

**Canadian Nuclear
Safety Commission**

**Commission canadienne de
sûreté nucléaire**

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Hope Fellowship Church
1685 Bloor Street
Courtice, Ontario

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Courtice (Ontario)

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Mr. André Harvey

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M. Marc Leblanc

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Mr. Jacques Lavoie

M. Jacques Lavoie

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Tania Gill

Courtice, Ontario

--- Upon commencing at 8:34 a.m./

--- L'audience débute à 8h34

Opening Remarks

MR. LEBLANC: Bonjour, Mesdames et Messieurs. Welcome to the continuation of the Darlington Public Hearing. The Canadian Nuclear Safety Commission will resume the public hearing on the Darlington nuclear site. This deals with three particular matters as we discussed yesterday.

During today's business, we have simultaneous translation. Des appareils de traduction sont disponibles à la réception. La version française est au poste 2 and the English version is on channel 1.

We would ask that you keep the pace of speech relatively slow so that the translators have a chance to keep up.

I'd also like to note that this hearing is being video webcast live and that the hearing is also archived on our website for a three month period after the closure of the hearing. I will just note for those on webcast that we are experiencing some small technical

the Members of the Commission.

On my right is Dr. Moyra McDill and Mr. Dan Tolgyesi. On my left is Ms. Rumina Velshi and Dr. Ron Barriault and M. André Harvey.

We've heard from Marc Leblanc, the Secretary of the Commission, and we also have with us here today M. Jacques Lavoie, Senior General Counsel of the Commission.

So as Marc already said, we'll continue with the presentation. I'd like to remind everybody that we have allotted 10 minutes for the summary of all the presentations that were made to us. We have read the written material. And we would like to engage in discussion about the written material, so please keep to the 10 minutes, please.

And the first presentation today is by Bruce Power as outlined in CMD 12-H13.59 and H13.59A. And I understand that Mr. Saunders will make this presentation. The Floor is yours.

12-H13.59 / 12-H13.59A

Oral presentation by

Bruce Power

MR. SAUNDERS: Good morning President

Binder, Members of the Commission. Thank you for the opportunity to present this material. As he said, my name is Frank Saunders and I'm Vice President, Nuclear Oversight and Regulatory Affairs for Bruce Power.

I felt that the experience that we had on the Bruce site with fuel storage is appropriate to the matters in front of you. So I really wanted to just come in and give you our experience over the years with this subject.

So I think first, it's been a -- it's a long history on the Bruce site since the Douglas Point reactor began operating in -- it was the late '60's or early '70's, but some while ago now.

We have been storing fuel on the site and since then in the -- in 2003, we started actually shipping used fuel from the reactors at Bruce B over to the storage location on the OPG waste management facility.

So you can see here the number of shipments to date is 774, and they continue to increase, roughly about a two week or a little more at the current average.

I think to describe this shipping container as robust would be a considerable understatement. The container is quite impressive when you see it up front. It has you know, 20 inches of concrete about yeah-much, and a half inch of a steel on each side of that. The fuel

is stored in there.

It stays in the base for 10 years minimum. And this is to allow actually -- the fuel cools with time, so the heat removal requirement goes down with time. And 10 years is a minimum requirement.

The -- each field container holds 384 fuel bundles and I'll talk in a minute to about how they get in there. And it weighs about 70 tonnes all together and we have a unique transporter that moves it around. It's transferred across site over to the waste management facility. This is five or six kilometres at most on site roads. It never leaves the site, never actually goes on the public highways.

The schedule is managed between us and OPG. And I'd like I say, we do ship on average these days about two a week, or a little more, and obviously there are some days in the winter when you don't ship too much. So if it's in the summer time it's probably more like three a week.

And this is actually about two times our production rate, two to three times our production rate. So we are making capacity in the bays at this time after, you know, nearly 20 years of reactor operation work, we're moving it across.

This is how we actually get it into the

flask. This whole flask actually goes in the bay, in the loading part, it's full of water. These racks that you see here, there's four of them that are stacked in each flask. So you know, four fuel bundles slide in each tube. All the tubes are filled. That rack goes in and the next one is filled and it goes in, until you have four of them in there. And in the end there you've got 384 fuel bundles.

We then, you know, put the top on and take it out of the bay. All the water that's in the flask is dried out. So this is termed dry storage and that's why there's no water left in the flask. The flask is then decontaminated on the outside, cleaned up so that it's suitable for storage essentially anywhere. And shipped over to OPG waste facility where it's stored essentially in a building.

The -- what's not in here is the sort of radiation fields. To ship this on site the fuels need to be less than 10 millirem power at contact. Typically they're less than two and a half. And at a metre, they're typically less than one millirem. So very low radiation fields on the outside of these containers.

So OPG actually does the transport. We escort it with security vehicles. This transporter moves about 10 kilometres an hour, on a good day it's pretty

slow. As you can see, it's specially designed. The flask slides in the back. And you can see a couple of pictures here inside the storage facility where these flasks are sitting in a concrete floor inside a storage building. It keeps them clean and dry.

Truthfully they don't really need to be in a storage building. That's more for control and cleanliness. And that's the end of it.

I guess a couple of other points that we should bring up. Security on site of course is provided by Bruce Power overall which includes the nuclear waste facility. Emergency response, fire response, all these things are provided site-wide by Bruce Power through an agreement with OPG. So, our Emergency Response exercise we did -- we did a few weeks ago, would apply equally to conditions that might require at the waste site. So, it's in a fully serviced area of the site.

That's the content of the presentation. I'm certainly hoping for questions.

THE CHAIRMAN: Thank you.

Questions? Who wants to go? Monsieur Harvey?

MEMBER HARVEY: Just a question to Mr. Saunders. What is the object to come here and to present that?

MR. SAUNDERS: I think the objective is really just to show that this is not really a new thing. We've been doing it for a long time; we've been doing it very safely with no issues, that the story is actually very robust and very safe.

So, people don't see the details of it and they don't get a look at these things on a day-to-day basis. So, I really just want to get people a sense of how robust the flasks are and that -- It's been at least ten years we've been moving these across the site now with no incidents at all. So, there's been no reportable events on these things of any sort. So, I just -- it's really a fairly routine pass for us, I guess.

MEMBER HARVEY: Thank you.

MEMBER VELSHI: A quick question for OPG.

Is the process for Darlington identical to the one that Bruce Power has identified?

MR. TREMBLAY: Pierre Tremblay, for the record.

Clearly, with no exception at all, that work would be done at Darlington. It's essentially the same process, yes.

THE CHAIRMAN: You know, since you spent some time describing this container and it's about the same thing, maybe you should spend a little bit of time

about the container itself.

What's -- do we know what is now the clear thinking about what's the life of such a container? What's the shelf life before you have to replace it?

MR. SAUNDERS: I think I'll have to turn that question over to OPG who are really the designers.

MR. TREMBLAY: Pierre Tremblay, for the record.

I'm going to ask Terry Doran to talk a little bit about it. I think we touched on it briefly yesterday, but I think it would be appropriate to elaborate.

Terry?

MR. DORAN: Yes, thank you.

Terry Doran, for the record.

The minimum design life of the container is fifty years and we have conducted studies that with appropriate aging management plans, it can exceed a hundred. So, the types of studies that we're undertaking not only look at corrosion, the welds, and the exterior, but we've also fully instrumented dry storage container to start to do corrosion monitoring measurements from the inside.

So, we want a complete portrayal of the rigorous approach these containers that we can then verify

that they will indeed exceed a hundred-year lifetime. That's currently under study.

THE CHAIRMAN: So, you have a -- you have a drain port, I noticed in the diagram. There's a drain port. What is drained out of this container? And you might as well also tell me there's also a safeguard tube, presumably some monitors for some radiation, how about explaining a little bit what are the functions of all these?

MR. DORAN: Thank you.

For the record, Terry Doran.

So, let me speak to the drain first. As was illustrated in the vectorial, the radiated fuel, that is where the modules are loaded. So obviously, when it comes out of the bay, there would be water within the dry storage container, so that is drained out of the drain port and we then make sure that it's empty of any residual bay water after it's been clamped for transport over to the used fuel facility.

So, that's the drain port version. We can also use it in any other testing that we need to do in terms of back filling with helium later on.

The second question in terms of safeguards, under the Security Regulations for non-proliferation, these containers are fully instrumented for review by the

IAEA and they're obviously under constant surveillance in our storage facilities to assure the safeguard in the long term, care, and control of these containers.

THE CHAIRMAN: So, the IAEA actually can measure. Do they have to physically come in and measure using those instrumentation or is it all done automatically?

MR. DORAN: Terry Doran, for the record.

So the IAEA has fully instrumentation, remote monitoring through cameras that can review our facilities indoors where we store containers. They also do come and do inspections unannounced at our facilities to verify that not only that the equipment is operating correctly, but to assure themselves that the protocols we've established have fulfilled their requirements.

THE CHAIRMAN: So, our last question is: did any or one of those dry storage containers ever failed? Did you have any failures in all the -- over the years?

MR. DORAN: Terry Doran, for the record.

In terms of failure, a breach from within the container, no, we've never had one.

THE CHAIRMAN: Bruce Power, same thing?

MR. SAUNDERS: Yes. We've had no incidents with them at all on site. They work fine.

THE CHAIRMAN: Okay. Thank you.

Anybody else? Mr. Tolgyesi?

MEMBER TOLGYESI: Yes. Is there -- you know, you move the fuel; is there residual heat which remains in the container and, therefore, increase the pressure inside? Or, because of these drain holes, et cetera, the pressure will be released?

MR. DORAN: Terry Doran, for the record.

The dissipation of heat is begun by retaining them in the irradiated fuel bay. So, as previously mentioned, our current reference is that they would remain in the bay for a minimum of 10 years. By that time, the bulk of the heat has been dissipated. However, the design of the dry storage container, its robust design, obviously considers any residual heat for the lifetime of the storage of the used fuel.

MEMBER TOLGYESI: And the lost ones -- how resistant these containers are? You know, if it's a fire?

MR. DORAN: So -- Terry Doran, for the record.

As was illustrated in the presentation, we're talking about a concrete container, 20 inches thick, with steel both on the inside and outside, fully welded. So, they're impervious to fire based on their design and testing.

MEMBER McDILL: Thank you.

Bruce is refurbished for reactors, now?

Give or take?

(Laughter)

MR. SAUNDERS: Yes. Fully refurbished too and partially another two, that's right.

MEMBER McDILL: Right. Recognizing there's some contractual lease issues with OPG, a lot of intervenors are asking about cooling towers and with four -- let's stay on the goal, then -- what was Bruce's position on cooling towers in Kincardine, here?

MR. SAUNDERS: I don't know, you know, to what level we considered. We certainly looked at it in relation to new reactors builds that we considered. And you have an impact from cooling towers in terms of water consumption; you have an impact obviously from operating reactors in terms of Delta T or some heat that you're putting back out.

So, generally, it's a decision you'd need to make between those two competing factors. Both are relatively small; the A show us that they don't have a large effect. But I think people would be misguided to think that to just put a cooling tower, it makes the problems go away. It's like every other industrial complex should put up here, you're looking at the impact

of the different technologies and typically you'll get a different impact in a different way, but they don't go entirely away.

Your job is to manage those with a parameter that doesn't, you know, overly impact the environment or the people. So, I don't think cooling towers are any more fancy than any other particular technology. They can be. It really depends on your situation and the terrain and the location of where you're -- where you're sighting your plant.

MEMBER MCDILL: But I don't recall -- maybe I'm -- I don't recall a lot of interventions during the -- the timing is different, of course, and rules are different than they were. I don't recall interventions apart from the Review Panel issue.

MR. SAUNDERS: Yes. I -- my memory is not perfect, but I don't recall either any interventions around cooling towers for the Park Bruce EA. I may be wrong and now I'll have to go back and read that paperwork, but certainly it wasn't something that stood out in a major way.

MEMBER MCDILL: Thank you, Mr. Chair.

THE CHAIRMAN: Just to follow up on this. And did you also, in the Environmental Assessment, did we also get the green light from DFO to proceed and all that?

MR. SAUNDERS: Yes. The Environmental Assessment determined that there were no significant impacts. We did undertake some EA follow-up work to actually confirm that all the assumptions on the -- that we made in EA were correct and that Environmental Assessment work is currently under way.

It was time to start with the return of the service of the Units 1 and 2 because you want a full station operating through that work. So, we have those contracts out and that work is underway to confirm that the -- that the low impacts we predicted were in fact correct.

So over the next few years we'll gather data and feed that back both to CNSC and others to indeed confirm our assumptions are correct.

THE CHAIRMAN: So is the Bruce power intake of water, is it similar to the Darlington? I mean does it have the same kind of fish impingement and you know and larvae entrainment. Is it the same kind of parameters? I'm trying to make the comparison between your impact on fish and Darlington impact on fish.

FRANK SAUNDERS: Frank Saunders, for the record, it would be a little bit dangerous for me to do a comparison without knowing exactly what the Darlington numbers are, but they are both deep water intake type of

plants which was designed that way on purpose to reduce the impact on fish and on the water in general. I'm afraid I just don't know the numbers well enough to tell you if they're relatively the same or not. OPG may have a better sense of that on the Darlington site.

DR. MCDILL: Just wondering if we could go to staff to sort of...

THE CHAIRMAN: About fish Darlington, I think OPG wants to ---

MS. SWAMI: Lauri Swami for the record. I don't have a comment on the particular numbers that Bruce impingement and entrainment would look at. I would make a comment though that as Ontario Hydro at the time looked at the different designs for the intake and outfall channels; they progressively improved the design with respect to fish loss. So Pickering is a very early design and we've had a lot of discussion about fish impingement and entrainment of that facility. With Bruce, we - as Ontario Hydro went to an improved design and then with Darlington - we went to the state of the art design that we've talked about yesterday. So it's sort of a step change in performance with each of those particular design components.

THE CHAIRMAN: Staff?

MR. WISMER: Don Wismer. In terms of the

the number of fish at the different facilities impinge, we heard yesterday Darlington's 275,000. Bruce is -- appears to be a lot less, but we're just starting a rigorous sampling program now which would be more comparable. So, and they're different lakes and different fish population numbers, so comparisons like that are -- are very difficult to do in a meaningful way.

