate response to this particular incident. We understand you did receive notification from CNSC. And just confirm your response in terms of in the principle to OPEX and as well as within the regulatory requirement to have a look at the situation and changes that it would trigger.

MS SWAMI: Laurie Swami, for the record.

Our corporate response was I

would call it significant. We also, as described by Dr. Thompson, we went through a thorough review of all of our facilities to assess if this hazard existed at our facilities. We did that both at our operating plants and at the Western Waste Management Facility.

And I understand we did identify a few areas, so we took precautions around those areas at the Western Waste Management Facility.

We also entered into retrospective dose assessments for the potential that someone may have been exposed. That work was completed and we reported, of course, to the CNSC on that aspect of it.

So we did the identical work that all of the other facilities were doing at the time. As Dr. Thompson referred to it, there was a limited capacity for doing the analysis, and so it was done on a priority basis. And we did some screening of the potential for the effects within OPG.

And there are international standards, as referenced, but we also followed EPRI guidelines for implementation of the program, and that had been underway for about --

since 2009 we had initiated the program.

But with the event, it sped up our implementation and really, you know, we looked at that very seriously and took the appropriate action, whether through the regulatory response or through our own OPEX program, through the World Association of Nuclear Operators as well as through contacts directly with Bruce Power.

THE CHAIRPERSON: Thank you.

Dr. Greening?

DR. GREENING: Just one more question. This one is on iodine-131, which was mentioned both by the CNSC and OPG. And I think it was the CNSC that asserted that iodine-131 is released from the incinerator.

And, by the way, the figures they give of around 10^{-4} to 10^{-5} becquerels per year are correct. But I would like to point out that in 2001 there was more than 10^{-7} becquerels of iodine-131 released that year.

So my question is basically why are there any iodine-131 emissions from an incinerator that is supposed to be burning low-level waste? I am baffled why there should

be iodine-131 in low-level waste, because it is supposed to be wipes, cloths, rags.

Iodine-131 comes from the heat transport system and is collected by the ion-exchange resin and it should remain on that ion-exchange resin.

So could the CNSC and OPG explain why there is any iodine-131 coming out of the incinerator stack?

Thank you.

THE CHAIRPERSON: I will start with CNSC?

DR. THOMPSON: Patsy Thompson, for the record.

The data we provided is for the period that will -- the five-year review period essentially.

We haven't gone back to earlier periods. We just -- the key message was that, you know, this is being monitored, we are aware that it is being released, and the higher value provided by Dr. Greening is still below the derived release limit. And so it is a fraction of the public dose limit of 1 millisievert per year.

In terms of why it is being released, it is beyond my capacity to respond to that question.

I don't know if Ms Klassen can...?

--- Pause

So perhaps OPG would be better positioned to explain the origin of iodine-131.

THE CHAIRPERSON: OPG?

MS SWAMI: Laurie Swami, for the record.

At our facilities the heat transport system can be opened up for maintenance from time to time, and during that maintenance we would use materials to clean up and ensure that there was no spills of material as an example.

So that would be cleaned up and would enter the waste stream as a low-level waste and would enter into the incinerator stream. That is one way that iodine-131 could get to Western Waste Management Facility.

These are small quantities, it is not -- compared to what you would see at the reactor sites, it is fairly low-level.

THE CHAIRPERSON: Thank you.

Ms Lloyd?

MS LLOYD: Thank you, Dr.

Swanson. Brennain Lloyd.

My first question is for CNSC and it is in follow-up to the discussion about the CSA document that embodies the requirements for safety culture. And I think it was Dr. Thompson this morning identified that as CSA N286.

I did a search and there are numerous documents as N286. And I just want to confirm that I am looking at the right document, it is CSA N286-12 and it is titled Management System Requirements for Nuclear Facilities. The first several appear to apply only to nuclear power plants. And it is available on the CAS website for \$490.

Now, my first question is whether Dr. Thompson can confirm that that is the report she has identified to us?

THE CHAIRPERSON: Dr. Thompson?

DR. THOMPSON: Patsy Thompson, for the record.

It is CSA N286-12, which means it is the 2012 version. And as for the cost, we are aware of the cost. The CNSC has tried to address

this with the Canadian Standards Association, and obviously with not much success.

THE CHAIRPERSON: Ms Lloyd?

MS LLOYD: So, predictably, my next question is where is the document available by some means other than paying \$490? Is it, for example, available in the CNSC library or through inter library loan or by some means?

THE CHAIRPERSON: Dr. Thompson.

DR. THOMPSON: Patsy Thompson, for the record.

I believe it is available from the CNSC library, but I can confirm that and I will let Ms Lloyd know.

MS LLOYD: Thank you.

My second question is around the licensing handbook which was filed as part of CNSC PMD 13-P1.2 last July. And my question again is for CNSC. I am wondering if CNSC intends to file a revised draft licensing handbook based on changes to project definition and so on in the course of the last 13 months?
--- Pause

THE CHAIRPERSON: Apparently we are waiting for the CNSC to respond?

MS KLASSEN: Kay Klassen, for the record.

The intent is to review the LCH to reflect changes that might have occurred over the period of the review, the decision of the Minister of the Environment, and to reflect the decision of the Commission should a licence be issued.

THE CHAIRPERSON: Thank you, Ms Klassen.

Ms Lloyd?

MS LLOYD: And I think that is helpful in terms of the next part of my question, which is around -- and this may be actually a question for CNSC counsel.

I am not clear on the Panel's role in approving the licensing condition handbook prior to the close of this hearing.

You are charged with issuing the first two licenses, so how does that -- you know, what is the sequencing and what is your role in that final license approval, particularly given that there will be revisions both to the supporting documents, I assume, and to the draft licensing condition handbook?

THE CHAIRPERSON: Ms Lloyd, I will start with a response. And if counsel decides that I need a bit more detail, I am sure he will pass me a note.

But, as you know, step 1 is that the Panel will release our report to the Ministry of the Environment. And it is only after the report is released the Minister conducts her review and gives a recommendation that we even know whether we are going to the licensing phase.

At that point, the Panel is provided with the updated licensing document, as Ms Klassen has just explained.

And at that point, the Panel, as now temporary commissioners under the CNSC, would interact with staff, as I am sure you have seen in other licensing processes, and go back and forth with questions to staff in terms of the licensing conditions until we settle satisfactorily on the final form of those licence conditions -- unless I am incorrect, and I am sure Mr. Saumure will let me know if I have left anything salient out or have erred.

--- Pause

THE CHAIRPERSON: Sure enough, I

wasn't quite right.

So the Licensing Handbook is to align with the licence conditions and it enunciates the expected compliance verification conditions of the licensee.

So the Panel would approve the licence and the licence conditions and then the Licensing Handbook is for compliance verification.

Uh-oh, it looks like I'm still not -- Dr. Thompson...?

--- Laughter / Rires

DR. THOMPSON: Patsy Thompson, for the record.

Essentially the proposed licence that accompanied the CMD last year had generic conditions that spoke to, you know, the Minister's decision. There were requirements for a follow-up program if there are hold points, and then the Licensing Condition Handbook would need to be updated to reflect the commitments and the criteria that CNSC staff would propose to use to verify compliance.

This is in the CNSC management system, a control document, and so there is very

tight control of the Licensing Condition Handbook and any updates to the Licence Condition Handbook as a result of work being done, for example, is provided to the Commission on a regular basis so that they can track how the control changes to the LCH have been done to reflect work that has already happened, for example.