In terms of the other question about the intake types, they are both are off-shore submerged intakes, but Darlington has a special cap, velocity cap that's porous so that the velocity going into the intake is really low, lower than the swim speed of most fish. Whereas the Bruce intake is a traditional velocity cap and it has a stronger suction.

MR. SAUNDERS: And I might add there that part of the Bruce A follow up work that we are doing is actually around entrainment and impingement, so we have studies that are in progress to look at that at the Bruce site. So that data will be coming over the next few years in some rigorous detail, more than today.

THE CHAIRMAN: A DFO is still here and Ramzi, you want to say something.

MR. JAMMAL: Thank you Mr. President.
Ramzi Jammal for the record.

This is great discussion with respect to

the design and the comparison of numbers. Just to compliment Mr. Wismer's answer is: the CNSC exist for continuous monitoring. And what you heard from Mr. Wismer is we take this very seriously. As part of our existence is the continuous monitoring. Continuous evaluation in order to ensure there is proper protection of the environment. I just want to make this comment that we are talking of design principle. We're talking of counting, sampling, however, the CNSC will always monitor to ensure that the impact is always minimal or not significant.

THE CHAIRMAN: Okay. DFO? I am just curious to know what your evaluation of of the Bruce refurbishment was.

MR. HOGGARTH: Tom Hoggarth from Fisheries and Oceans and I'm not gonna to be able to give you an answer. And the only reason for that is that I was not involved on the DFO side and so I wasn't prepared to speak to the Bruce plant. So given time, if you need a specific response back from DFO on something like that, I'd have to go back and talk to my colleagues that were involved in the Bruce. We just didn't realize or didn't think that the Bruce would come up here as a -- as a topic.

MR. CHAIRMAN: Well it does seem to me that Bruce is gone so the whole process that's being proposed for refurbishment, so I would expect that you would have a

little bit more knowledge about what happened after the refurbishment is been approved with respect to impact on fish.

MR. HOGGARTH: Yes.

MR. CHAIRMAN: So if you know it doesn't have to be today.

MR. HOGGARTH: Right.

MR. CHAIRMAN: But it would good if we can actually find information about that.

MR. HOGGARTH: Yeah, absolutely.

MR. CHAIRMAN: Good. Staff?

MS. THOMPSON: Patsy Thompson, for the record. I just wanted to mention that at the time that we did the environmental assessment for Pickering A and for Bruce Power, that the Department of Fisheries and Oceans was not involved at the time. They weren't a responsible authority and so the technical support we received at the time was from Environment Canada, Health Canada, Natural Resources - the typical support we get - but not from the DFO.

THE CHAIRMAN: How come?

MS. THOMPSON: I think it's because there was no authorization being discussed. And there was the - and I think Mr. Hoggarth could speak to that probably better than I can.

There was some agreement between the province and DFO in terms of who was responsible. The situation has been clarified since and DFO has been providing us technical support and playing a role as a responsible authority for the two last years for Pickering B and for the Darlington new build and this project.

MR. SAUNDERS: Yes, sorry, Frank Saunders. I think that like, you know, like say having gone to the A, it's important to, I think, clarify for people the basic process.

So you make a pretty broad study about the potential impacts on the environment, including fish in the lake based on, in our case, a lot of historical data that we already have and some current data.

And that decision of that EA was that there was no substantial impact on the environment, but the EA's don't really stop there. So anywhere where you made an assumption like number of fish impacted, temperature in the lake, which requires some ongoing monitoring to make sure that you got it right when the project that you're looking at is actually in place, then the EA actually extends well beyond. And there's, in our case, we called it an EA follow up program, but it basically means you have a number of obligations to now go collect data and observe those and make sure that -- that the assumptions

you've concluded in the EA were correct. So the EA has many facets to it. It's a pretty thorough study in itself. And then it has ongoing work to confirm that those studies were indeed factual and correct. So it's a pretty thorough process and I think that's just a point I wanted to make here.

THE CHAIRMAN: Okay. Anything else? Okay. Thank you. Thank you very much.

I'd like to move now to the next submission by Northwatch as outlined in CMD 12-H13.200 and 13.200A. I understand that Ms. Lloyd will make the presentation. And I understand that we have some people joining us via teleconference and that is Dr. Thompson and Dr. Resnikoff. Can you hear us.

DR. THOMPSON: Yes. This is Gordon Thompson.

THE CHAIRMAN: Dr. Thompson we can barely hear you.

DR. THOMPSON: This is Gordon Thompson speaking.

THE CHAIRMAN: Okay. Thank you. Ms. Lloyd the floor is yours.

DR. RESNIKOFF: And this is Martin Resnikoff speaking.

THE CHAIRMAN: Okay. Thank you. Welcome.

I think you should turn off the internet services because the delay and it will gonna disrupt communication here.

12-H13.202 / 12-H13.202A

Oral presentation by

Northwatch

MS. LLOYD: Thank you and good morning.

Thank you and good morning President Binder and members of the Commission and staff and review participants.

My name is Brennain Lloyd and I work with Northwatch. We are a regional organization in -- based in north-eastern Ontario. And we have with us, as Dr. Binder has indicated, Dr. Marvin Resnikoff from Radioactive Waste Management Associates and Dr. Gordon Thompson from the Institute for Resource and Security Studies.

They have provided us with expert assistance and will be joining me in the question and answer to follow our very brief presentation.

We have filed seven documents plus Powerpoint presentations with the Commission, and I trust that those are all available to Commission Members.

Northwatch's interest in this submission, in this review with respect to nuclear waste and its management in the short, medium and long term.

We have appeared before the Panel on a number of other matters in the past, both this Commission and its predecessor Board, primarily with respect to matters in Northeastern Ontario, the legacy waste at the uranium mine tailings in Elliot Lake and the Blind River Uranium Refinery.

We're here today to speak to nuclear waste because of its potential impact and interest to affect Northern Ontario.

OPG's conclusion shared by Canadian Nuclear Safety Commission staff is that there will be no significant effect as a result of this project. When you view this project through the lens of nuclear waste, the wastes that are to be generated through this project, I think that finding of no significance is unsupportable.

As a result of the refurbishment activities alone, 500 cubic metres will be generated for each year of the refurbishment. Intermediate level waste generated through refurbishment will include over 3,000 cubic metres of just re-tube waste alone. These are highly radioactive waste products.

The low level waste that will be generated as a result of continued operation includes things like common industrial items that have been contaminated during routine cleanup. These are contaminated with radioactive

properties.

They're currently shipped to the Bruce Nuclear Generating Station to the Western Waste Management Facility for incineration and storage, as are the intermediate level wastes from operating.

These include highly radioactive materials, ion exchange resins and filters and the like. Highly radioactive. They are sent to the Western Waste Management Facility for compaction and storage with an expectation that they will at some point be placed in an underground repository for which the design is not yet complete and the review is only recently under way.

Refurbishment waste include both low and intermediate level waste and, again, the refurbishment waste, the intermediate level waste, can be highly radioactive, and a large volume of them are. In fact, the largest volume of the intermediate level waste being shipped to the Bruce Nuclear -- to the Western Waste Management Facility are from refurbishment.

The high level nuclear waste is the irradiated uranium fuel bundles, which acts as a fuel source for the reactors and will provide a long-lasting legacy of highly radioactive hazards that will be safeguarded.

We have two reports we've filed with you

prepared by our experts, the first by Dr. Marvin Resnikoff dealing with the transportation and the long-term management of the radioactive waste, of the intermediate level -- low and intermediate level radioactive waste.

The concentrations of the intermediate level waste are comparable in many counts to that of the irradiated fuel.

The impacts of malevolent attacks on the high level waste shipment has not been considered and, overall, the documents prepared and provided lack sufficient detail on any of these materials to provide an adequate assessment.

Dr. Resnikoff has provided an inventory which demonstrates for you the comparability of many of the intermediate level waste with the high level waste and we would suggest to you that these wastes need to be managed in a manner very similar to the high level waste.

Dr. Gordon Thompson's presentation, his reports have focused on the short-term management of the high level nuclear fuel waste and the radiological risk arising from the fuel waste, particularly as they are managed in the spent fuel -- in the fuel bays and the short-term management.

The spent nuclear fuel from Darlington reactors and other CANDU reactors ---

MR. LEBLANC: Madam Lloyd, I'll just stop you a second. We believe we lost one of your two colleagues, so I'm just going to verify.

Dr. Thompson, are you still with us?

DR. THOMPSON: Yes, this is Gordon Thompson.

MR. LEBLANC: Dr. Resnikoff, are you still with us?

DR. RESNIKOFF: I am.

MR. LEBLANC: Oh, good. Sorry. We thought we lost one of you, so we're happy that you're still with us. Thank you.

MS. LLOYD: Shall I continue?

The CANDU fuel bundle after being discharged, we've heard today from Bruce Power about some of the short-term management of the fuel bundle, and we hear various estimates from industry of six to 10 years, the fuel bundle as it comes from the reactor core into the irradiated fuel bay.

We've heard that it's managed there for a minimum of 10 years but, in fact, the irradiated fuel generally stays in the fuel bay for a much longer period of time. And we can -- that's clearly demonstrated by the numbers that 75 percent of the fuel that has been removed from the reactors at Darlington and Ontario-wide is still

in the fuel bay.

Some of the lessons learned from Fukushima Daiichi are that the wastes are in an extremely vulnerable state when they remain in the fuel pool. They are vulnerable to things like exothermic reactions because of the zircaloy cladding, if that zircaloy cladding becomes exposed.

I trust that the Panel Members are familiar with some of the outcomes of the Fukushima Daiichi catastrophe, which is still ongoing, but, really, the largest amounts of those releases are as a result of the exposure of the fuel in the pools and that has resulted in a deposition of radioactive materials over a wide area within Japan.

And particularly -- and Dr. Gordon has provided you with a map showing the deposition of the cesium released from the Fukushima accident and it really demonstrates the vulnerability, I think, of the fuel when still -- when in the pools and left in this relatively available state, available to human air, natural events and malevolent activities or malevolent attacks. So the releases that we've seen from Fukushima Daiichi are really unprecedented.

Malevolence is a risk factor. Without argument, this is a risk factor. Canadian Nuclear Safety

Commission staff, in responding to our comments on the draft screening report, responded to Dr. Thompson's comments saying that it was out of scope, that the *Canadian Environmental Assessment Act* did not require them or require you to examine malevolent attacks.

It's very much part of the risk factor, part of the risk scenarios that need to be considered as part of this review and part of the ongoing operations of any of the reactor stations in Canada.

One potential instrument of attack, the shaped charge, Dr. Thompson has provided some detail on this in his report, and it is again for illustrative purposes. It's not the full suite of risks by any stretch of the imagination, but the shaped charge is one instrument by which the dry cask -- even the dry cask storage containers -- and certainly this applies, I think, even more so to the fuel pools, but even the dry cask storages are vulnerable to this kind of attack.

A Raytheon shaped-charge test -- there have been some tests done in the U.S. on those, and I think the results clearly demonstrate that there is a high level of vulnerability.

The U.S. studies on this as has been conveyed to us by Dr. Thompson don't do a full examination. For example, they don't do an examination of

the potential for exothermic reactions within the dry cask after that penetration has taken place, but still it is a starting point for those kinds of discussions, certainly.

Dr. Thompson's position on the proposed screening report is that it is insufficient. No consideration of loss of water from the fuel bay, no consideration of the potential for exothermic effects.

And the conclusion that Dr. Thompson came to is that the spent fuel risk is significantly high, is significant and established for light water reactors but we don't have a similar suite, a comparable suite of studies for the CANDU reactors, for the heavy water reactors. And he recommends to you that the Canadian Nuclear Safety Commission and the nuclear industry should assess the CANDU spent fuel risk and risk reduction options, and that should take place prior to the completion of this environmental assessment process because in our view you really can't go forward without having a full assessment. And the work put before you is not a full assessment of the risks from a number of different perspectives.

Northwatch's own conclusions are quite consistent with those of Dr. Thompson's, that the material before you is insufficient and inadequate.

This conclusion, this finding of not

significant, as I stated at the beginning of our submission, of our presentation, really does not -- does not withstand an examination through the lens of the waste that will be generated.

I will say, I appreciated the discussion this morning with Bruce Power about the management of the fuel waste and its transferring to the dry storage containers and so on. Those discussions would more rightly be within the evidence, within the documents that are provided to you in advance of that -- this hearing, and provided to the intervenors as well.

Those details are not there and I would -- I would differ, based on my own reading, with some of the summaries that you were provided. But we have no opportunity to really engage in that debate if it's not in the documents.

In our view, the waste needs to be made much more secure onsite. There is a -- an expectation has been created that the waste will go away.

Dr. Barriault -- Commissioner Barriault asked yesterday a question about -- so if everything went as industry wished, it would go away in 35 years. I don't know if those were -- that wasn't quite your wording.

If everything went as -- according to industry, the very most -- you know, most -- most hopeful

thinking, most optimistic thinking, the waste -- the waste would not begin to leave the site for the first 35 -- yeah, for at least 35 years.

There are -- there is a long list of social issues, scientific and technical uncertainties with geological repositories as an approach, as a long-term management approach. We don't know at this point if those are going to be resolved within the 10 years that the Nuclear Waste Management Organization has estimated.

Even if they did - and I'm not confident that they will be - even if they were resolved, it's 35 years, at minimum, until the first waste leaves and another 30 to 40 years until the last waste leaves, if we stop producing right now.

That means we've got at least seven decades of waste being left in a more vulnerable condition at the waste -- at the reactor station and that needs immediate attention as has been -- I think -- quite -- you know -- capably pointed out in Dr. Thompson's report.

Thank you.

THE CHAIRMAN: Thank you.

Okay, who wants to start questions?

Dr. Barriault?

MEMBER BARRIAULT: Just a brief question really. The containers, as I understand from OPG, weigh

70 tonnes each for transportation. To transport these containers to a permanent repository, if you want, what are the road's limitation to these containers of 70 tonnes? Is that a problem at all, and that's been looked at?

MR. TREMBLAY: I'm going to ask -- Pierre Tremblay, for the record, I'm going to ask Terry Doran to talk a little bit about this to provide some context in that response.

Terry?

MR. DORAN: Terry Doran, for the record.

The transportation of used fuel falls under the federal government -- under the Nuclear Waste Management Organization mandate. They have the accountability for transportation of used fuel to their final repository and it's part of their ongoing studies to deal with that, not only on behalf of Ontario Power Generation, but for the other CANDU utilities.

MEMBER BARRIAULT: So I guess you don't have the answers; is that correct? I'm sorry.

MR. DORAN: Terry Doran, for the record.

We do have a representative from Nuclear Waste Management Organization in attendance and in light of potential questions in this area; he would be available to speak to their long-term plans, which would include

transportation.

THE CHAIRMAN: Okay, can -- Mr. Russell, I understand you are here.

MS. LLOYD: While we're waiting for Mr. Russell ---

THE CHAIRMAN: He's right there.

MS. LLOYD: NWMO has done a number of transportation studies. The ones we looked at most closely were in their 2002 to 2005 study period. During that period they did four studies on transportation, not one of those studies estimated dose release exposure levels for the bystanders, the workers involved and so on.

So I think that the transportation of these wastes is an important and large discussion and I do find -- while I certainly never -- I would never shirk from the opportunity to share a table with Sean Russell, I do say that this is a rather awkward way to go about having this discussion.

I think that the Nuclear Waste Management Organization, Ontario Power Generation's long-term management of the waste, their proposal, their plan, should be part of this discussion. But in the documents we were told it's not and yet the NWMO is here to speak to it.

So I certainly don't object to having

Commission Members questions answered by the NWMO or by myself on these matters, but I think -- I think it illustrates one of the problems with this process.

These matters are either part of the review or they're not. I would say they should be and they should have been in the documents that were put before you.

(APPLAUSE/APPLAUDISSEMENTS)

THE CHAIRMAN: Okay. Before -- can we get staff to comment about what these -- should have been in the EA or should not be in the EA; is that part of the scope.

Could somebody deal with that?

DR. THOMPSON: Patsy Thompson, for the record.

The long-term management plans for the spent -- or the used fuel is out of the scope of the environmental assessment for the refurbishment continued operation and the waste facilities that are considered within the environmental assessment, the scoping document was accepted by the Commission.

And I'd like to note that the -- any plans by the NWMO to move forward with a project would require a licence from the CNSC and would trigger its separate environmental assessment.

THE CHAIRMAN: But can you give a little bit more explanation as to why is it out of scope. Is it because none of the things will move out for the next foreseeable future; is that what we're talking about?

Because all the argument the intervenors made about security, about this -- it exists right now. I mean you can make all those arguments around the storage of the waste right now; it's got nothing to do with -- necessarily with refurbishment. So ---

MS. LLOYD: That's right and -- well, it is to do with refurbishment because refurbishment is going to extend operations for an additional 20 years.

I don't disagree with you that we need a venue for a full examination of the fuel waste, the high-level waste and the intermediate level waste which is also highly radioactive, and its current management at the reactor station. That's a good idea.

We limited ourselves in this discussion to the part of the fuel waste -- well, we didn't really, but the fuel waste is going to continue to be generated as a result of extended operations.

Therefore, it is very much part of this discussion. I don't disagree an additional discussion and review is necessary, warranted over -- you know, overdue, but there will be more fuel waste generated as a result of

20 years of extended operation, so it is part and parcel of your decision today.

MR. JAMMAL: Ramzi Jammal, for the record.

Just to complement Dr. Thompson's answer, the scope exclusion or inclusion of the waste.

The safety case of every licenced facility, and specific for the NPP encompasses waste management. So let's not segregate now normal operations of waste, refurbishment operation facility encompass the waste management.

So in other words, as long as the facility is operating, there are management or waste measures or programs in place in order to ensure continuous safety. And those waste management, as you heard: from design perspective for the construction of the waste facility itself, the certification of the containers to include onsite transport and offsite transport.

So let's not misrepresent the fact that a licensed facility contains a safety case for the waste management related to the operations of that facility.

And if anyone would like -- from our waste division would like to add -- we can add to this. So again, I will reemphasize the fact that safety case encompassed the long-term waste management on site of that facility.

THE CHAIRMAN: I think we still owe Dr. Barriault a reply. Mr. Russell please?

MR. RUSSELL: Sean Russell from the Nuclear Waste Management Organization.

I'm trying to think back to the original question, but I thought it had to do with the transport of used nuclear fuel from the reactor sites to the ---

MEMBER BARRIAULT: That's right. That's to go from onsite to a permanent repository and the problems involved in transportation of these 70 ton containers, as I understand because my reason for the question is, if for any reason that you have to start taking bundles out of these containers, then you've also got an added source of contamination. That's all, but if you could explain the transportation problems, I guess.

MR. RUSSELL: Well I can explain briefly the proposed transportation system. It will be either shipping the used fuel from the nuclear stations in their dry storage containers to the final APM facility or the Adaptive Phase Management Facility for long-term management of used nuclear fuel or there would be a transfer of the used fuel bundles at the reactor site into transportation specific containers or casks which would be, of course, licenced by the Canadian Nuclear Safety Commission. So either of these methods would be

potentially possible in the future and the earliest date that we are anticipating for planning purposes, for the transport of used nuclear fuel would be around the 2035 timeframe.

MEMBER BARRIAULT: Thank you. So in the planning of the containers, was transportation taken into consideration? And what I'm hearing, I guess, it wasn't taken into consideration was it?

MR. TREMBLAY: Pierre Tremblay for the record.

You know, we've talked a little bit about what was considered in terms of the long-term intermediate storage requirements, the low intermediate waste, the spent fuel and the provisions that are being made as part of the refurbishment and continued life of Darlington, and so that's all considered.

I mean, we clearly recognize that there is a waste management issue. We account for it financially, we account for it in terms of our planning processes and at the appropriate time and subject to the necessary Federal approvals, OPG will transfer the spent fuel to a licenced facility that will be designed and appropriately built to house those wastes.

In the interim period, as we've talked about, the casks themselves are robust, they're monitored,

the dose rates emanating from surfaces of those containers is very low, it's in a safe, dry, secure area and we have adequate provision for the space. And they are safely and well maintained in that time period, recognizing that there's a fair bit of time ahead of us in the longer term.

And as is stated, our safety case requires us to consider that and to demonstrate competence in managing this area, which we have. Thank you.

MEMBER BARRIAULT: Thank you. Thank you Mr. Chairman.

MR. DORAN: It's Terry Doran for the record.

Just specifically to your question, these design -- these containers are certified for road transportation. So I think that was specifically your question. So they have been certified for transportation and approved.

MEMBER BARRIAULT: Thank you.

THE CHAIRMAN: Certified by whom?

MR. DORAN: They're certified by the Canadian Nuclear Safety Commission.

THE CHAIRMAN: Are these the international kind of certification? I'm trying to understand what it is. IAEA approved or is it CNSC approved? Who approves these?

MR. ELDER: They -- just to clarify, if I can. Peter Elder for record. They are certified packages under our transport regs which are derived from the IAEA transport regs.

THE CHAIRMAN: So those are international --

MR. ELDER: They meet the international standard for transportation, yes.

MS. BRENNAIN: Dr. Binder, if I could ask for clarification? My understanding is that there is a certified dry cask storage container that is certified by the CNSC according to IAEA (sic) standards, which we could have a very good discussion about the rigor or lack of rigor in those standards, but I also understand that the dry storage containers in use at Darlington, that there is a cask design which was approved by CNSC and that what has been in use at Darlington is based on that but is not the exact design.

And so we have -- there's some imprecision to these descriptions which I find difficult. So is it -- is the dry cask storage container that fuel waste generated from the extended operations would be placed in, is that the same container that Peter Elder has just referred to? Is it the same container that the EA document described as being approved by the CNSC, but my

impression from that document is that there was a container approved and there have been modifications to that? It wasn't clear from the documentation, how, when, if, by who, the modifications were approved. And again I think this all illustrates why we need a really detailed review.

THE CHAIRMAN: Okay. Well you asked a question, we would like to hear the answer.

MS. BRENNAIN: Yep, thank you.

THE CHAIRMAN: Anybody has the answer?

MR. TREMBLAY: Mr. Chairman, you're asking a question around, is it the same container that's approved? Is that correct?

THE CHAIRMAN: That's right.

MR. DORAN: Yes, just for the record, it's Terry Doran speaking.

So the original dry storage container, the one we're referring to, was enhanced and as part of our continuous improvement program. So we improved on the design characteristics of this container and in doing so, the objective was to make an easier container for draining, as well as reduce any potential occupational exposure to the workers by removing a vent. So that particular container is gone through that same rigorous review process. We have submitted to the CNSC for

approval, for transportation of this container and that submission, I believe, is due later this year.

MR. JAMMAL: Ramzi Jammal for the record.

I'll pass you along to my colleagues in a second. I just -- there is one thing I need to qualify and clarify here. Modifications, enhancements, are always taking place for enhancement with respect to safety. The intervenor's perception of modification without authorization does not happen. OPG cannot modify a certified container without the approval of the CNSC. So as it's mentioned by the OPG, they are proposing modifications. Nothing will be approved; nothing will be used until the CNSC reviewed the modification and issued the certification. I will pass it on to our colleagues and Mr. Howard.

MS. JONES: For the record, Pamela Jones, Senior Project Officer, Waste and Decommissioning Division.

The dry storage containers are approved by the CNSC for onsite transport from the station to the waste management facility. In order for them to be transported off-site, the addition of impact limiters, which is two pieces that go on either end of the dry storage container, would have to be added.

And the Mark 1 dry storage container has

been certified, as OPG has indicated, by the CNSC for that, with the slight modification, as Mr. Doran talked about, to the dry storage container. That has been approved and accepted as safe by the CNSC, and OPG has indicated that they will be applying to certify that version for off-site transport as well, but right now, both types of containers are approved and accepted by the CNSC for onsite transport.

THE CHAIRMAN: Thank you. Other questions? Oh, go ahead.

MR. HOWARD: Don Howard, Director of the Waste and Decommissioning Divisions. I just wanted to clarify one thing, is that these containers have two purposes right now. One is for storage. So when we look at the containers and we look at the modifications, we want to ensure that whatever modifications are made, ensuring safety for the workers and the environment for that container.

The other purpose of the container, which is why we call them dual purpose containers, is to look at transportation. So we look at that separately and we certify the actual design of the container for actual transport.

So we look at it from two lenses; one is more safety, storage in -- of the spent fuel onsite and

then we look at it from the design of the container for transportation purposes.

THE CHAIRMAN: Thank you. Questions, Ms. Velshi?

MEMBER VELSHI: I'll ask you the question and then, OPG, the very same question. In your review of the EA, did you look at opportunities perhaps that OPG should have looked at for minimizing the volume of waste whether it was the refurbishment waste or for the continued operations. And how those volumes that they have predicted compared with best practices.

MS. LLOYD: No I did not look at waste minimization. I know Ontario Power Generation calls incineration waste minimization. And we didn't have the resources to look at incineration even though certainly in the popular literature, the technical literature as well, there are certainly numerous issues identified with it. But we didn't look specifically at waste minimization as part of our review.

MEMBER VELSHI: OPG?

MR. TREMBLAY: Pierre Tremblay for the record. Yes, we did. I'd like Deitmar Reiner, the Senior Vice President, Refurbishment, to speak to this issue.

Thank you.

MR. REINER: For the record, Deitmar

Reiner.

The intermediate level waste, the actual volume of that, is directly tied to the components that we replace in the reactor. So it would be comprised of things like fuel channels, pressure tubes, calandria tubes, end fittings, feeder pipes. Our process involves volume reducing that waste which essentially entails cutting it, crushing it and that allows us to store it in a -- in a much reduced container.

The low level waste would be very similar to what's generated at the station today as part of normal operations. It would involve things like protective clothing, rags, that sort of thing. So that's essentially what the volume would be comprised of.

MS. LLOYD: And if I could just add, those are all volume reductions but none of it speaks to the key question, which is reduction of the production of the radioactivity, the radiological properties. Stopping producing it is the only -- you know, really is the only option is to just stop generating the waste.

MEMBER VELSHI: Right.

So my question was that does this refurbishment give an opportunity to OPG to reduce the volume of the waste going forward whether it's with new processes or design improvements? So it is still volume

that I'm interested in, but you know, as opposed to are we doing this now and are we planning on doing that for the next 30 years?

MR. TREMBLAY: Pierre Tremblay for the record. Clearly, waste minimization is a specific focus of ours. And there are ongoing efforts to reduce waste both at source and in terms of dealing with the waste that has accumulated if you will over time.

I'll ask Terry Doran to speak a little bit about the efforts. But I guess what I would just clarify is that this is an ongoing aspect of our operation. It's part of our commitment in terms of the licence. And while there's some unique aspects to refurbishment, overall waste volume reduction is a specific focus of ours.

Terry?

MR. DORAN: Terry Doran for the record. Nuclear waste has worked with the stations in concert for a number of years to look at their waste minimization initiatives. Definitely, it's recycle, reduce, reuse is the theme.

In regards to recognizing that we have different types of waste to deal with, particularly in the area of low and intermediate level, we have undertaken some pilot studies to look at taking waste that has currently -- has been stored for a number of years in our

storage facilities, of which we anticipate tritium would have been one of the principle hazards, and have substantially decayed away. And so we're actually undertaking to go back into these storage facilities and re-sort and reduce that through alternative processing techniques.

And we found some successes already in different types of areas that we can actually go in and in actual fact, free release metal tope frames for instance that were used and stored that are no longer contaminated with any type of fixed-end or loose contamination. So we're seeing successes in those initiatives. And we continue to pursue and take those learnings forward so we can minimize and reduce our overall environmental footprint. And ultimately that leads to the final repository, the volume of waste that would go in there.

So our goal is to eliminate anything that doesn't need to be permanently disposed.

MEMBER VELSHI: Okay. I have a few follow-up questions on the CMD 12-H13.202, where the intervenor had raised some questions.

On page 9, it was the bottom half of the page, where the concern has been raised that certain information that you probably had wanted had not been provided to and that the low level waste and the

intermediate level waste volumes had been combined as opposed to be shown separately.

Can OPG comment on that please?

You see there, it's the second last paragraph on page 9.

MR. TREMBLAY: Pierre Tremblay for the record. Just give us a minute. We're going in to look at this.