THE CHAIRPERSON: Thank you.

Ms Lloyd...?

MS LLOYD: Thank you.

This is the final part to this question. My understanding based on limited experience, experience of the Darlington new build, which was also a Joint Panel and both EA and licence, is that after the Panel adjourned the EA hearing that was the end of opportunity for public engagement or input.

So I'm wondering if this process is going to be the same or if, in fact, we will have an opportunity to review and comment on that revised draft Licence Condition Handbook.

As I understand it from looking at the draft Licence Condition Handbook, it relies on a whole list of documents that described the project as filed 2011, 2012, 2013,

I expect many of those will have to be revised and updated.

So I'm wondering, it seems to me, you know, there is a big job lies ahead in the licensing stage if you should ever issue when EA approval.

So what is the public role in that? What are the opportunities for further comment, or is the 2013 draft Handbook it in terms of our opportunity to review?

THE CHAIRPERSON: Dr. Thompson, I believe you indicated you could answer that question.

--- Pause

THE CHAIRPERSON: In the meantime, Mr. Saumure has pointed out that if the Panel needs further information or deems that further public input is required, the Panel could ask for additional days.

MS LLOYD: Please do.

THE CHAIRPERSON: Dr. Thompson...?

DR. THOMPSON: The fact that this is a Joint Review Panel and a joint review process the opportunity to comment on the licence, the

licence conditions and License Condition Handbook was during this hearing.

I would have one more information in terms of the CSA standard. The CSA standards, as a result of discussions between the CNSC and the Standards Association, is accessible to the public as read-only access. So it's not downloadable, but the public has access in terms of read-only to all the documents. This was announced on the CNSC website about a year ago.

THE CHAIRPERSON: Thank you.

Ms Lloyd...?

MS LLOYD: Okay. Thank you, Dr. Swanson.

THE CHAIRPERSON: Ms Martin...?

--- Pause

MS MARTIN: Joanne Martin, for the record.

My first question is, what follow-up was done for the health of the 550 affected alpha event workers? What follow-up has been done looking at their health since that incident?

THE CHAIRPERSON: I will direct this question to CNSC, please.

--- Pause

DR. THOMPSON: Patsy Thompson, for the record.

So as luck would have it, I had all those numbers a minute ago. Okay.

So as a result of the monitoring of workers, the results indicated that 410 workers had doses less than 1.0 mSv per year; 104 workers had doses between one and 2 mSv, 40 workers were assigned doses between two and 5 mSv; three workers were assigned doses between five and 10 mSv and there were no workers who had doses above 10 mSv.

To put that in context, the CNSC dose limit for workers is 50 mSv per year and 100 mSv over the five-year period. No workers exposed during the alpha event exceeded any of the dose limits, the regulatory dose limits.

At those types of levels of exposure, no health effects are expected on workers.

THE CHAIRPERSON: So to sum up, Dr. Thompson, the Panel understands that because of those doses there was no formal follow-up of any of the workers?

DR. THOMPSON: Patsy Thompson,
for the record.

All the workers that work at CNSC licensed facilities that are nuclear energy workers and for whom doses are measured by a licensed dosimetry service, so like Bruce Power, OPG and other licensees have licensed dosimetry service, so it is a separate licence that is issued by the CNSC for dosimetry.

All their dose information is sent to Health Canada's National Dose Registry. So there is a tracking -- so all their past doses and their future doses, including those from those events -- from that event are sent to the National Dose Registry and statistics are kept and there is essentially follow-up of those workers.

That information is used periodically by the CNSC and others to do epidemiological studies of those workers. For example, last year we reported on a large epidemiological study that the CNSC had completed that was published in the British Medical Journal of Cancer that essentially looked at Canadian and NPP workers for an extremely long period and

looked at -- it was a cohort study, it looked at cancer incidence in those workers.

THE CHAIRPERSON: Thank you.

Ms Martin...?

MS MARTIN: So my health background makes me ask, and we know the names of all those workers, and has there been any looking at if any of them have ended up having cancers, and also what were the psychological consequences of this accident?

Were there some workers that actually were too upset to continue at work and what happened to those people?

DR. THOMPSON: Patsy Thompson, for the record.

There were I guess services in place, so all workers were met individually, were explained the situation, they were explained why they needed to provide bioassays, samples. They were provided through individual meetings their bioassay results, their dose information with explanations of their significance.

When families needed information, there were meetings with those families as well.

The elapsed time between the

incident would not be long enough, taking into consideration the latency period of cancer development, to expect any cancers at this time in that group of workers, but they will continue to have their doses reported to the NDR and would be captured in a future epidemiological study.

THE CHAIRPERSON: Thank you.

Ms Martin...?

MS MARTIN: Now if I could turn to risk assessment. Many interveners have expressed the opinion that the risk assessment exercise was not carried out in a complete and repeatable way and, therefore, was not adequate in considering alternative siting options.

Will the JRP ask that OPG thoroughly investigate an alternative DGR site away from the Great Lakes basin, rather than a conceptual one, as well as an enhanced surface storage option away from the Great Lakes?

THE CHAIRPERSON: Ms Martin, direct questions to the JRP is not part of this process.

We have the information in front of us and we will determine whether there is sufficient information. Thank you.

MS MARTIN: Thank you.

The next question is financial. What I'm wondering is, what would be the financial consequence of OPG deciding to move on from this proposed site and look for another site? Is that a financial possibility; is it just too expensive for what are the ramifications of that, and what are the ramifications as well to places like Kincardine that is expecting to get money every year and maybe some other people who were hoping to make money or who would expect that maybe they would have some considerations?

THE CHAIRPERSON: Ms Martin, we are now getting into an incredibly highly speculative area and I'm really not inclined to forward that question on to OPG.

MS MARTIN: Okay. Thank you.

What assurance can the -- and then again, this is risk assessment, what assurance can the near public have that we are protected from any malevolent acts at the Bruce, the proposed DGR site or even at Bruce Power, given the increasing violence around the world and, as our American neighbours are prime targets, and how are we protected?

THE CHAIRPERSON: Ms Martin, as you know, last fall there was an in-camera session between the Joint Review Panel and OPG regarding security issues. For very obvious reasons that information cannot be shared in an open forum. I think that question is applicable to anything going on in society these days and I really don't know what else we can ask OPG at this point in time, or CNSC.

Well, if Dr. Thompson wants to volunteer, you can try.

--- Laughter / Rires

DR. THOMPSON: Patsy Thompson, for the record.

I wasn't going to volunteer protected information, what I was going to say is that the compliance of licensees with security requirements is assessed on an ongoing basis. There are regulatory requirements, there are inspections and this is reported regularly to the Commission and is a subject of consideration. It is one of the safety and control areas that is considered by the Commission in license renewals. And so Bruce Power -- the facilities on the Bruce site comply fully with security requirements.

THE CHAIRPERSON: Thank you for reminding the Panel. This information was, I can assure you, Ms Martin, given to the Panel last fall.

MS MARTIN: Thank you very much.

THE CHAIRPERSON: Next, Mr. Mann.

MR. MANN: Thank you, Dr.

Swanson.

I'm asking leave to ask OPG and CNSC the following: On Friday, February 28, 2014, just two weeks after the WIPP disaster exploded, the Toronto Star reported:

"Bruce waste site radiation understated says former OPG scientist, Dr. Frank R. Greening, and Ontario Power Generation has severely and consistently underestimated the level of radioactivity of material destined for a waste storage site near Kincardine, sometimes by factors of more than 100, sometimes as high as 600." (As read)

And the Star reported that OPG

confirmed some of his valid points. As a result of that Star article, I wrote an e-mail two days later on March --

THE CHAIRPERSON: Mr. Mann, I'm going to stop you right there.

MR. MANN: Yes.

THE CHAIRPERSON: We have dealt with that issue. The Panel explained that that particular information about the WIPP incident was not required by the Panel. We have devoted now a considerable amount of time learning a lot more about the WIPP incident.

If you have a specific question regarding the information in front of the Panel that would add new information, please go ahead, but I have no patience with going back over that well-ploughed ground.

MR. MANN: But, Doctor, OPG and CNSC didn't respond at any time, just like they haven't responded to any of my other 3,000 pages.

THE CHAIRPERSON: Mr. Mann, they have been responding since last week --

MR. MANN: No, to my --

THE CHAIRPERSON: -- for lots of questions.

MR. MANN: To my e-mails. They have not responded over my 3,000 e-mailed questions and, in our local paper, Dr. Swanson, they have an "Ask us" campaign going on. It says:

"Our team of experts is ready to answer your questions and hear your views." (As read)

And this has been in my local newspaper for the past four weeks. Well, I have been communicating with them for two to three years now and over 3,000 pages to my record, they haven't responded to my questions and answers yet -- to my questions.

THE CHAIRPERSON: Well, Mr. Mann, the Panel has looked at your 3,000 pages and this is the reason why we devoted a full day, plus additional follow-up days to questions and answers regarding WIPP, and I am rather confident that we have covered the points raised by Dr. Greening and explored them.

So unless you have a question that would add to our information, please move on.

MR. MANN: Thank you.

On page 122 of Dr. Greening's testimony he notes a question regarding the frequently asked question. The question is:

"How does OPG account for the discrepancy between Dr. Greening statements and OPG's submitted inventory report to the Joint Review Panel?"

OPG's answer:

"The estimates used in the pressure tube waste inventory for the 2010 inventory report were based on available information at that time."

Dr. Greening then goes on to say in his testimony before this Panel the other day:

"Now, this is simply not true. OPG did not use available data, but used fabricated data instead. Worst yet, the discrepancies in question are not due to unavailable data, but are due to mistakes in OPG's calculations. So OPG needs

to explain why it ignored real data available from no less than seven studies carried out between 1990 and 2006, studies that provide a plethora of measured values of radionuclide activities in pressure tubes. And OPG also needs to explain its computational errors."

So I'm asking OPG and CNSC to answer with Dr. Greening noted, because to me this is alarming to indicate that OPG might have fabricated evidence. That borders on criminal activity in my --

THE CHAIRPERSON: Mr. Mann, okay, this is the reason why the Panel returned to the subject today and we endeavoured to cover the points raised by Dr. Greening, first of all last week based on his original written submissions, and then today based on the new information presented to us in his oral submissions.

We have methodically gone through the concerns and issues raised by Dr. Greening point by point by point and the Panel at this

point, I can say to you, have no more remaining questions to ask related to Dr. Greening's submission, both his original written submission and the new information presented to us.

Unless you can identify something by simply reading out to us from the transcript, it has not identified to me anything new that we might want to ask.

MR. MANN: Dr. Swanson, as a citizen -- it says, "OPG used fabricated data". I'm concerned and they haven't responded to that so they must concede that they did.

THE CHAIRPERSON: OPG -- OPG explained the basis for the dispute was around the use of measured versus estimated data. We had a lot of conversation about this today. The Panel is quite satisfied that that information is sufficient.

The adjective used in the transcript to describe the situation regarding estimated versus measured data is arguable and we heard additional information today that helped us understand how the Panel will evaluate that adjective and that's all we need right now.

Thank you.

--- Pause

MR. MANN: Just one other question.

IEG had indicated that you should consult early and often and meaningfully, and I'm wondering if OPG and CNSC could comment on that in regard to their answers to the community with regard to Dr. Greening.

THE CHAIRPERSON: Okay. So this one, with respect to the response that OPG has responded to the general public with respect to the WIPP incident, can you quickly review how you have responded to that and provided information to the public, and the same question will again be redirected to CNSC.

The Panel understands we have already received some information about this, but just confirm whether there is, from OPG's side, over and above the FAQs, the frequently asked questions, and the media releases which we are aware of, was there anything else you wanted to add, in particular, with respect to perhaps open fora, community meetings and so on, that either have already taken place or that you are planning.

Ditto over to CNSC on that one.

MR. POWERS: Kevin Powers, for the record.

When asked a similar question last week I spoke about the e-mail blast that was done very soon afterwards, as well as the ads, the supplements in the newsletter and other activities. Beyond that, though, we have not done any other activities. I think I gave a fairly full explanation of what those activities have been.

THE CHAIRPERSON: Mr. Powers, do you have plans for any further interaction with the community on this matter?

MR. POWERS: Kevin Powers, for the record.

Mr. Mann did show one of the ads that we have up in the community which encourages the community to come to us with any questions they may have, whether it's about the DGR or the WIPP incident.

In addition, we have added Q&As to our website, we have -- our website is always open for questions, as well as our telephone line.

THE CHAIRPERSON: CNSC...?

DR. THOMPSON: Patsy Thompson,
for the record.

We have put our initial assessment on the public record essentially by submitting it to the Panel. I understand there is also information on the CNSC website about the WIPP event and some time last week I believe we made the commitment that our assessment of the Phase 2 Report we would make available to the public through our website.

THE CHAIRPERSON: Thank you.

I would like to move on now to Ms Tilman.

--- Pause

MS TILMAN: Anna Tilman, for the record.

I have some specific questions to ask from OPG's presentation and CNSC's presentation -- left-hand/right-hand juggling here.

I would like to go to OPG's slide No. 4, Justification for Correlations, where the last bullet says:

"For tritium and carbon-14 on

resins, for example, our reference inventory based on scaling factors agrees with our data." (As read)

My question is, what data, how much data, how robust was it and what were the confidence limits in comparing that data?

Do you want me to continue with my questions?

THE CHAIRPERSON: No, let's take them one at a time. It's a little bit easier to keep track.

--- Pause

THE CHAIRPERSON: OPG...?

DR. GIERSZEWSKI: Paul

Gierszewski, for the record.

So there are several aspects to the question. So the case of -- this was a question on resins, carbon-14, that was presented in the Information Request IR EIS 01-06. In that case, if I recall, the number of data points was on the order of 20 to 25. In the case of tritium, the number data points varies 10 to 20 I believe.

They all are actually relatively

closely spaced, there is not a large distribution of the tritium numbers, which the carbon-14 numbers were already on the record before. I don't have them in terms of a 95 percentile band at this point.

THE CHAIRPERSON: CNSC, given Dr. Thompson which you explained to us earlier regarding whether or not the data starts stabilizing around statistical measures such as the 95th percentile, can you help the Panel understand whether it was indeed the case with respect to this particular bullet?

DR. THOMPSON: Patsy Thompson, for the record.