MS. LLOYD: If I could help with this, I think this is the issue that Dr. Resnikoff highlighted in his report, is that the combining of the low level waste and the intermediate level waste in the dose estimates makes it very difficult -- impossible really to evaluate the radiological impact and effects of either of those waste categories. And we had noted that it would have been appropriately provided in a separate by-waste category.

MEMBER VELSHI: No, I hear your concern on this.

MS. LLOYD: I'm telling them.

MR. TREMBLAY: I'm going to ask John Peters to address your question. Thank you.

MR. PETERS: John Peters for the record.

I just want to clarify that the question that was asked is related to the CNSC's screening report

documentation table 3.4-2, and this is a summary of average low and intermediate level waste specific activity.

The purpose of this table was to give an indication of the range of waste activities that are being considered. For the purposes of the work that the CNSC was summarizing, it's a useful summary to give an overview of waste volumes. It does -- from an activity point of view, we would treat all of these in the means by which we've described elsewhere which are very specific to the nature and type of that waste. So it doesn't drive a different analysis in our view.

MEMBER VELSHI: I guess the question is, is the information available of lower level waste and intermediate level waste separately -- volume and activity?

MR. PETERS: John Peters for the record. The answer is that's correct. Yes, it is available.

MS. LLOYD: And if I was answering that question, I would have said yes, it is available. It's available in the low level -- in the radioactive waste inventory that's been prepared for the review of the deep geological repository proposed for Ontario Power Generation. That's what I would have said if I was Ontario Power Generation. And then I would have responded

as an intervenor in this process that it should have additionally been available here.

And in -- you know, and applied to this review. But of course, I'm not OPG or I would have given a number of different answers.

THE CHAIRMAN: Okay. Staff?

DR. THOMPSON: Patsy Thompson for the record. I'll answer on -- in relation to the environmental assessment and then Peter Elder will talk about the information that's available for the licensing of the waste facility.

And so for the environmental assessment, the consideration of the waste characteristics was done in relation to environmental consequences of the normal operations of the waste facility, waste generation in the streams.

We also looked at the waste characteristics in relation to the accident scenarios that were considered for the purposes of the EA. One of them is the dropping cask of spent fuel and the consequences of those accidents.

We have to make a difference between the information that is available or was used for the purpose of the EA, which in our opinion is sufficient. We've calculated all the exposures, the doses to members of the

public, to workers and the environment for normal operations of the waste stream as well as for accidents and malfunctions.

You also have in front of you a licence renewal for the waste facility and for the purposes of the waste facility licence, the information required for the waste inventory is quite different, and I think my colleague can speak to that.

MR. ELDER: So, Peter Elder, for the record.

I think we're looking at, in the EA, the report, the screening report again, is just as Dr. Thompson has said, it's a summary of more detailed information that OPG had given.

And when we're looking at this one, there are current requirements that OPG identify all their waste sources and manage them appropriately. So these are requirements in the licence and they have to report to us, on an annual basis, the volumes of waste generated and to confirm that they are being appropriately managed.

So in terms of for EA of summarized, it's a summary, but each type of waste has to be identified and appropriately managed as part of the operating licence, and to make sure that it is managed in a safe and secure manner.

THE CHAIRMAN: Can you, Dr. Resnikoff, in these reports -- there's an interesting table that you replicated about the -- the table differentiates between high-level waste and intermediate-level waste, with all the isotopes, the radioactive isotopes.

So can somebody clear for me -- I guess, the intervenors are making the point there is not much difference between intermediate-level and high-level, if I understand their presentation here. And, therefore -- and I think I read somewhere that the American don't have intermediate kind of a level definition.

So is it really clear what is a low-level, intermediate-level, and high-level? Who wants to tackle that?

MR. ELDER: So, Peter Elder, for the record.

Yes, there is. We have -- there are Canadian standards that define those different categories of waste. Every type of waste has to be managed in an appropriate manner, to make sure it's safe and secure.

So transportation of intermediate-level waste will be, must be, in a certified package, certified transport fast, very similar to what transportation of high-level waste is. There are a couple of differences. For high-level, obviously, the amount of heat generation

will be different, and in terms of long-term management, the fact that the high-level waste has a transuranic material -- it means it has to be managed for a lot longer period than intermediate-level waste.

But in terms of how you would day-to-day manage the waste, we would agree that you have to manage all the waste in an appropriate manner, and that the intermediate -- well, waste needs to be -- significant shielding, to be managed safely for storage and transport.

THE CHAIRMAN: But ---

MR. EDLER: But there are rules. I mean

THE CHAIRMAN: But the question is based specific to the refurbishment. Thinking about spent fuel -- we all know what that is, it's high-level -- what about all the pipes, et cetera, et cetera, and some of the other waste material, comes as a result of refurbishment, is it all going to be passed along to the right bucket, low-level, intermediate-level, et cetera? And how do you determine in which bucket things go?

MR. HOWARD: Don Howard, for the record.

The International Atomic Energy Agency has a standard -- I forget the exact numbers, WR, I think 5.1, if my memory served me right -- but it's titled, "Classification of Wastes."

So, basically, they have classified waste into three buckets, as you say -- low-level, and low-level is subdivided into very low level, short-lived, and so on. And then they have intermediate-level waste, and then they have high-level waste.

The IAEA has moved away from categorizing waste according to on-contact dose rates of the container, to looking at classifying waste in accordance to how it can be disposed of. So, in essence, according to the IAEA, low-level waste is essentially material that can be disposed of in, say, the first few metres in the ground, whereas intermediate-level waste, up to 200 metres, and then high-level waste, up to 500 metres.

And, basically, they look at, you know, the radionuclides -- short-lived, long-lived radionuclides' heat generation, things of that nature. So it's all encompassed in the IAEA standard.

So when we looked at that, and we look at the Canadian standard, through the Canadian Standards Association standard, we looked at the IAEA and adopted that document, and reintroduced a fourth category for Canada, because of the amount of tailings that we have, so we have a separate Canadian classification, "Tailings."

But I think the point that we should make is that when you look at waste, is that, "Yes, we can put

things in buckets," but the thing is, is that you're looking at what are the characteristics of the waste? What needs to be safeguarded? Is it the radionuclides? The chemical composition?

There's all kinds of factors that you look at. So you have to manage the waste according to its characteristics, and, basically, you need to put -- ensure that the safeguards are in place to protect workers, protect human health, and protect the environment.

So when we look at, in this case, the waste coming from Darlington, or any of the OPG facilities, is that we look at the characterization of the waste, and how do you best manage that to ensure protection of human health and the environment.

THE CHAIRMAN: Mr. Tolgyesi? Okay, who's next? Dr. McDill? Mr. Tolgyesi?

MEMBER TOLGYESI: In going back to this low and intermediate radioactive waste storage, on your OPG presentation, which was 12-H15.1, on page 39. You are showing waste produced and stored, which I believe the difference is a ratio of compaction, how you reduce the volume?

MR. TREMBLAY: Pierre Tremblay, for the record.

I'm going to ask Terry Doran to deal with

that issue.

MR. DORAN: I need just one minute to find that exact article, please. Could you reference it again, please?

MEMBER TOLGYESI: It's page 39 of your presentation, is the Figure 10, which is saying what's the waste produced and waste stored. The difference, I suppose, if it's the same waste, is the effectiveness of waste reduction initiatives.

MR. LEBLANC: To be clearer, it's the page of document H-15.1, of your submission, not your presentation.

MR. TOLGYESI: Yes, submission.

(Short Pause/Courte pause)

MR. DORAN: Yes, I have that, I think.
Terry Doran, for the record.

This particular article is part of the handling of waste that's done at the Darlington station, and Brian Duncan is prepared to speak to that.

MR. DUNCAN: Brian Duncan, for the record.

Yes, quite simply, this looks at the total amount that is initially produced. It's sorted, and then it goes into categories where some will be incinerated, some will be compacted.

So what you see on Figure 10 is the

difference between, if you will, the initial, before it's handled or treated, and then ultimately what gets stored.

MEMBER TOLGYESI: That's what I understand, and in 2008 your reduction rate was 61 percent; in 2011, it's 42. That means you produced relatively -- your initiatives are effective, or -- because you are producing more waste stored on the site?

MR. DUNCAN: Brian Duncan, for the record.

There's -- what can happen, year over year, depending on the nature of the outage work we're doing, for the maintenance outages, you can see different types of waste streams produced. Some of them can be more effectively compacted, or incinerated, some less so.

As well, through this time period we've had initiatives in place where we're looking at going to more rewashable garments so that there will be less produced in the first place, and, therefore, less than ultimately have to get stored. So, it's not always an apples to apples year over year, and that's important to know that.

MEMBER TOLGYESI: The next question is that Northwatch was saying that to remove the fuel storage period in the fuel pool is much, much longer than ten years. You are talking about six to ten years.

MR. TREMBLAY: I'll ask Terry Doran to speak to that.

MR. DORAN: Terry Doran, for the record.

The -- there's sufficient capacity within the irradiated fuel bay at Darlington, so the need to remove in the next related manner just wasn't there.

Having said that, we do appreciate the value of safe and secure storage in a dry storage container and to that end, in preparation for refurbishment, we've actually undertaken accelerated loading of dry storage containers. It will provide additional capacity in the bays for any refurbishment work and activities and it aligns with the long-term strategy we have that the safe and secure storage in terms of storage of fuel in a dry storage container.

We've actually have increased our DSC loadings both at Darlington and at Pickering, and again, these are drivers that we've taken to put it in to a safe and secure storage medium.

MEMBER TOLGYESI: My last.

UNIDENTIFIED SPEAKER: Mr. President?

THE CHAIRMAN: I'd like to speak about a conductor question. There's a lot of people who are comparing Fukushima storage and the CANDU storage. I'd like to hear from Dr. Thompson.

Maybe you can explain to me who came up with the design, the Fukushima design that put the fuel

bay four storeys up? And how does it compare to the pool which is in ground? So, I'm trying to understand the risk of activities between the Fukushima and the CANDU system.

DR. THOMPSON: This is Gordon Thompson speaking. Can you hear me?

THE CHAIRMAN: Yes, we can.

DR. THOMPSON: The problem with -- that came to public prominence during the -- subsequent to the Fukushima accident regarding spent fuel, partially reflects the particular design of the Fukushima plant and partially reflects the fact that the fuel storage in the Fukushima pool is at a very high density.

The high density configuration applies to all reactors in the United States and most reactors around the world. The particular configuration of Fukushima, where the pool is at an elevated position high above the ground, is characteristic of General Electric boiling water reactors. The Fukushima pumps were designed by General Electric, have the same configuration as similar reactors in the United States.

The majority of reactors in the United States are pressurized board reactors and the levels of the pools are approximately at ground level. Design details vary, but it's common for the -- the top of this spent fuel has to be at or around ground level.

The fear at Fukushima was that the fuel would become uncovered due to loss of water and that the fuel would then suffer an exothermic reaction, that the chromium would steam or would air resulting in a large atmospheric release of radioactive material, especially cesium 137 and 134.

THE CHAIRMAN: Sorry to interrupt. We are fully aware of what happened in Fukushima. I'm trying to understand your assessment of the CANDU methodology of in-ground pool and its relative risks.

DR. THOMPSON: The CANDU configuration has never been subjected to a thorough analysis to determine it's potential to undergo an exothermic reaction of the circular gliding without the steam over there and the resulting radioactive release.

That's essentially what my report calls for and I'm reflecting the same request from the CNSC's Fukushima Task Force.

THE CHAIRMAN: Thank you.

Staff?

MR. JAMMAL: Ramzi Jammal, for the record.

I'd like to set the record straight to you Sir, that the Fukushima Task Force did review and we have a full understanding of the management of the fuel, especially in the fuel pool.

I'll look on to my colleague, Dr. Rzentkowski, but we know for a fact the heat dissipation in the Canadian pool, there is a big difference in the design with respect to the composition versus the enriched uranium. First, it's natural uranium.

I'll pass on to Dr. Rzentkowski with respect to -- or Peter Elder, whoever -- but we'll start with Dr. Rzentkowski.

We did study post Fukushima, the behaviour of fuel including the dissipation of the heat in water and how long does it take for cooling and interventions.

DR. RZENTKOWSKI: Thank you very much, Mr. Jammal.

I would like to stress the point that the safety case exists since the initial licensing of the CANDU reactors. And the safety case is being described in the safety analysis report. The safety case has been reviewed by the CNSC staff and accepted.

If I could remember, the limiting accident in that area is a loss of cooling. Under those extreme conditions, it has been demonstrated that it takes approximately 72 hours for the water to reach 100°C and, in addition, several days for the water to boil off. So, basically, this would mean that the fuel in the spent fuel bays would be uncovered. But, it would take several days.

So, generally, this is a very slowly progressing event and there would be ample time for intervention.

Nevertheless, the Fukushima Task Force took another look at the spent fuel bays because the accident, considering the loss of coolant -- that means no water inventory left in the spent fuel bays -- was not considered in the original safety case. It was simply ruled to be beyond design basis accident.

This was a correct assumption. But, of course, Fukushima forced us to look into those incredible events to make sure that mitigation measures would be put in place.

So, this accident scenario is being examined by Darlington and additional provisions are being put in place to make sure the mitigation measure could be provided even in the case of beyond design basis accidents.

At the current stage, this is the situation and I'm sure that Peter Elder will provide more details.

MR. ELDER: Just to -- I'm not going to -- What we've been done -- so, I think, there are two things I want to add is saying, from an environmental assessment situation, the Environmental Assessment does not consider every single accident scenario that's in the safety report. It picks representative accidents that were

considered to be bounding.

The analysis that we've done so far would show that fuel pool or fuel bay accidents would not be bounding.

And there are a number of significant differences in risks. Some of them are raised by Dr. Thompson, but I think, in terms of looking at the CANDU reactor and what goes into the fuel base point of view.

The first would be: it's the fuelling approach in LWR, roughly 30 per cent of the core is put in at a time as opposed to 10 small bundles a day. So, the significance in terms of high-level heat load in the bays is very different.

The burn up -- so, this is the amount of time that the fuel has spent in the reactor -- is significantly different and LWR is averaging now five or six times higher residence time in reactor. The heat generation, after a few days, is proportional to that burn up.

Also, most importantly, the cesium inventory is proportional to that burn up as well. So there is five times after a few days of cooling, ten days of cooling. In the LWR rod, there's five times the heat generation and there's five times the cesium inventory.