Our assessment at the time was that there was insufficient work done to validate the scaling factors, but we had also stated that the conservatism and the inventory with, in some cases, multiplying by a factor of 10 to bound the assessment was appropriate and the gaps in the process used was the reason why we made the recommendation to the Panel for the ISO and IEA Standards.

THE CHAIRPERSON: Thank you.

Ms Tilman...?

MS TILMAN: I'm not sure that both answers really addressed the concern about -- like I'm not sure that there was a 95 percent confidence interval or limits for this data. I'm not sure if the samples -- I hear they were close, I'm not sure how close they were, so I'm still left with uncertainty on it.

THE CHAIRPERSON: Ms Tilman, I think actually the response was pretty clear which is, from Dr. Thompson, which is no, there were insufficient data for a 95th at this time, therefore, they relied back on the conservatism built into the original inventory and that led to CNSC's recommendation to the Panel regarding further verification that is required.

All right?

MS TILMAN: Okay. I will leave that one then and I want to move to chlorine-36.

Between the two, again both OPG and CNSC, I find some confusion there. In OPG's Slide No. 5 and 6 they talk about the amount of chlorine-36 on resins, heat transport resins is below detection limits.

On CNSC slide, chlorine activity on resins, Slide 10, their second bullet says,

assuming Dr. Greening is correct, in 2062, they give a value 7.4 times 10 to the 11 becquerels instead of 7.4 times 10 to the 8 becquerels; in other words, a thousand factor there.

And the next point says that that activity is still that much lower at closure.

The point I want to ask is, I wasn't sure if OPG, when they made that comment on their slide, looked at Dr. Greening's value as well when they said it was below detection limit. That's one part. So I wasn't sure if that referred to looking at the new levels that Dr. Greening brought forward, if they could say it was below detection limits.

My second part, if I can get that in, regarding CNSC's slide, chlorine-36 has a half-life of approximately 300,000 years, so even if the activity at closure at 2062 may be a fraction of the total activity, what happens 1,000 years later or that much later because of that significant difference in activity in chlorine-36?

THE CHAIRPERSON: I would like to start with CNSC on this one.

DR. THOMPSON: So Patsy Thompson,

for the record.

We are not disagreeing with the statements made by OPG in terms of levels that were -- measurements that were non-detectable. What we said was -- what I said was that when we reviewed the transcripts, Dr. Greening made reference to some COG documents essentially to support the --

THE CHAIRPERSON: Dr. Thompson, what was that acronym, please?

DR. THOMPSON: So Dr. Greening, in the transcript portion that talks of chlorine-36, supports his statement in terms of that OPG had underestimated on the basis of some CANDU Owners Group technical reports.

So during the presentation what we mentioned was with the time that we had available we were not able to go back to review the COG reports to determine whether Dr. Greening's statements were valid or not. So we assumed that Dr. Greening's statements, that the inventory had been underestimated to be correct and then we looked at what the consequences on the overall dose assessment in relation to the benchmark, the criteria of 0.3 mSv.

And given the time for the peak dose, the assessment was that this increase in inventory is still quite a bit lower than the total inventory for chlorine and doesn't materially change the peak dose that is assessed in a long-term safety case.

THE CHAIRPERSON: Thank you.

Ms Tilman, was that sufficient, or do you want to hear from OPG?

MS TILMAN: Not really. I mean if this deep geological repository is to safely isolate waste 100,000 years, then one has to take into effect the half-life of this particular radioisotope.

So it's not just the quantity in 2062, but you have to consider in terms of the safety case much, much later and --

THE CHAIRPERSON: Okay. So I will redirect back to Dr. Thompson, please.

DR. THOMPSON: Patsy Thompson, for the record.

So the example we gave was because we had discrete numbers to do the comparison, but when we look at the radioactive inventory and the projections for the long-term

safety case, the peak dose is mainly related to iodine-129 and there are other components, and so the increase -- the potential increase in inventory of chlorine-36 would not materially change the maximum dose at the maximum time.

THE CHAIRPERSON: Thank you for that reminder.

OPG, did you have anything to add?

MS SWAMI: Laurie Swami, for the record.

Yes, we would like to respond to some of the comments, if that's acceptable. Dr. Gierszewski will answer those.

DR. GIERSZEWSKI: Paul Gierszewski, for the record.

As was said in the presentation, the dominant source of the chlorine-36 in the repository is in the pressure tube, in the calandria tubes, they are by far the dominant source.

We do have numbers for resins and we do include those as a source and it's not just at 2062, that amount is in the repository and we do model the potential transport of chlorine-36

over long periods of time and we are very interested in that because chlorine does have a long half-life, so it is an important radionuclide.

But, as I said, we are operating -- as far as the resins go, we know that they are a much less important contributor because we do have measurements on the moderator and the PHT. In the case of the PHT the measurements that we have are all below detection limits.

We did -- in response to Dr. Greening's comments, we actually had gone back and increased all the chlorine-36 on heat transport resins by a factor of 1,000 and it made no difference to the results, as you would expect, because the inventory is dominated by that in the pressure tubes.

THE CHAIRPERSON: Thank you.

Ms Tilman...?

MS TILMAN: I don't think there is more I can respond to that because I just feel that I'm addressing an issue that --

THE CHAIRPERSON: Ms Tilman, question please?

MS TILMAN: Yes, okay. I will leave the chlorine and I will move to the de-nitration.

From what I understand, and I'm seeking clarification from OPG on this, the nitrates, that it is very difficult to do de-nitration, that from what I understand you would have to let things settle for quite a number of years before you attempt a de-nitration.

From what I thought the discussion was, is the problem with de-nitration, it has to do with carbon-14. I just want some clarification about the de-nitration from OPG.

THE CHAIRPERSON: Ms Tilman, I have never heard that term.

MS TILMAN: De-nitration?

THE CHAIRPERSON: What does that refer to exactly?

MS TILMAN: Removing the nitrates from the waste.

MS SWAMI: Laurie Swami, for the record, if I might.

Was -- perhaps Ms Tilman was referring to the conversation with Dr. Evans

describing different ways and means of managing resin and that he referred to carbon-14 as one of the reasons that in the CANDU fleet we don't have some of the same options that other resins could use. I think he was referring to vitrification.

MS TILMAN: M'hmm.

THE CHAIRPERSON: Thank you.
Could that be it, Ms Tilman?

MS TILMAN: Yes. Although de-nitration is used in some literature as well, so that's fine.

THE CHAIRPERSON: Okay. So I think we have the answers from Ms Swami regarding why that was not mentioned.

MS TILMAN: And I just remain -- the concern remains, that's what I was -- about nitrates in the waste, in the waste containers.

THE CHAIRPERSON: The Panel, as I'm --

MS TILMAN: Yes, I have heard that.

THE CHAIRPERSON: We have been asking quite a few questions about that. So if we feel we need any more follow-up on that, we will continue on on that topic, Ms Tilman.

MS TILMAN: If I may, I have a question of clarification for CNSC and that concerns the previous public question regarding the alpha incident at Bruce.

I just wanted clarification. I'm not sure how many of those workers were nuclear energy workers or contract workers and my question is, are contract workers subject to the same dose as nuclear energy workers or are they subject to the public dose limit?

THE CHAIRPERSON: CNSC...?

DR. THOMPSON: Patsy Thompson, for the record.

So any worker that has a potential to exceed 5 mSvs -- 1 mSv per year is a nuclear energy worker and so whether they are contractors, they are employees of licensees, it's not who you work for, but it's the potential exposure you have that puts you in a category of a nuclear energy worker.

THE CHAIRPERSON: Thank you.

DR. THOMPSON: That essentially -- my apologies, but just to address, so it's not just a title, there are also requirements when an employer, whether it is the

employer of the contractors or licensee, the requirement when someone is a nuclear energy worker is to provide training to that worker so that the person understands the risks and the measures that have to be taken to protect themselves.

THE CHAIRPERSON: Ms Tilman...?

MS TILMAN: I understood the annual dose for nuclear energy workers was 10 mSv per year, but the public is one, so that's why I'm wondering when Dr. Thompson mentioned the 1 mSv per year now. I just want a clarification on it.

THE CHAIRPERSON: Dr. Thompson...?

DR. THOMPSON: Patsy Thompson, for the record

So the annual dose limits for workers is 50 mSv per year and with five -- 100 mSvs over a five-year period. So they are both conditions.

But there are workers, for example on nuclear facilities, that are employed in different areas where they will not be getting a radiation dose above 1 mSv, so there is no

requirement to make those individuals nuclear energy workers. So those people are subjected to the public dose limit, but if the work requires -- would lead to a potential exposure greater than 1 mSv per year, there is a requirement to make these individuals nuclear energy workers.

THE CHAIRPERSON: Ms Tilman...?

MS TILMAN: So just to answer the question regarding the alpha incident then, that was the explanation when Dr. Thompson was reading off the results of the various doses exposed, that because they were above one those workers would be tracked.

Have I misunderstood you, Dr. Thompson?

THE CHAIRPERSON: Yes, you have.

Dr. Thompson, can you clarify again, please?

DR. THOMPSON: So Patsy Thompson, for the record.

All the workers that were involved in work in Unit 1 of Bruce A, the work that was going on that led to the alpha exposures, they were all nuclear energy workers.

What I mentioned was, through the bioassay program the exposures from the alpha emissions, the number of workers who were originally identified, a number of them through bioassay measurements we found that they had not been exposed.

So a number of workers had zero exposures and then there were categories of workers with different categories. So some workers had less than 1 mSv, some between one and two. Those are categories I mentioned.

That's the number of workers where, through bioassay measurements, we confirmed their doses, but they were all nuclear energy workers.

THE CHAIRPERSON: Thank you, Dr. Thompson.

Reverend MacLean...?

REV. MacLEAN: Reverend Ruth MacLean, for the record.

During these hearings it seems that OPG's safety case is based on very short-term analysis. For example, only 30 seconds' exposure of zirconium to high temperatures, 15 to 30 years' global experience

with DGRs, health exposures and risks only for workers during construction and operational phases, beyond this we have heard only reference to a farmer on the land above the DGR and possible radionuclide exposure.

My serious question is: Given the extreme length of time, ten thousands of years that this DGR must function, what if the contents do not rest in peace deep in the earth?

For example, Dr. Haszeldine referred to the possibility of chemical and radioactive interactions that could produce earthquakes, fatally damaging a DGR. What mitigation would even be possible in post-closure phase, say five generations from now, if powerful natural Earth events or acts of God occurred resulting in substantial radioactive or chemical leakage into Lake Huron or atmosphere or terrestrial environment?

How can OPG's safety case purport to cover this long-term post-closure uncertainty when they are not present and CNSC no longer exists?

Thank you.

THE CHAIRPERSON: Reverend

MacLean, the Panel actually has a lot of information addressing that question and its part in the EIS I would direct you to, it's called "In the Long Term: Disruptive Events", where OPG assumed really bad things would actually happen and worked their way through what would happen, for example, under a sudden failure of the seal, for example.

So the Panel are quite satisfied that we have lots of information regarding your question that will allow us to evaluate the strength of the safety case and we will, of course, be pondering that very carefully once we get to the stage of preparing our report.

So I really don't know that we need to redirect your question at this time. Thank you.

Dr. Greer...?

DR. GREER: Thank you, Madam Chair. Dr. Sandy Greer, for the record.

I would like to refer to the OPG presentation today and begin with citing Dr. Greening's paper that he presented earlier last week.

I would like to just re-cite here

that:

"The radioactive waste operations site No. 1..." -- now that was terminated in the year 2000 -- "...because it was releasing radioactivity into the underlying aquifer and the site was abandoned." (As read)

And then Ms Swami mentioned that the RWOS 1 still has the CNSC licence and that in 2001 OPG installed the monitoring system in the groundwater.

But similar to Dr. Archibald's question earlier about radiation leaking into the groundwater and the flow, I would like to know if studies were done in the field and the radioactivity analyzed in the aquifer immediately after the release was discovered and if ongoing studies have been conducted through the years?

I would think this would be a very important opportunity to create baseline studies using real life experience.

THE CHAIRPERSON: Thank you, Dr.

Greer.

I would just ask OPG to quickly reconfirm for the Panel what was done in terms of monitoring in the aftermath of the RWOS 1 release to groundwater, and I will ask CNSC to further comment in terms of monitoring up to and including current status.

MS SWAMI: Lauri Swami, for the record. I'm going to make a few short comments and then Ms Morton will provide more detail on this.

But just with respect to the question asked, in my comments earlier today I talked about OPG installing groundwater monitoring network in 1989, just to clarify that, and I also discussed the groundwater monitoring was going on and that we identified elevated tritium levels in the late '90s and that we removed the waste between 2001 and 2002, repackaged and moved it to the Western Waste Management Facility.

That was through a series of groundwater sample results, it wasn't based on -- I don't know how else we would have known, but nonetheless, it was based on actual results.

I would also note that the word "abandoned" can mean something very specific from a regulatory perspective and, in this particular case, we still have a licence and if it was an abandoned site it would no longer have a licence. So this is still under regulatory oversight.

I think Ms Morton can describe some of the work, she can also describe the reporting methods used for this site.

MS MORTON: Lise Morton, for the record.

So again just to clarify and follow up on what Ms Swami is saying, correct, the site is not abandoned, it is currently under a licence with the CNSC. By virtue of having that licence that means the CNSC also performs inspections in the field of that site.

So there were -- there currently remains seven monitoring wells around the RWOS1 site, plus we monitor the RWOS1 south and north discharge ditches. Those samples are taken on a quarterly basis and that has been the case since 1989.

That information is reported to the CNSC and those samples are analyzed for

tritium and gross beta. So I would submit that there is quite a long baseline of information on that site. And again, that information is reported to the CNSC as part of all of our licensing emissions reporting on a quarterly basis.

THE CHAIRPERSON: Thank you, Ms Morton.

CNSC, did you have anything to add?

DR. THOMPSON: Patsy Thompson.

Just to confirm that monitoring actually started in 1989. It's from those results that remedial action was taken. The site is under CNSC licence and continues to be reported.

I was also going to add that the CNSC has in place quite extensive requirements for environmental monitoring that includes groundwater monitoring.

And I believe Ms Morton, a couple of days ago, mentioned that they were in the process of installing more groundwater monitoring wells to respond to the requirements of the CSA and 280.8 Standard. This is a new standard that

the CNSC expects licensees to implement on environmental monitoring requirements and it's a more structured approach to developing programs.

THE CHAIRPERSON: Thank you.

Dr. Greer...?