And also, Dr. Thompson mentioned the high-

density fuel packing. This is not and has never been done in CANDU reactors. The approach has always been to go to dry storage.

And also, going back in, the elevated fuel base in Darlington is a steel-lined double-walled bay with leak detection between the two bays. So again it's an in-ground design. So there's -- would not be subject with a double wall to any events that would lead to a rapid -- rapid loss of coolant in the bays.

The third one is the criticality risk. CANDUs use natural uranium. LWR's, even after discharge there is still significant enriched uranium in them that you have to manage a criticality risk in the bays by controlling the chemistry in the water. That risk does not exist in CANDU.

So there are again a number of significant differences in how the bays and what goes into the bays that actually mitigate the risks that you have from accidents in a fuel base.

That said, was, Dr. Rzentkowski has said, we are doing under the Fukushima task force more work on what mitigation is required if you ever got into the situation when the bays would be completely drained and just saying it's not very obvious that there is enough heat load in the CANDU to get exothermic reaction.

There'd been lots of experiments done on CANDU fuel to look at fission product release. Taking real fuel and heating them up to temperatures and normally you need to get a very high temperature, in the 800 to a 1000 degree Celsius range to actually get that exothermic reaction in steam or air.

So I think it's important that we, as I said we're looking at this one but our position is still going in -- back in this is not likely to be a bounding accident. It's a very severe accident that you would want to have extra mitigation. And the mitigation is frankly fairly simple. If there are going to be slow progressing accident it's to make sure that there is a possibility of getting emergency water into the base.

THE CHAIRMAN: Okay. Thank you.

MR. TREMBLAY: Pierre Tremblay for the record.

If you would mind, I would like to have Mark Elliot speak a little bit to some of those additional precautions.

THE CHAIRMAN: Okay.

MR. ELLIOTT: Mark Elliott for the record.

Just to add a couple of things to what Dr. Rzentkowski and Peter Elder mentioned.

First of all in the environmental impact

statement to the IFB, various fuel bay accidents are discussed. It's in the technical support document that was input, so you have it there.

Couple of things. The bays are seismically qualified. So they're, they can withstand earthquake. They are rated for 100 degrees temperature. So if the water did boil the bay is robust to withstand that temperature.

And since Fukushima, what we've done is improved our procedures for adding water. So the operators have a variety of ways to add water should there be a leak or should there be a risk of water boiling off.

And finally there are, in our emergency mitigating equipment, our diesel pumpers, we have facility to pump water into the bay as well. So there are a number of features beyond what's been mentioned and it is covered in the environment assessment.

THE CHAIRMAN: Okay. Thank you. Mr. Tolgyesi. Dr. McDill.

DR. MCDILL: Dr. Binder, I'm just wondering if Dr. Thompson could reply. There's been a lot said about his report in the last few minutes and I'm wondering if you could invite him to reply.

THE CHAIRMAN: Okay. Dr. Thompson.

DR. THOMPSON: Thank you. This is Gordon

Thompson again.

A witness from CNSC recently said that -- or said just a few moments ago that there's ongoing work to determine if a drain gradient fuel bay would result in fuel temperatures reaching the ignition point. And I agree with him that the temperature would need to reach in the 800 to 1000 degrees Celsius range. It seems to me that this is a fundamental question that needs to be settled by a really thorough analysis before this issue can be settled one way or another.

And it's a fundamental issue to this environmental assessment process. Also, there's been talk about mitigating an event of this kind and the assumption by all the witnesses appears to, or other than myself, appears to be that a slow boil off evaporation of the water is the only scenario concern. That's not in fact the case. Water could be lost by leakage, by displacement, by pumping or by siphoning. And this could occur as a result of an accident or a malevolent event. And one needs to really -- risk assessment to determine which of those mechanisms is possible or likely at Darlington.

I see no evidence that that work is being done either. But that's also something that needs to be done before this spent fuel issue can be put to rest in

the environmental assessment process.

THE CHAIRMAN: Okay. Thank you. Dr. McDill.

DR. McDILL: Most of my question is now completely gone. But I had one bit left that maybe we can try. And I'll ask staff and then OPG. Obviously the intervener's expert, Dr. Thompson, was unable to find or was not given some of the studies. So perhaps there could be some direction as to where they could be found. The most recent ones are on-going and maybe we could have a date for when they will be complete. And the ones going back to the original design basis must be at least on paper somewhere. So is there, is there a specific list that could be provided to the intervener of where these studies have been done on the original design basis for the radiated fuel bay. The differences on fuel loading; the differences in fuel itself; the differences in the pool so that it would be easier for the intervener to -- if you like, get her teeth into the meat of the matter.

I also -- I'll ask the intervener did you see the YouTube or the video yesterday? It's not on YouTube but I guess the video yesterday. I think we are gonna have it on YouTube. It will be on YouTube channel.

UNIDENTIFIED SPEAKER: It is on YouTube.

DR. McDILL: It is on YouTube channel but

it wasn't, we didn't see it that way yesterday. Have you seen that video?

MS. LLOYD: Yes, I did see it yesterday. I haven't seen it on YouTube.

DR. McDILL: So with respect to the technical documentation, is there some points that we can direct the intervener to find the relevant material? Staff and OPG.

MR. TREMBLAY: Pierre Tremblay for the record. While your staff is looking at that, I guess what I would say is to the extent that we would just review it from the standpoint of security given some of the subjects that have been talked about, but in terms of technical detail, it's certainly -- that's available and we could work with the CNSC on that and the relevant parts.

DR. McDILL: The reason I'm asking is that there is a statement that says on page 34 of the report by IRSS that says, "Comparable studies have not been done for SNF discharge from CANDU" and I think staff is saying that comparable studies have been done with the exception of this last piece, post-Fukushima.

MR. RZENTKOWSKI: If I may comment on the last observation, the IRRS. Typically the IRRS missions don't review the technical assessments, and review only the steps taken to formulate a safety case in accordance

with IAEA requirements. As I indicated already, the safety case is described in the safety report provided by Darlington for our assessment. And also, just after Fukushima happened, we issued a briefing note. We issued a briefing note which was posted on our external website, which compared the safety case for irradiated fuel bays for CANDU reactors against that in boiling water reactors, and I am quite sure the safety case is still on our external website.

THE CHAIRMAN: Oh the answer is you will undertake to find whatever is written about the safety case for the bay, the fuel bay and share it with the interveners. Okay. So we can do that. Dr. McDill, want to pursue?

DR. MCDILL: Fine. Thank you.

THE CHAIRMAN: Anybody else?

My last point, maybe some staff can talk little bit about security and terrorism and thing of that nature. First of all, I'm surprised at some of the argument. I can tell you I'd be very surprised in the States if you actually get to talk about their nuclear security in the public. But they are going to be using some of those weapons, but I want to hear what Staff feels about some of the malevolent kind of activity that could happen and how -- what is the kind of defence in depth?

DR. THOMPSON: Patsy Thompson.

Perhaps while our specialist is getting organized, I just wanted to remind that malevolent acts were not considered under the envelope of the EA. It is a risk factor but it is considered under security and licensing as will be described.

MR. ADAMS: Yes, good morning. Patrick Adams, the Canadian Nuclear Safety Commission, Senior Security Advisor.

The Nuclear Security Regulations publicly available documents apply to the facilities and all the nuclear material, whether it's in current use, storage or transportation. Under the Nuclear Security Regulations threat risk analysis are undertaken, their obligations to counter the new risks from the design basis threat and inspections and performance-based activities are undertaken to confirm the adequacy of the security.

The issues of malevolence and design fall outside of the security category and I can't speak to those but I can assure that the security regulations are there, that we have a very robust inspection and oversight program to ensure that they are maintained.

THE CHAIRMAN: Thank you. You have the last word.

MS. LLOYD: Thank you, Dr. Binder and

Commission Members.

I note in reviewing these documents and other documents that what seems to be fully absent is any reference to what I think is a really active discussion internationally about extended onsite storage. I think the IAEA calls it very long term onsite storage.

In the U.S. that discussion is often coupled with a discussion of hardening the facilities, making them more secure and I don't see any evidence of Canada, the CNSC, industry in Canada contributing to that discussion and I really do think that in addition to bringing more detail and more rigour into the review of the waste management methods and systems and facilities, we also need to look at extending the onsite storage.

Fifty (50) years to a hundred (100) years is what we always hear from industry, but certainly the waste has been in storage for some decades and will be in storage for many more decades and we really need to move to that lively international discussion about extending onsite storage, moving the waste from the pools into the most secure environment possible. And I think we owe that to the reactor communities and certainly to the communities in Northern Ontario being studied as possible burial sites. We don't expect to be rushed or pushed into that kind of a decision simply because of security risks

onsite. They could be avoided by taking clear action now.
Thank you.

THE CHAIRMAN: Thank you.

MR. LEBLANC: So based on the agenda, the next submission was to be an oral presentation from Ms. Ysabeault-d'Valar-Alba, as outlined in CMD 12H13.31. As she is not available today, her submission will be considered as a written submission later on with other written submissions.

So Mr. President if you want to announce the next presenter.

THE CHAIRMAN: The next submission by the International Institute of Concern for Public Health as outlined in CMD H13.201 and 13.201A and I understand that Ms. Tilman will make the presentation. Please proceed.

12-H13.201 / 12-H13.201A

Oral presentation by

International Institute of Concern

For Public Health (IICPH)

MS. TILMAN: I want to move quickly through our overview of our presentation. Our primary focus is on health effects, which is a focus of IICPH. We have also appeared at a number of other hearings regarding

Darlington and the refineries and so on and which health has been our primary focus, and continues to be.

Because of the nature of OPG's planned project, experiences with Refurbishment have also been our main focus here looking at other CANDU facilities. And we also have examined other issues that are always related to the human health factors, such as accidents, malfunctions, and so on.

Another matter that has arisen in our work in trying to find more information about refurbishment is Access to Information, public accountability and we'll have a fair amount to say on that.

Moving to the next slide, standards -- current standards are not protective. They're far too lax and over time as more knowledge is accrued, they will change. We're looking at a 40-year project at least and longer for decommissioning. We won't have the same standards, I hope then as we do now.

It is well known and recognized, there's no safe level of exposure. So any value that is set is set on the acceptance of harm.

Background levels you heard some discussion about that yesterday, they're not innocuous and as indicated, any additional radiation can cause greater harm. There's also the effects of other hazardous

substances, hydrazine which is a very critical substance in nuclear power plants. It's a non-threshold carcinogen, and other air pollutants and all of these affect the health and wellbeing of populations nearby and workers.

Exposure to radiation, radiation damage can affect any part of a cell and cellular processes and we have listed here some of the issues, lung, bone cancer, et cetera, damage to internal organs, reproductive systems particularly sensitive. Women are particularly sensitive. Also, diabetes is another issue that has arisen as a potential result of exposure to radiation.

Vulnerable groups, pregnant women, children, the foetus, new-born, the immune comprised, the elderly and there's risk to workers. When we use the word 'workers', there's the nuclear workers and those trade workers that come in and do all kinds of jobs and is particularly important for refurbishment.

Another issue is these effects may not be easily determined visible, you know immediately, they're intergenerational. It may take a while.

You've also heard about tritium which is CANDU particular issue here. And there are routine leaks into the air and water and the properties of tritium are also well known. It's been stated many times that drinking water standards are completely inadequate and are

based on 350 fatal cancers per million. That's the kind of issue we need to look at in standards.

The Darlington Nuclear Generating station, well there's been a number of spills but a major one in December of '09 from the injection water storage tank. The amount released is recorded there, 45 million becquerels of tritium. The actual concentration is far in excess of 7000 becquerels per litre. Now this is just three years ago approximately. Given the half-life of tritium is 12.3 years, it will take at least 10 half-lives before you're down to 1000th of the level that is there.

Why this spill is considered outside the scope of the EA is beyond us. Spills are important. They are part in parcel of what happens when these facilities operate during routine circumstances.

Regarding workforce issues. Workers are on the frontline. Some of the work is done manually and they're on the frontline whether there's accidents, emergencies. And we've listed some of the issues, the expose to multiple pollutants and the potential effects aren't just on the workers themselves, but extend into their families. We don't know, we don't track that.

The limits that are set, the permissible limits for nuclear workers, the 20 millisieverts per year or 50 over a five-year period and so on, they are set to

allow 3.2 excess cases of fatal cancer per hundred workers over a four-year career. That is, why should these limits place workers at such high risk? It's unfair and unethical.

There have been workers health studies, the 1500 country health study, for example. We've heard from the Durham study. We see there are small, but potential, significant increases in cancer.

However, repeatedly, these studies have been criticized, dismissed, and, yes, there's faults in the Durham study, we're heard about that. But we can't dismiss this, and unless we have better information on this, and more thorough information, we shouldn't.

Now I want to turn to refurbishment, specifically, and this has been a herculean task, to find out what has happened at our CANDU reactors when they're been going through refurbishment. This is particular important, because this particular proposal is four reactors, not just one.

So I'm going to focus on one case, and talk about a couple of others. One is the alpha contamination incident, that happened at Bruce at Unit 1, and outlined about over 550 trades workers were internally exposed to alpha radiation while they were cutting and grinding feeder tanks, and, as a result, particulate matters

released that contains radioactivity, and they were not required to wear respiratory protection.

There was a major independent review that was conducted, called for by Ministry of Health, the trades unions, and Bruce as well, I -- was involved in that.

It's an interesting report. They came up with 19 recommendations, covering a host of topics. One I just want to mention, or one of which is recommending that this experience be shared broadly amongst operators of CANDUs.

Now, when they were looking at the root cause of the accident - this was quite astonishing - there were a couple of explanations given, but the explanations didn't pan out, scientifically. They had to do with extra-oxidation crumbling of particulate matter.

What the accident was traced to was a "fuel channel crushing accident," as it was called, in 1979, 30 years prior, during a refuelling exercise, and it resulted in a release of irradiated uranium, okay? And that caused a five-fold increase in the radiation fields, due to deposition of the fission products.

What this root cause did was say, "Hey, we overlooked something here," and it's something the report mentioned. This is not me saying this; this is the report

-- mentioning the mindset was so based on alpha, it's just a small fraction of what -- of the beta and gamma hazard in doing this kind of work.

Well, they were wrong. And as a result of delayed response -- and CNSC staff also noted that it was the high ratios of beta to alpha, that are typical, and again protection of beta should protect alpha. That was wrong as well.

So we were wondering, what's happened with a report of this kind? Because this is the only thing that I was able to find. Have any of these operators looked at this report? Has Bruce adopted the recommendations? And, particularly, OPG, in this case, and what about New Brunswick?

Now, a case of -- going into New Brunswick right now, but I put it here under "Alpha contamination" because there was a hearing, a CNSC hearing, on the alpha contamination incident. And during that hearing, it came out that there was alpha contamination, as well as Point Lepreau -- at Point Lepreau -- but it was below New Brunswick Power and Nuclear's action levels, and, hence, not reportable to CNSC. That's an issue.

Now, going to -- oh, sorry, I should go back. Okay, Point Lepreau is a sad story of refurbishment. Now, we're talking one unit, remember, and

we're talking four units for Darlington. The new calandria tubes had to be replaced twice.

Now, an issue that the previous intervenor addressed was refurbishment waste. Well, in this case there were far greater volumes that were anticipated, partly due to unforeseen problems they encountered during refurbishment. As a result, they didn't know what to do with the amount of waste, and, the last I knew, they were contracting to have it shipped off-site because they didn't know what to do with it. There are other incidents, too -- spills of tritium water, and so on.

As a result, there are enormous delays -- well, three years well beyond the original start date, restart date in '09; the costs exceeded by \$1 billion, and an extra billion for replacement power. No doubt this would affect the workers and the community. It's rather depressing.

Pickering has been accident-prone for a long time. I don't know what else to call Pickering. It's been a litany of accidents since the 1990s -- 1983, actually, was an extremely serious loss-of-coolant accident.

There has been retubing done. Now, this is called "retubing" versus "refurbishment." I think we can pick on words, but it really was their -- I was unable to

find anything at all on what happened to workers, either Lepreau or Pickering. I did contact OPG, through advisement of CNSC staff. I contacted New Brunswick Power.

Just before our submission was due, our written submission, I received a letter from OPG that I would have to use Access of Information to get any information, and I have copies of the letters that were attached to the submission. So, unfortunately, as much as I wanted to track these records, it was impossible to do.

But, one thing -- the experience at Pickering has send out -- you know, maybe we shouldn't be refurbishing. So, with respect to refurbishing, the estimates, times, money -- unrealistic. Darlington, it's a guesstimate. Hidden costs are not attributed. Some of them are unforeseen. You always need contingency plans.

Extra waste is produced, and it adds to the problems that we've heard from our last intervenor. How about shutting -- working towards decommissioning, instead of refurbishing?

Malfunctions in accidents, we just find it unconscionable that no malevolent acts are considered possible, and CNSC states "no residual effects are expected from accidents." In this day and age, you can't talk about what you expect. That's an unrealistic term.

You have to think the worst-case scenario, and we've listed some of the problems we've seen. You can't discount human malevolent pieces.

Well, we've got two mathematicians here, in the presenters, and we have a great deal of problem with the discussions on probabilities, that I've already gone on -- the one a million is not a calculation; we heard that yesterday. It was a chosen ratio. You can't just pick and choose.

If you look at the past 30 years, and you look at empirical probability, there's been three major accidents in 32 years -- we're talking about 1 in 10 of major accidents, but we've defined those terms, one in a million -- who knows, creates that. And, as we say, the probability of an event happening does not govern when it will happen. You can't foresee everything, and you can't ignore the possibility of a major accident.

You've heard a lot about evacuation contingency plans yesterday, and I think that considering there's been nuclear reactors in this region since the early seventies, that's absolutely outrageous that there's no strong evacuation plan that considers worst-case scenarios. Also, we didn't hear much about what health care -- how are you going to manage the health case issues that would ensue, in the case of a worst-case scenario?

Now, "refurbishment" is defined by OPG and the World Nuclear Association, "replacement of key components," so it's sort of vague. But steam generators are not included in this, and steam generators, if something goes wrong, you've got a real problem -- they are key components, and, traditionally, there's a lot of vibration, there's fretting, there's cracking of pipes, et cetera.

I would say that replacing fuel channels is like a heart transplant. Replacing steam generators is a means of protecting the integrity of a radioactive/non-radioactive barrier. Think of a blood/brain barrier. Clearly, it's a necessity to do both, to refurbish.

Cumulative impacts, it's -- they do have an impact, all of this work, for all these years, is going to have an impact that can't be ignored, every single thing we've talked about. In particular, all radiation exposure is cumulative.

Okay, public accountability, absence of evidence is not evidence of absence. As I mentioned before, under "Refurbishment", there was so little information that was available, and what was available, under S99 reports to CNSC, were one-sentence statements -- very difficult.

From a public perspective, this is an

impossible field to track. We're not interested in looking at specific workers, or specific things, but we would like to know a better explanation of accidents. And I have copied out a list of all reportable accidents that I could find on these reports. And none of them made any sense to me. Like they're all encoded language about failure to put a tape on something or some water mineralized, demineralised water got released or dual reactor --

THE CHAIRMAN: We got the report. We read it. Would you please conclude?

MS. TILMAN: Yeah. I will. And I just want to report that nuclear plants leak acutely and chronically and the public has a right to know.

In concluding these remarks, refurbishment is costly, hazardous and wasteful. There is yet no guarantee that refurbishment would extend the life of a reactor by any particular length of time. And there's no justification for the conclusion of CNSC that the project would not cause a significant adverse effect on the environment. And therefore, IICPH recommends the Commission reject OPG's proposal. Thank you.

THE CHAIRMAN: Thank you. Questions?

MEMBER HARVEY: Merci Monsieur le Président.

I'll start with OPG. In the executive summary of the written submission, we can read:

"We also -- we are also very concerned that a steam generator, a key component of nuclear reactors, are not being replaced during the proposed refurbishment. Next to calandria tubes, steam generators are the most likely cause of problems with nuclear plants." (As read)

Could you comment on that?

MR. TREMBLAY: Pierre Tremblay for the record. Certainly the overall approach around examining what is in scope, what will be done, what isn't done, is a comprehensive assessment of the condition of every component. And that clearly included the steam generators. I guess I would ask Dietmar Reiner to comment on what was done and the decisions that were made.

MR. REINER: Dietmar Reiner for the record. Clearly steam generators are a critical component to operation of the power plant. And so it's an item, when we did our condition assessments, that we took very seriously.

So we undertook some very extensive studies, brought in a third-party expert consultant to help us with those studies. And we assessed all of the degradation mechanisms that the Darlington steam generators could be subject to, as well as all of the

history we have on the performance of the steam generators.

Coming out of that assessment, we concluded that the steam generators can last to the end of the refurbished life of the station. And we do not see that as being -- as being a significant risk.

Now, the environmental assessment does contemplate a potential replacement at some point in the future. So it is covered in the environmental assessment. But as far as the scope of the project is concerned, based on the excellent condition that the steam generators are in and good controls on water chemistry in the station, we don't see this as being a requirement.

MEMBER HARVEY: What is so different in the steam generator at Darlington than it was at Bruce?

MR. TREMBLAY: Pierre Tremblay for the record. I'll ask Mark Elliott to elaborate a little bit on the inspections and the results. Thanks.

MR. ELLIOTT: Mark Elliott for the record. Just before I answer that question, just a couple of more points for -- on Dietmar Reiner's comments.

What we do in our inspection program is every outage we monitor the steam generators. And we're looking for the existing degradation mechanisms that we know about that have happened to steam generators around

the world. We're watching for those and we haven't seen that degradation go further. We haven't seen it deteriorate the steam generators. And that's due to our inspection and maintenance and also our chemistry control.

But we also go further than that. We're looking for new degradation mechanisms. Things that may not have happened yet on our steam generators, but we may have heard about in the literature and we're looking for those as well. So, looking to see that we're still fit for service, but looking at what might be coming up with these steam generators. And so far we haven't seen anything that would prevent us from running those steam generators for the second life that's being discussed here.

The Bruce steam generators were -- you know, the Bruce is an older plant than Darlington. The techniques to preserve the steam generators were not as well advanced in those days. And in fact there was a particular event with the unit 2 at Bruce where some foreign material was left in a steam generator and caused that unit to not be able to be operated because of the steam generator.

So Darlington: newer plant, new techniques, we preserved it well and we don't expect to have to replace them.

MEMBER HARVEY: Thank you. My other question is related to the staff. They just mentioned at the end about the bonding scenario approach and at the end of the paragraph on page 11, under "C, The Bonding Scenario":

"These are scenarios that are so severely limited that they miss -- they miss-present and minimize and ignore many other serious potential environmental and health effects. The approach is not scientific. It cannot be justified." (As read)

Ms. Thompson?

DR. THOMPSON: Patsy Thompson for the record. I'll start the response and then I'll ask my colleagues to complete the answer if I missed any points in terms of the safety assessments and the considerations.

When we -- for the purposes of the environmental assessment, the *Canadian Environmental Assessment Act* requires that we look at accidents and malfunctions and it's stated accidents "that may occur". And so what we direct OPG to do and what the technical review that staff does, is to look at all the operational parts of the facility including the fuel base, the things we've been discussing this morning, the transport of material to the waste management facility.

So we look at all the aspects of the

facility and the operations. We consider operational experience. There was a statement made earlier that we did not consider spills, for example. So we look at all the operational experience to make sure that we include things that have happened for which we have operational experience.

We look at the safety assessments that have been done, the potential accidents that have been identified. And as we explained yesterday, we don't look at all of the accidents under the EA, but we make sure that the accident that covers the others are being considered. When we looked at the accidents for a nuclear accident, we took a probability of one times 10 to the minus six, or one in a million. And that is considered a beyond the design-basis accident.

So in our view, we did take into consideration an accident that is a very large accident and that is bounding for the other types of accidents that are in the "may occur" category.

In terms of the fuel base at the earlier discussions, because of the type of progression of the accident, we felt that this was not an accident that would be bounding for other types of accidents related to the management of fuel. And so -- but we did look at dropping of the fuel cask and the consequences of that. And that

was a more relevant accident to consider under the EA.

And I'll ask my colleagues if they need to add details.

MR. FRAPPIER: Gerry Frappier, Director General, Assessment and Analysis. So maybe just to explore a little bit more about the difference between the environmental impact assessment that we're talking about now and some of the overall engineering safety analyses that are done.

So as Dr. Thompson was saying, for the environmental impact, we are looking for accidents that may occur and we firmly believe that a 10 to the minus six type of screening level is -- certainly captures all of the accidents that we believe may occur.

However, we also in the Integrated Safety Report -- Review rather, that will be coming at the time of licence -- looking for a licence to actually do the refurbishment. We also have several other deterministic analyses that say, independent of the probability of occurrence, we should be looking at things to ensure we have defence in depth against things that may not be known at the time. And those include some analyses as has been mentioned yesterday, that go beyond the design based -- beyond the 10 to the minus six type probability and just says we don't exactly, you know, what the reason might be,

but if we had this kind of accident, what would be the -- the severe accident management approach and what would be the defense in-depth that would provide us confidence that it still meets all our safety goals.

MEMBER HARVEY: Thank you. Just -- I would like that you comment on the fact that because there is a choice, it's not scientific.

MR. TREMBLAY: Pierre Tremblay, for the record.

If I could just get Mark Elliott to comment on bit on that and the whole area of beyond design-basis.

MEMBER HARVEY: Okay.

MR. ELLIOTT: Thank you, Pierre.

Mark Elliot, for the record.

I really appreciate the chance to talk about this because there was a feeling in the room yesterday that the Environmental Assessment didn't deal with beyond design-basis accidents, didn't deal with multi-unit accidents and the Commission would have to wait till 2014 to fully understand and resolve this.

In fact, the Environmental Impact statement does assess beyond design-basis accidents including the station blackout and it's on the record right now, so we don't have to wait.

The reason for doing that is to get to the

ten to the minus 6 accident. You have to understand the full range of accidents that could occur. And so we've done that. We put that on the record and come up with this ten to the minus 6.

Also, people seem surprised that this ten to the minus 6 accident doesn't have worst effects, doesn't have worst consequences on the environment, and I want to explain why that is.

When we were doing this work to prepare the Environmental Assessment, for this project, we made a conscious decision early on to install four new safety features. These are not related to Fukushima, this was done before Fukushima, and they're permanent safety features. They are called "Safety Improvement Opportunities".

And the four of them are: the containment filtered venting system; a third emergency power generator, a seismic generator; improvements to the power house steam venting system to make that system more reliable; and an emergency heat sink, another heat sink for the reactor that is again seismic.

So, these are again not Fukushima models, they -- and they're actually going to be installed before we do refurbishment. We know the lab safety right now, so we're not waiting for refurbishment; we're installing them

station to the year 2055, is a hugely serious undertaking.

If approved, along with the two proposed new Darlington reactors, it will be on the leading edge of a nuclear trajectory into several generations or more of Ontario's unsettling reliance on nuclear power for at least half its needs. Rather than investing much more in energy efficiencies, conservation and alternative sources of power such as geothermal, solar, wind, combined heat and power, as well as distributed power.

Instead, nuclear power will not only continue to negatively impact public and worker health and well-being and the environment, but it has the potential to cause devastating impacts on millions of people in the GTA area, around the Great Lakes and further for years to come should a major natural or human-triggered accident happen.

We are not alone in considering the importance of this nuclear proposal. And despite the weakening of the federal environmental rules around environmental assessments, the Minister of Environment obviously had some concerns and he decided to let this project go through the screening level rather than to go forward without it.

And this Darlington plant was built in another time when standards were weaker and that may have

come into some of the considerations there federally.

And there was no public knowledge of course of events such at Chernobyl and Fukushima when it spilt.

As well, Canada and the U.S. have agreed that nuclear issues must be addressed as part of the September 7th, 2012, renewed Great Lakes Water Quality Agreement, Article four, Implementation Two: "These programs shall include, but are not limited to, pollution abatement control and prevention programs for six sources of radioactive materials" and "the parties shall notify each other of the planned activities that could lead to a pollution incident or that could have significant cumulative impact on the waters of the Great Lakes such as the storage and transfer of nuclear waste or radioactive materials and nuclear facilities." (As read)

Other intervenors and presenters will have dealt with the multiple flaws in the screening review, so we will just highlight our concerns with a few of the most startling screening document omissions and inaccuracies regarding this proposal that have led us to believe that CNSC is not acting in a precautionary manner and that therefore, it is not fulfilling its responsibilities under the *CEAA*.