DR. GREER: Yes, thank you. Dr. Sandy Greer, for the record.

I appreciate that information and a final question is: Is any of that description in the documents submitted for the public hearing or otherwise available for people to look at?

DR. THOMPSON: Patsy Thompson, for the record.

The information on environmental monitoring requirements and monitoring results is presented to the Commission on performance reports of the industry. It's also compiled and analyzed by staff to support our submissions to the Commission for licence renewals, for example.

The information is publicly available. There is also a requirement for licensees to make -- have their public information program and OPG under that program has put in place an initiative where their long term results are made public.

THE CHAIRPERSON: Thank you.

OPG, did you have anything to add in terms of public availability of this information?

MS SWAMI: Laurie Swami, for the record.

I just need to read carefully. This is actually posted on our website:

"The environmental emissions data for the nuclear waste management at the Bruce site and the information is provided for the radioactive waste operations Site 1 groundwater monitoring and results for tritium and gross beta." (As read)

THE CHAIRPERSON: Thank you.

Mr. Kamps...?

MR. KAMPS: Thank you, Dr. Swanson.

My first question is a follow up on the Bruce alpha radiation exposure to workers question.

My question to CNSC is: Isn't it

true that even a microscopic amount of alpha radiation in the human lung can initiate lung cancer with a latency period sometimes measured in decades? So what is the follow-up to make sure that doesn't happen in the future?

THE CHAIRPERSON: Mr. Kamps, I believe Dr. Thompson actually already answered that question a few minutes ago where she described the general follow up which is via the Health Canada database.

Dr. Thompson also described the periodic studies such as the most recent study which was published in the British Medical Journal. I'm not quite sure what else you're suggesting we need to know.

MR. KAMPS: It sounded to me like the follow up had ended, that it was assumed that the damage was not done --

THE CHAIRPERSON: No.

MR. KAMPS: -- because of the low dose.

THE CHAIRPERSON: The Panel is quite clear that Dr. Thompson did describe follow up through Health Canada and then back, looping back to CNSC.

MR. KAMPS: My next question is on safety culture but it also touches on institutional control and quality assurance, and it gets back to the WIPP accident.

So the question is the lead theory at this point -- and there was some testimony provided by the Department of Energy to the State of New Mexico after my presentation yesterday and there's news reports today -- it looks like the mixture of a lead glove from a glove box plus nitrates plus organic absorbent, which happened to be kitty litter with no change order recorded. So a decision made by an individual or a small number of individuals in the Department of Energy complex led to this change. So when the barrel was received at the WIPP facility there was no indication that it was any different from thousands of other barrels that already arrived.

So how can such a change happen without quality assurance, without institutional control, without a safety culture running that up the flagpole for approval?

The acceptance criteria at the WIPP site could not detect this change so there

has to be a trust in place that the waste generators, the waste packagers are following the rules and that appears to not be the case in this accident.

And just briefly, the news reports also reported a second barrel having been identified by Los Alamos National Lab in the underground at WIPP that likely shares the same constituents as the guilty barrel. So another question perhaps to CNSC, would be that that confidence of a reopening and resumption of activities when they don't know what caused the first barrel to rupture and what might cause the second barrel to rupture.

THE CHAIRPERSON: Mr. Kamps, I'm not going to ask the CNSC to comment as a Canadian regulator -- regulatory agency on any regulatory decisions that might or might not be made in the U.S.

However, there is a relevant question that has occurred to the Panel regarding what you have just told us which is related to waste acceptance criteria and the rigour with which that is applied and the quality assurance that is applied to that in the Canadian context

and in the proposed DGR context.

So I would ask both OPG and CNSC to reiterate how a circumstance such as has just been described by Mr. Kamps would be addressed through your QA around your waste acceptance criteria.

MS SWAMI: Laurie Swami, for the record.

Ms Morton is going to provide a detailed response, but just, we did describe in detail when we were speaking about the WIPP incident earlier this hearing time and so there is a lot of information.

But at a high level, I'll ask Ms Morton to respond to your question.

MS MORTON: Lise Morton, for the record.

I'll give my response actually, first, maybe more to the specifics. But it speaks to the QA, I think, behind the program.

As we described, we have a waste acceptance criteria that serves as a document between ourselves and the waste generators in terms of what is acceptable to be received at the WWMF.

There is a whole category of wastes that we call quote/unquote "non-routine wastes". And I want to be clear that this does not mean that they don't occur. They do.

But what that means in our context is that every time, every time a waste generator is going to send us that non-routine waste they have to provide us with what's called a radwaste notification which then goes through an individual case-by-case assessment of its acceptability and we give guidance in terms of packaging, et cetera.

So for example, in the case of solidified liquids that is considered a non-routine waste. So the waste generator every time they send us a solidified liquid would have to first send us a radwaste notification that would clearly indicate the solidification agent they have used for that particular waste and there is a companion document that provides a list of which are the acceptable solidification agents.

So it serves as a form of QA in the sense that for these wastes -- and I think I mentioned these in my presentation or in one of

the questions -- you know, there's quite a long list of these non-routine wastes. We verify them case by case every time they are sent because we want to ensure that there's no ability to change over time the way that those wastes are packaged, labelled, shipped, et cetera.

So I think that kind of gives a bit of an overview in terms of that level of QA that we apply to the process.

THE CHAIRPERSON: Further to that, Ms Morton, I think Mr. Kamps is referring to something he called a quote/unquote "change order". What would be the analogous situation for you when you're dealing with the people that are the sources of the waste?

MS MORTON: I'll answer that twofold.

So further to what I describe with respect to what we call a radwaste notification process for non-routine wastes, if a waste generator identifies any, what we call new waste form, any waste form that is not currently covered by the waste acceptance criteria there is a separate process called a new waste form review that then kicks in.

The new waste form review process requires an extensive review by many experts including the experts at the NWMO who are responsible for ultimately, you know, looking at the waste characterization and disposal in the DGR. They are part of the review process as well for a new waste form review. So any potential new waste form that could be generated has to go through that process.

The other part that I would say in terms -- I guess the equivalent of a change order, is that any revision of the waste acceptance criteria similarly goes through quite an extensive review. Because it has such an impact on the ultimate waste inventory, it has implications with respect to all of our waste generators, both Bruce Power and OPG's. So there is quite a revision process just to be able to revise the waste acceptance criteria.

I hope that addresses the question.

THE CHAIRPERSON: Not completely because and, again, I'm reacting in real time to the information Mr. Kamps has just given the Panel.

My understanding, Mr. Kamps, is that the originator of the waste changed its nature without telling the WIPP people. Is that correct?

MR. KAMPS: I believe so. I think the repackaging of Rocky Flats, Colorado waste from decades ago at -- which took place at Los Alamos National Laboratory introduced, for one thing, this organic kitty litter which could have been a fuel for a fire that somehow sparked. And the origin of the fire, the chemical reaction is still a mystery but some of the lead candidates are a lead glove, so the lead and nitrates reacting.

So the unexplained question still even from the Department of Energy in New Mexico yesterday, is how did the high temperature happen, a very high temperature of 600 or 800 degrees Fahrenheit to spark that fire in the first place?

So yeah, the introduction of the fuel for one thing was a major change and the lack of appreciation for the possibility of a chemical reaction between the lead and the nitrates was also a mistakes.