For PCWO, the most glaring omission which undermines the credibility -- CNSC's credibility as a

regulator, is their neglect of the Ontario Power Generation's admission in its Darlington draft screening report that accidents involving large radiation releases are realistic at the Darlington nuclear generating station.

Greenpeace has noted that the screening report makes no reference to the role of institutional failure and human error in past nuclear accidents such as Fukushima. This provides an unbalanced view, in their point of view, on the risk continuing to operate -- risks of continuing to operate Darlington.

Greenpeace also notes that despite the identification of two accident scenarios by OPG that would create widespread contamination and most likely abandonment of land, and that will also cause several thousand latent cancer deaths and would in some tradition -- be considered by CNSC as realistic, CNSC has failed to apply the precautionary principles strictly and has excluded these scenarios from the review report.

The above-mentioned omissions and result and lack of action run directly counter to the actions taken by other countries who are paying close attention to the Fukushima causes, particularly human and institutional error, impacts and long-term risk of nuclear. And hence, they are either downsizing or phasing out nuclear power.

And again, as noted by the Canadian Coalition for Nuclear Responsibility, CNSC staff post-Fukushima action plan itself, fails to recognize the huge risks of a Fukushima type disaster. Even though the action plan's director, Dr. Rzentkowski, has publicly admitted during the recent Point Lepreau licensing hearings held in Saint John, New Brunswick that CANDU reactors cannot necessarily withstand the conditions that led to Fukushima's nuclear accident. And on record, he stated:

"Even if we will experience an extremely high magnitude earthquake here in Point Lepreau approaching a level of that in Fukushima, the reactor will shut down safely. However, there will be some consequences. Definitely, the core will melt. Now the question is if the molten fuel will be contained in the calandria. Probably not -- it may be. But it cannot be guaranteed. So the worst-cased consequences would be some level of unfiltered releases of radioactivity to the environment after maybe four or five days from the

accident. That's the worst-case scenario which also included large releases of radioactivity because we cannot preclude this as we have seismic activity of this magnitude."

Well, the level of seismic activity in the area of Saint John is greater than that in Pickering and Darlington area. These Ontario sites are located in the -- on the interlinked and interactive bedrock structural elements of Logan's Line, the Saint Lawrence River fault, the Ottawa Bonnechere Graben, the Findlay Algonquin Arch, and the Hudson River Fault.

NWMO's 2009 Annual Report also shows seismicity in the Findlay Algonquin area, among others. And the CNSC DNG screening report notes, one earthquake with a Magnitude between 5 and 5.9 was recorded approximately 100 kilometres -- 60 miles -- south of the Darlington site.

Even though the historic seismicity record over 180 years shows most recorded events have magnitudes that do not exceed M5, the magnitudes have increased over the years and the clustering repetitive nature of activity is even more critically important.

In this regard, we note that on May 24th, 2000, a mild earthquake shook the Pickering region and

neighbouring areas -- the fourth 18 months.

We also note in a 1993 article by Dr. Arsalam Mohajer, of the University of Toronto, who did early seismic work for OPG -- he wrote this as a result of his study of the Rouge Valley in Lake Ontario over several years of study and showed the faults near Pickering including under Lake Ontario were active.

Dr. Mohajer repeated his opinions to the Standings Senate Committee on Energy, Environment and Natural Resources on May 30th, 2000. And in remarks made to the Globe and Mail on June 24th, 2010, after a 5 point Magnitude earthquake near Ottawa, where he was quoted as saying, "the faults run across Ontario and Quebec and are potentially disastrous".

While Dr. Mohajer's work was almost instantly critiqued in a geological survey of Canada Report for AECB, this GSC report itself was critiqued by former Ontario Hydro employer J.S. Wallace who spent considerable time in the area under discussion, and who noted significant inaccuracies and extremely short time line of the work of GSC -- a half a day.

With regard to public interest safety health and community health and wellbeing and economic fallout, the nuclear industry's lengthy track record of disregard for public concern and CNSC's growing role as a

nuclear advocate has made it more -- even more difficult for independent experts, the general public, and even federal ministries and other advisory groups to give cautionary advice on nuclear issues.

For instance, CNSC has refused to promote a precautionary change in standards for tritium releases into water 28 years after Environment Canada issued a precautionary Draft Codes of Practice in an attempt to tighten the rules, and four years after the 2008 Ontario Drinking Water Advisory Committee Report advised the government -- provincial government to reduce the allowable releases of tritium from 7,000 Becquerels per litre to 100 Becquerels per litre and eventually to 20.

The CNSC report talks of new job opportunities which of course are always a lure to communities, particularly in times of economic stress. Yet there is no recognition of the huge financial consequences of a core -- critical core meltdown and the lack of insurance for homeowners, businesses, and public institutions, and the minimum 75 million per incident coverage for the OPG which leaves the taxpayer to cover the rest.

Of particular concern should be the 3-kilometre size of plant, emergency and evacuation area which is far less than Durham Region's 2009 emergency plan

area of 10 kilometres -- which itself is much less than the 20 to 80 kilometre recommendation of the Darlington Implementation Plan approved by the provincial Cabinet.

Given the ever growing population, and of course, the millions of GTA residents living close by, how will they be fed, housed, schooled should a critical meltdown occur? How will they deal with lost jobs, contaminated homes, closed schools, ill-health, for years to come? How will they be evacuated in times of crisis and how long will they have to stay away from their communities?

To conclude, PCWO finds it shocking that with so many warning signals from the information to be found in the hearings of the Federal Standing Committee on Economics, Environment and Natural Resources, the CNSC's Fukushima taskforce, a very wide diversity of groups, and independent scientists and knowledgeable individuals and even OPG, the CNSC staff should go so far astray from its mandate under the CEAA.

However, all this speaks clearly the completely unacceptable changing role of CNSC where the defence and promotion of nuclear projects have become the norm.

The fallout from this is not only a lack of precautionary oversight, but dissemination I think, of

incomplete and misleading information, the significant downplaying of risk in the public's mind, and the catering to the Proponent's -- in this case OPG's -- nuclear business-first attitude.

On this matter, it is important to note the 1998 Seaborne Commission's decision, the public unease, the lack of societal acceptance, meant that AECL's plan to bury nuclear high level waste in the Cambrian Shield should not go forward until the proper public process had been completed; that all 27 problems with the concept, as noted by the scientific review committee had to be -- and the Commissioners at that time had to be fixed; and that the First Nations consultation was completely inadequate and must be engaged in properly. And ---

THE CHAIRMAN: Can you please wind up?

MS. GRACIA: I'm almost finished -- one more line.

--- and that an independent oversight committee should be formed to monitor the process. For its part, the Federal Standing Committee on Energy, Environment and Natural Resources recommended that CNSC maintain an arm's-length relationship with utilities dealing with compliance orders on critical matters of safety.

We therefore find it imperative that there

be a full federal review panel under CEA Section 20-1C.

THE CHAIRMAN: Thank you.

Just as a question, were you -- were you listening to yesterday proceedings and today's?

MS. GRACIA: I've only listened to parts of them. I've listened to -- I missed one I really wanted to hear about the geology.

THE CHAIRMAN: Well, too bad because many of your issues you raised, already been discussed extensively so now what I would like to do is open up for any new issue that's been raised. So --

MS. GRACIA: Could I deal with that one just from what I heard --

THE CHAIRMAN: Can we get some questions first posed?

MS. GRACIA: Well, first, and then if I can go back to that just briefly. I did hear part of the geology.

Go ahead, questions.

THE CHAIRMAN: Sorry. Go ahead, monsieur Harvey.

MEMBER HARVEY: Merci, monsieur le président.

On page 7 of the submission -- written submission -- and it has been touched in the presentation

-- it's about the role of institutional failure and human error. How is that considered? Where, is it in the safety analysis or how this is studied or analysed?

MS. GRACIA: I'm sorry. I'm not quite catching your question. I'm referring to a quote -- with a direct quote from the hearings that were held at Point Lepreau.

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

The question is for staff.

MS. GRACIA: Okay.

MR. JAMMAL: Two things -- is --- number one is: every -- operating facility in Canada under the CNSC must have to have in place a human factors program.

I will pass on the -- sorry -- the microphone to Ms. Kathleen Heppell-Masys in order to provide the response with respect to the institutional and human error control.

MS. HEPPELL-MASYS: For the record, my name is Kathleen Heppell-Masys. Sorry, I have a cold. I'm the Director General of the Safety Management Directorate.

The CNSC has expectations for the licensees to have a management system in accordance with CSA standard 28605 and in that system there is a reference for management -- sorry, for a human performance program.

And those programs are in place to deal with the prevention of human errors.

THE CHAIRMAN: Okay. So does that -- can you elaborate? So does that mean that covers institutional mishaps *et cetera, et cetera*?

MR. JAMMAL: Okay. As part of the -- it's Ramzi Jammal for the record. As part of our probabilistic safety assessment, we take the human error into consideration. I'll pass it on to either Mr. Frappier or Madam Yolande Akl to give the response.

DR. AKL: Yolande Akl, Director of the Probabilistic Safety Assessment and Reliability Division.

In the probabilistic safety assessment, we consider human error, pre-initiator human errors like maintenance errors for example, calibration errors and also post-accident errors which we consider -- are considered or called omission errors, when the operator missed doing one step.

So they are considered in the probabilistic safety assessment and analysis.

MEMBER HARVEY: Monsieur Tremblay do you want to add something to that?

MR. TREMBLAY: Pierre Tremblay for the record. I'm going to ask Mark Elliott to talk about the science of the specifics that you asked. I would simply

note that as a matter of the integrated management, safety management system that we have, is essentially a program of operating -- of bringing in operating experience into the organization through an integrated system of looking at events that occur throughout the world.

Some of the significant events would undergo a significant review and internal assessment in the organization to look at similar situations within our organization to see what organizational learning needs to be done and so on.

To the specific question around the risk assessment and the inclusion of the human interface, I'll ask Mark to speak to that.

MR. ELLIOTT: Mark Elliott for the record. I'm going to get some specifics to you through our colleague, the Director of Nuclear Safety, Carlos Lorencez, in a minute but just to set some overall context.

To defend against organizational weakness we've got a number of barriers in place in addition to our oversight that we get from the CNSC and the other regulators that oversee our operations.

Just to go through a few of them. Our -- all our managerial direction that we give to our staff must be in accordance with our OPG Nuclear Safety Policy

that puts the principles of nuclear safety -- strong nuclear safety culture first.

We have a robust corrective action and operating experience programs, so when there are breakthrough events, we either in our plants or elsewhere, we investigate those and come up with corrective actions and check that those have been effective.

We've got a robust internal audit program that -- our audit group reports directly to the board of directors. So they have the ear of the board of directors and they audit us and tell those senior people what they think of our performance.

We get external reviews. You've heard about WANO reviews and other reviews that we get that look at how we operate and we also have a Nuclear Safety Review Board which is a set of -- a group of Senior Nuclear Executives that come into each of our plants once a year and look at specifically nuclear safety issues and that provides a very useful feedback for us.

We could get into talking about the learnings -- organizational learning from Fukushima, but I'll leave that for another question, but I'd just like to get a few words on -- from Carlos Lorencez on how we factor human error into our analysis. Carlos?

MR. LORENCEZ: For the record this is

Carlos Lorencez. The statement made by Dr. Akl are quite accurate. We, from Darlington, have created the greatest probabilistic assessment that's ever done.

In that part we have added the human reliability assessment which deals exactly with this, the error made by -- committed by a human, whether by not doing it -- by doing it wrong or simply not completing the action as expected.

All that is captured. This human reliability assessment is an essential part, a fundamental part of the PRA, therefore it's included into the PRA with the best industry practices that we could find around the world. So therefore it's considered complete in our period.

THE CHAIRMAN: Okay, thank you. Questions?
Ms. Velchi?

MEMBER VELCHI: Question for staff.
Something that I don't think we have discussed in the last couple of days. It's just in the area of evacuation zone and the intervener says that the 10 kilometres is not sufficient and that the province may have approved something as much as 80 kilometres.

I don't think EMO is here, but can you comment on the 10 kilometres, what the Fukushima action plan is contemplating on the evacuation zone and what may

have been approved by the Province?

MR. JAMMAL: It's Ramzi Jammal, for the record. I'll pass it on to Mr. Luc Sigouin.

MR. SIGUOUIN: Luc Sigouin, for the record. And our colleagues from EMO are still in the room I believe and may want to comment on this as well.

The current plans in place in the Province have formal plans for evacuation in a defined emergency planning zone of 10 kilometres.

There are provisions however, explicitly in the plan; they speak of the possibility depending on plant conditions for need to evacuate to 20 kilometres. So that is considered explicitly in their plan.

What EMO does have in place and what Durham Emergency Management Office have in place is a command and control system and methods and processes that allow them to execute evacuations more broadly if they need to.

So those systems are in place to allow them to make those decisions and undertake those evacuations.

As part of the Fukushima task force and the staff action plan, there was a recommendation made to the Province of Ontario, to EMO, to review the emergency planning zone size and I think we've heard our colleagues from EMO talk about that work that has been started and will continue over the -- in the near future.

I think I've seen a representative from EMO approach. I don't know if there's anything he'd like to add. I hope that answers the question.

MR. CONTRA: For the record, Tom Contra from Emergency Management Ontario. Ms. Stuart regrets she was not able to remain for today.

To re-emphasize both what Monsieur Séguin said and what Ms. Stuart said yesterday, we do have a number of existing mechanisms and we do have work in progress to expand.

The most important aspect I think Mr. Séguin touched on, which is we have a command and control mechanism in place to actually act on the situation as necessary to any distance from a nuclear plant.

In other words we have concentrated on the 10 kilometres, but the actual zones, structure and the organization goes beyond that and if we had to, we could activate beyond that.

THE CHAIRMAN: There's -- quite a few times we hear that there is no plan for evacuation of Toronto. Let me put it this way.

But if memory serves right, you guys actually exercise a major evacuation of an accident a few years back. There was some rail, derailed -- was it in Mississauga? and you had to actually evacuate a quarter of

a million people if memory serves right?