THE CHAIRPERSON: So I guess my question back to OPG, and I'll also direct this to CNSC, is in terms of how often you check the accuracy and completeness of the records regarding the true nature of the waste as it is appearing at the Western Waste Management Facility; in other words, the spot checks, audits, random checks both by OPG at the Western Waste Management Facility and any requirements you have for the generating stations to do the same thing at their end and report to you how well they are doing with the proper description of each waste container?

MS MORTON: Lise Morton, for the record.

Again, I'll try to address this. So a couple of things, maybe to address your last point first just because it's top of mind right now.

So our waste acceptance criteria also has a clause, if you will, indicating that nuclear waste management division shall conduct periodic assessments of the waste generators' compliance with the waste acceptance criteria at a frequency no less than every three years.

So we did conduct those assessments in 2012 and did not find any non-compliances with the waste acceptance criteria.

I think I mentioned earlier as well that -- so we have a fairly close working relationship with the waste generators. So above and beyond these compliance assessments we work very closely with the waste generators. We have quarterly stakeholder meetings at the working level and above to identify any concerns, any issues that they may have with respect to the waste acceptance criteria and how they are having to adhere to it in the station.

The only thing I think I should reiterate that I believe is germane and that was mentioned previously is that with respect to how waste is collected at the stations there are approved procedures for collection, handling, storage, transfer, shipment of all of those wastes.

And with respect to intermediate level waste, which I believe we indicated would be the most likely to be subject or a concern for the type of event that we're seeing at WIPP,

those wastes are transferred from closed loop station systems, again following approved procedures, into the engineered containers.

I guess if -- yeah, we have very, you know, relatively routine, uncomplicated waste streams that are quite well known.

I don't know if you have any further follow-up questions.

THE CHAIRPERSON: So just would the Panel be correct in assuming that an additional phrase that might be added to your question is that the well-known waste characteristics in contrast to, or as compared to, the kinds of waste that might be dealt with by WIPP?

MS SWAMI: Laurie Swami, for the record.

That's correct. I think that the waste at the WIPP facility is from various sources whereas our waste is from Bruce and from OPG-operated facilities. So it's a known quantity.

The only other thing I would add is that the employees at both locations understand the implications of the wrong material

getting into these facilities and so would be careful to ensure that they are thinking of others' safety at the same time as their own.

THE CHAIRPERSON: CNSC...?

DR. THOMPSON: Patsy Thompson, for the record.

Perhaps to add information to what OPG has provided, but from the regulatory point of view, the management system requirements are in place for both the nuclear power plant operators, licence holders as well as OPG as a waste management organization.

I will ask Kay Klassen to speak to essentially the technical review that is done of OPG's procedures, but also the inspections and verification of records that is done by Ms Klassen's group through inspections and other procedures.

I would also add that waste management is a safety and control area that, for example, a nuclear power plant licences and we do look at their waste management practices including conducting inspections to ensure that the procedures that are in place are being complied with and that the many wastes

segregation; separation of hazardous waste -- radioactive waste, for example, is done appropriately. Those types of inspections are done by staff in my directorate in collaboration with the nuclear power plant inspectors, CNSC inspectors.

But I'll ask Ms Klassen to speak more to the process that's in place at Western Waste Management Facility and that would be transferred to -- you know, if OPP receives a licence for the DGR operation.

MS KLASSEN: Kay Klassen speaking, for the record.

CNSC staff over the period that we're managing and doing compliance verification, certainly have audits done of the management system that is applied to the waste management activities at Western or Darlington used fuel dry storage or Pickering used fuel dry storage. That management system review would look specifically at waste practices or the management of the waste practices at those facilities. But management system reviews also occur at the nuclear power stations in the context that they too have the similar appropriate systems for conducting

self-audits, implementing their processes and their procedures.

With respect to onsite inspections, our inspections will look at the records. Our audits of the management system will include discussion with staff, checking on their knowledge of their systems and processes. We'll inspect and review documents. We'll watch work taking place on the various sites and, certainly, inspectors at the nuclear power plants conduct the same kinds of activities.

So through those processes, through our review of the reporting on OPG internal self-assessments we get a good idea and understanding of how OPG remains compliant with the requirements and safety at their facilities.

I would also like to state that our understanding, again through our reviews of what has happened at WIPP, is in the context of the materials that are being received at WIPP. They again don't have the benefit of very narrow waste stream processes for generating those wastes. WIPP is receiving wastes from 60 to 70 years' worth of defence wastes and research.

So in the context of managing a

wide variety of waste materials, understanding where those wastes originally came from because this also includes remediation of various old sites of these activities, that is expected to be a very daunting task. And in the context of controls of wastes through relatively limited processes as occur at nuclear generating stations that does -- and the history of the train of control between the power reactors, OPG and on to the sites of management, it does add an element of increased difficulty for the WIPP, relative to that more limited streams that would be handled by OPG.

THE CHAIRPERSON: Thank you.

A supplemental to that, when you are conducting your review, are these based on records only or do they include actual physical checks, physical sampling of waste containers?

MS KLASSEN: Kay Klassen, for the records.

Typically, we are not sampling the waste. We will observe. We will make -- take note particularly with the low level materials that may be arriving onsite through the plastic bags, through the material as it's

approaching the incinerator, through our observations of what's in there.

Are we taking samples at this time? No.

Do we take environmental samples? Yes, we do.

THE CHAIRPERSON: Same question over to OPG.

MS MORTON: Lise Morton, for the record.

So one of the things I'll point out is that with respect to both waste heading for the incinerator or the compactor, I guess another form of QA or a level of QA is that every one of those bags is visually inspected prior to going into either of those processing streams for exactly that purpose, to make sure that there hasn't been a lack of segregation at the stations that would cause incinerator problems as an example.

I should point out as well, supplemental to what Ms Klassen has said, is that typically on every CNSC inspection and, again, they perform inspections three times a year, as they are walking through our facilities they will

very typically randomly choose one or several bins. Every bin is barcoded, and it could be from any one of our buildings or our storage structures. And they will ask for the history docket of that particular bin.

So that just gives a bit more information in terms of how it's done in terms of a form review.

With respect to sampling, again, I think I gave some information previously. It may not really fall in the category of sampling, though, as you're requesting.

But we've had several campaigns, as I've mentioned, where we've accessed waste as recently as last year. We did open a random selection of 80 non-processable bins of low level waste and inspected every one of those contents. And we were looking at it more from a -- you know, is there an ability to further process that waste.

But in having inspected those bins, we certainly also were looking for any non-compliances with the waste acceptance criteria, and we didn't find any evidence of that.

And we selected those bins based on all of our waste generators, so we ensured that we had samples from Bruce Power and the OPG stations, and we also tried to go back in time over a relatively good period of time back to 2006.

Does that address it?

THE CHAIRPERSON: Yes, thank you.

Mr. Kamps.

MR. KAMPS: Yes. My next question has to do with zirconium ignition.

And essentially, it's a question of accident versus attack.

So Dr. Greening asked about the potential for an intentional ignition of zirconium by an attacker, but is it not possible that an accident can lead to this kind of a fire?

And I point to an incident in Oregon in 2012 where a facility that manufactures road de-icing chemicals called Envirotech in Prineville, Oregon experienced not one, but two, zirconium fires that were caused by a simple spark from a mechanical scoop shovel in one instance and, in another, a fire was sparked by an excavator.

And the fire was 4,000 degrees Fahrenheit, which translates to 2,200 degrees Celsius, and was put out by pouring cement on it as opposed to pouring water, which would have made the situation worse, apparently.

So the question is, how can CNSC claim that intentionally trying to start a zirconium fire with a 2,000 degree Celsius blow torch proved difficult but, in this case, a simple spark at -- caused a zirconium fire burning at 2,200 degrees Celsius?

THE CHAIRPERSON: Mr. Kamps, the trouble is we don't have all the information, and you may recall the other day we were -- we got into a lot of detail about how much zirconium dust would be actually present because it turned out that it was the dust that was important. Also, the size of that dust and sort of the combination of factors that would be required.

And what we understood from the CNSC experts is that there is a certain critical mass.

So I'll defer to CNSC here, but the Panel's impression is, without more information about that particular example you

gave us with the road slating company --

MR. KAMPS: In my PowerPoint yesterday, I -- because of the time limits, I passed over very quickly. The image of the zirconium fire that was included was this incident in Oregon, so that's the --

THE CHAIRPERSON: Okay. Was there information in your slides around things like the -- whether that was caused by a particular mass of zirconium dust?

MR. KAMPS: I believe there was more information in my written submissions from July 21st. I wouldn't have included it in the PowerPoint otherwise.

THE CHAIRPERSON: Okay. All right.

CNSC, would you care to comment on Mr. Kamps' question around whether or not, quite apart from a deliberate attack, some sort of spontaneous event might happen?

DR. THOMPSON: Patsy Thompson, for the record.

Without more context, as you mentioned, I don't think we could say anything of value to speak to this issue.

The information we've tried to respond to from last week and this week is in terms of the types of zirconium material that would be expected to be in the waste that would be emplaced in the DGR, so I don't think I could add anything else.

THE CHAIRPERSON: Dr. Thompson, the Panel would request that you have a look at Mr. Kamps' written submission and get back to us tomorrow morning if you find anything -- more details in the written submission that would help you respond to his question.

Mr. Kamps?

MR. KAMPS: Sure. I'd be happy to take it as a carry-over as well to try to --

THE CHAIRPERSON: No, that's fine. CNSC can, I think -- you're -- correct me if I'm wrong. You're saying that there are more details in your written submission that would be helpful in terms of understanding the context for the incident in Oregon?

MR. KAMPS: Well, I do have the name of the company, the date of the incident, the news report, for example, so I believe that, you know, more information could be attained as

to how much zirconium was present, in what form, how this fire happened.

It's certainly obtainable.

THE CHAIRPERSON: Dr. Thompson.

DR. THOMPSON: Patsy Thompson, for the record.

At this time, I would propose that we look at Mr. Kamps' written submission to see if there's any information that we could provide to our experts. Beyond that, I think it would be very difficult to have any linkages to the information that is on the record in terms of the pyrophoric nature of the zirconium that would actually be handled in the DGR.

THE CHAIRPERSON: Thank you, Dr. Thompson.

Mr. Kamps?

MR. KAMPS: Yeah, my final question is in regards to a statement made by CNSC about the resumption of operations at WIPP.

And I guess what was stated was that the Department of Energy is confident that within a couple years or so that operations can be resumed. But I find that difficult to understand given that the recovery plan has not

been published, certainly funding levels that would be required to accomplish that recovery plan and even such basic questions as what caused this accident and the risks of the second barrel I mentioned also rupturing and releasing materials.

And what I'm getting at is if a billion dollar clean-up is undertaken in the underground at WIPP and a second barrel or two release materials and cause another billion dollar mess in the underground, how much will the State of New Mexico put up with, how much will American taxpayers put up with?

As I mentioned in my PowerPoint, a very real possibility is that an entire section of the underground, if not the entire facility, could be decommissioned because of this incident, let alone another one.

THE CHAIRPERSON: So Mr. Kamps, I will ask that CNSC slide number 18 be brought up on the screen.

And what the Panel would appreciate is if CNSC could again clarify their interpretation of the situation with respect to the reopening of WIPP.

DR. THOMPSON: So Patsy Thompson,
for the record.

So we have no specific
interpretation as to when the WIPP would be
reopened. We simply --

THE CHAIRPERSON: Sorry to
interrupt, Dr. Thompson, but can you explain the
quotation marks because I think that may be part
of the source of confusion here.

DR. THOMPSON: So Patsy Thompson,
for the record.

So the quote that is the first
bullet on the slide is a quote from the U.S.
Department of Energy.

Oh, that's the quote from Dr.
Greening:

"The U.S. Department of
Energy has announced that the
WIPP facility may not open
for up to three years."

That was Dr. Greening's quote.

Our statement was that until
the -- on the U.S. DOE web site is until the
source -- so the quote on our slide is Dr.
Greening's. The quote in my speaker notes was,

"Until the source" -- and that's from the U.S.

DOE:

"Until the source of the February 14 event is isolated and mitigated, it is premature to say when the shipments can resume. The WIPP will reopen only when it is safe to do so."

That's the quote from the U.S. Department of Energy.

The quote on our slide is Dr. Greening's quote.

THE CHAIRPERSON: Thank you for that clarification.

Mr. Kamps?

MR. KAMPS: Yeah. I guess my question is, how can DOE's assurances of safety be taken at face value given that all previous assurances for years and decades were this is a safe facility and will remain so for hundreds of thousands of years?

THE CHAIRPERSON: Noted.

Thank you.

MR. KAMPS: Thank you.

THE CHAIRPERSON: I know it's already gone 20 after 6:00, but there are -- there's a couple -- one matter that I would like to deal with before we adjourn today.

Ms McGee?

MS MCGEE: Thank you very much, Dr. Swanson.

The Panel received the following written only hearing submissions. I will read the name of each intervenor and the PMD number. And at the conclusion of that list, I will ask the Panel if they have any questions pertaining to these submissions.

The first written submission is from the Bruce Peninsula Environment Group, PMD 14-P1.29.

Next submission from Terry Gill, PMD 14-P1.32.

Next, a submission from Corinna Psarrou-Rae, PMD 14-P1.37.

The next, a submission from Terry Brown, Michigan State Representative, PMD 14-P1.61.

Next, a submission from Iris Drew, PMD 14-P1.62.

And final written submission is from Nukewatch, PMD 14-P1.66

Do the Panel Members have any questions?

THE CHAIRPERSON: The Panel has no questions based on these written submissions.

With regard to the request for a ruling on the scientific or engineering design basis supporting OPG's assertion regarding potential radioactive contamination of Lake Huron, which appears in the Nukewatch PMD 14-P1.66, the Panel is of the view that this is a matter under consideration as part of the overall Joint Review Panel process and, therefore, the Panel will not rule on this issue at this time.

I have one more quick matter with respect to items that were carried over from previous days.

On September 10th, the Panel noted that it would determine if we needed the D.W. James Consulting report for waste inventory verification.

The Panel has determined that this document is not required.

Thank you to everyone who

participated today, either by being here in person or by watching the webcast. We'll resume tomorrow at 9:00 a.m.

The subject of tomorrow's session will be the geoscientific verification plan.

Thank you, and good night.

--- Whereupon the hearing adjourned at 6:24 p.m., to resume on Thursday, September 18, 2014 at 9:00 a.m. / L'audience est ajournée à 18 h 24 pour reprendre le jeudi 18 septembre 2014 à 9 h 00