So did the plan -- there was a test of a plan, did it work and ---

MR. CONTRA: No Sir. That was actually proof of what I'm saying. We had a command structure in place and we were able to get the cooperation of the community of Mississauga and it was in the neighbourhood of a quarter million people that were evacuated long before my time with the system, so this is hearsay evidence on my part, but it did function with the then existing mechanisms of communication which is loud-hailers and police, fire, public works going from area to area. Those that did not have transportation, community transportation, buses and that sort of thing were organized so that the people could move out in an orderly fashion.

As you've heard yesterday from Ms. Stewart, we have, in particular, in the nuclear areas the five of them that we are concerned with in the province, a traffic coordination mechanism which would assist further and today's exercise of that sort of an event.

THE CHAIRMAN: Thank you.

Ms. Velshi?

MEMBER VELSHI: So on page 10 of the intervenor's submission, she makes a statement and you

don't have it in front of you so I'll read it out to you. She's expressing concerns about the 10 kilometres saying:

"...Which is, itself, much less than the 20- to 80-kilometre recommendation of the Darlington implementation plan approved by the Provincial Cabinet pre-Fukushima."

Do you know what she may be referring to or can you comment on that?

MR. NODWELL: Dave Nodwell, for the record. I'm sorry, could you repeat that?

MEMBER VELSHI: I'll read the whole paragraph.

"Of particular concern should be the 3 kilometre size of the planned emergency and evacuation area which is far less than Durham region's 2009 emergency plan area of 10 kilometres which is, itself, much less than the 20- to 80-kilometre recommendation of the Darlington implementation plan approved by the Provincial Cabinet pre-Fukushima."

MR. KONTRA: I'm not -- sorry, Tom Kontra, for the record.

Obviously, they're quoting a document that I don't have in front of me. The reiteration is that while we focus on the 10 kilometres, we do have the ability to progress beyond that, so to say that we don't have anything beyond 10 kilometres, I think, is not accurate.

THE CHAIRMAN: I think she's quoting -- she's quoting the CELA, the Canadian Environmental Law Association's comments re CNSC's scoping document July 18, 2012. We just now gave you everything we know about this.

Anybody knows what this is about?

DR. THOMPSON: Just perhaps for context, my understanding is that there's a criticism that when we talked about the dose from the past accident, we end up with a dose of 5.7 millisieverts at 1 kilometre and we mentioned that it was within the 3-kilometre planning zone for sheltering and so I think that's where the confusion is occurring where we've talked about 3 kilometre, but we didn't say that that's all there exists in terms of emergency planning, but Mr. McAllister's looking for the comments.

MR. KONTRA: I think we're sort of narrowing down here 2009. First of all, if you recall on a previous discussion, I mentioned to you that our Provincial Nuclear Emergency Response Plan is eight

volumes and I won't go into that, but the 2009 reference to the Darlington implementation plan is the volume of -- or responsible for the Darlington area and in fact, we do go out to considerations well beyond the 10 kilometres and that's what that 20 to 80 refers to in the Darlington implementation plan.

THE CHAIRMAN: Thank you.

First of all, Dr. Rzentkowski, you've been quoted extensively. I wonder if you want to react to that.

DR. RZENTKOWSKI: Thank you very much, Mr. Chairman, for giving me this opportunity. Yes, I would like to comment on my statement.

It has to be realized that the statement was made in December of 2011 during the Point Lepreau relicensing hearing. This statement was intended to describe a doomsday scenario, the doomsday scenario we are discussing for two days in this hearing as well. And I would like to bring your attention to the consequences.

The consequences would be controlled, partially unfiltered, but controlled releases four days after the accident. And again, I would like to remind you that this was December of 2011. Our post-Fukushima action plan was just being finalized and in making this statement, I didn't give any credit to the post-Fukushima

improvements. If you asked me this question today, what is the doomsday scenario for the seismic activity of the magnitude approaching that at Fukushima, I would say there would be no consequences because in the meantime, we have a make-up water -- we have a hook-up to provide the make-up water to the steam generators and we have portable equipment, both pumpers and generators. Because of that, we can maintain natural circulation in the primary heat transport system generally indefinitely; so we can maintain natural circulation as long as this is required to provide external assistance and to control accident condition at the site. So there would be no consequences to the environment.

THE CHAIRMAN: Thank you.

DR. RZENTKOWSKI: Okay.

THE CHAIRMAN: Apparently, we've got to move on, but I have one last question which I think needs to be addressed. The intervenor made this statement about the weakening of the EA process in the last budget. Can somebody comment on this please?

DR. THOMPSON: Patsy Thompson, for the record.

I will have to ask you to repeat your question. We were looking at another issue, sorry.

THE CHAIRMAN: The intervenor made a

statement that the government -- last government budget weakened the EA process, weakening CEAA -- the new CEAA et cetera, et cetera. Can you make comment? Does this apply to the nuclear?

DR. THOMPSON: Patsy Thompson, for the record.

Again, my apologies. So the CEAA, *Canadian Environmental Assessment Act* was repealed and replaced by CEAA 2012 and in that legislation, the CNSC has made -- has been made the sole responsible authority for conducting the environmental assessments of nuclear projects and that was done in recognition that the CNSC has been conducting robust, scientifically rigorous environmental assessments for a long time under the existing CEAA and that as the Commission Tribunal has the ability to make decisions within our mandate that this was an appropriate delegation of authority.

What I would like also to say that is in addition to the -- any assessments done under the *Canadian Environmental Assessment Act* 2012 moving forward, they would be of the same rigor, the same follow-up programs as we had in place for previous environmental assessments and we also under the *Nuclear Safety and Control Act* have the obligation to look at environmental effects, effects on human health and the mitigation measures to minimize and

make sure that impacts are acceptable.

So together the new CEAA and our existing legislation is a comprehensive environmental assessment and protection framework.

THE CHAIRMAN: Thank you.

Ms. Janes, you have the last word.

MS. JANES: For everything or on that particular issue?

THE CHAIRMAN: For everything.

MS. JANES: For all the questions or for just a -- are you there?

THE CHAIRMAN: Just a final statement please.

MS. JANES: Just a final statement. Thank you. That's clear.

I guess I would say regarding the -- all of the safety measures that are in place and the evolving evacuation plans, I don't really expect that the Mississauga accident would qualify in the same level at all as something like this, and having read about it just recently in the "Globe and Mail", it was as much a matter of luck as having a very strong person like Hazel McCallion in charge.

I also find that it's the same -- there's the same attitude related to safety within the nuclear

power plants as was in existence before the Ndgne (phonetic) Report came out -- before they came in in 1995 or 6 and/or 7 came in. And up to that point everything was safe, everything was fine and it's no wonder that the public is always on the alert because in that case, there were fires that had been taking place inside the stations.

I talked to a former person in charge of safety in Pickering and indeed they were very pleased that Mr. Andonini had pointed out the problem and it's very hopefully that we'll -- that you have made more -- far more progress in this but it's really something we have to worry about. And I'm just saying I think that this is such a serious thing, it should be bumped up to a Federal assessment.

THE CHAIRMAN: Thank you. Thank you very much. We'll move on to the next submission, which is by The Citizens for a Safe Environment and The Committee for Safe Sewage is outlined in CMD 12-H13.62. And I understand that Ms. Buck will make the presentation. Please proceed. Can you press the button please?

12-H13.62

**Oral presentation by the
Citizens for a Safe Environment
and The Committee for**

Safe Sewage

MS. BUCK: Sorry, okay ---

THE CHAIRMAN: And introduce your colleague.

MS. BUCK: Okay. Anyway, good afternoon Chair and members of the Commission. As a Toronto resident, I am here today to speak to the very serious concerns of tritium concentrations in Lake Ontario and the Ontario Canada Regulatory maximum acceptable concentration of 7,000 becquerels per litre for tritium in drinking water.

While I am only one of millions of Ontarians who depend upon Lake Ontario as the source of my drinking water, I am taking the position that Ontario drinking water sources should not be under the influence of Ontario's nuclear power generating facilities.

And also, while I am only one of millions of Canadians whose water is effected by tritium, I am taking the position that the Canada, Ontario regulation for tritium in drinking water should be lowered to 20 becquerels per litre from the current 7,000 becquerels per litre. And a lot of my information is from the ODWAC Committee or the Ontario Drinking Water Advisory Council

and the years that they have spent since the ASUS report in 1994, has been brought forward at looking at this standard and wanting it reduced.

The Ontario nuclear power generator -- generating reactors located at Pickering and Darlington, are the source of tritium concentrations measures in Lake Ontario and in the water entering the Toronto water treatment plants.

Tritium entering Lake Ontario does not respect municipal boundaries. Once it is in the source of our drinking water, tritium cannot be removed by any technological treatment process. Tritium is measured as a concentration in becquerels per litre, as I've mentioned before, and as a measured concentration, is present on a daily basis in the drinking water at the Toronto FJ Horgan and R.C Harris plants.

Measurements taken by Ontario power generation indicate that tritium historically has been reported in Toronto drinking water in 2006, at a yearly average of 5.1 becquerels per litre and in 2007, at 7 becquerels per litre. The environmental background level of tritium in water that is not under the influence of Ontario's nuclear power generating facilities is 2 becquerels per litre.

So historically, Toronto drinking water has

been 2.6 times and 3.5 times the background level and currently, as reported in 2011 by Jim Harnum, a former water treatment director with Toronto Water, could be 2 times the background level because he reported to me, and it is difficult to find where these measurement and -- are recorded.

He told me that, in fact, it was about 4.1 now, which is good news, better news but tritium -- but there is a concern also, not only with the -- with surface source water for drinking, but groundwater because in the ODWAC report, monitoring records show that precipitation in the proximity of nuclear facilities contains elevated levels of tritium, resulting in elevated tritium concentrations in groundwater. This is even more serious, probably, than surface water.

In the Darlington and Pickering survey areas, well levels range from 23.5 becquerels to 86.1 becquerels per litre and in the vicinity of SRB technologies in Pembroke, a well used for drinking water at a business showed a concentration of 1,293 becquerels per litre. And that was in 2008.

Tritium does pose long-term chronic health effects that include fatal cancers, non-fatal cancers and DNA damage, specifically mutations that are trans-generational.

And everything is footnoted and I do have -
- I'm going to present my written presentation with the attachments.

Currently, tritium regulation, as an allowed concentration of 7,000 becquerels per litre in Ontario drinking water, is extremely permissive and does not reflect the models upon which other jurisdictions base their more conservative tritium regulation.

In an effort to arrive at a proposed new Ontario drinking water standard for tritium, the Ontario Drinking Water Advisory Council evaluated numerical variations of other models, and those are a part of my attachments that were derived using initial criteria used by Health Canada, other jurisdictions, and the International Commission on Radiological Protection, ICRP.

Based on their report and advice on the Ontario Drinking Water Quality Standard, for tritium, the Ontario Drinking Water Advisory Council issued recommendations that it should be at 20 becquerels per litre and I would agree with that.

And as far as reporting becquerels per litre and tritium in drinking water, I think it should be in the annual reports that every municipality has to produce for the Ministry of the Environment so that people do know what is in their water, in terms of tritium.

In closing, I have a -- some of my other recommendations include and they would echo the support for a more stringent Ontario Canada Drinking Water Standard for tritium at 20 becquerels per litre, as recommended by the Ontario Drinking Water Advisory Council.

And I would hope that that would be approved and adopted immediately. This has been going on since 1994 and it's about time that this consensus that was developed, through the ASUS Report and then the Ontario Drinking Water Advisory Council, be implemented.

Current Ontario monitoring and measuring programs for levels of tritium in Ontario drinking water should be reassessed and appropriately either enhanced or maintained, and all monitoring and measuring program results, as I've mentioned before, should be a part of the public record that's easily accessible by the public. And as part of the public record, should be required to be included, as I've mentioned before, in the appropriate Ontario Municipal Annual Water Supply Annual Reports.

And then, I am supporting a future phase out of Ontario nuclear power generating facilities, either through attrition or through a planning process that is coordinated with alternative, non-nuclear power generation

planning, so that background levels of 2 becquerels per liter are established as the future goal of all Ontario drinking water sources. No new Ontario nuclear power generating facilities should be approved, in my opinion. Thank you.

THE CHAIRMAN: Thank you. Questions?

MR. DONE: I'd like to say something if we still have a couple of minutes?

THE CHAIRMAN: Yeah, you've got two minutes.

MR. DONE: I've got two minutes. I'm co-founder of the Safe Sewage Committee, Karen is President of Citizens for Safe Environment. Safe Sewage Committee's concern with water quality in Toronto now with the R.C Harris and the FJ Horgan 5.1 becquerels per litre in Oshawa, knows all about their testing along the waterfront for tritium in the drinking water and we're puzzled how this -- like I talked to the regional office of the Ministry of the Environment for Durham, and there was no major releases of liquid heavy water into the lake, so we're thinking that maybe it's tritium water vapour that's hydrologically getting into the water table and seeping into the lake because it's a constant kind of significantly higher than background level at a number of water supply intakes along the shore of Lake Ontario.

Now, I mean, there's a lot of other issues with the nuclear like long-term waste management, nuclear accident and this sort of thing. But because we -- we live in the east end of Toronto. The RC Harris is right in our neighbourhood.

We're focusing on this issue and want some answers with regard to these tritium levels. And like the refurbishment at Darlington should maybe be looking at this issue if it's 7 in Oshawa, 5.1 over where we are, it looks like Darlington and Pickering are both maybe contributing to this problem. And we would like to see some explanation.

Like I talked to public relations at OPG and we basically got sort of nicely deflected. This is about eight months ago because we deputed at the hearings back in March, I think it was, and then in terms of the new build.

So in conclusion, just sort of supporting what Karen has to say -- and we founded the ad hoc committee against non-medical commercial nuclear reactors in Ontario and Canada for not only this issue, which is a local concrete issue in our neighbourhood, but in terms of the wider global set of problems which is quite evident in the debates over the last few decades.

Thank you.

THE CHAIRMAN: Thank you. We'll open it up for questions.

Dr. McDill.

MEMBER McDILL: Perhaps I can just deflect the question posed by the intervenor with respect to tritium if we start in Lake Superior and then come down and around the lakes.

MR. DONE: I think I mentioned that the background that was less than 1.9 Orangeville, North Bay in areas away from nuclear plants it's -- now, they say less than that, but I believe that might be a technical detectable limit, 1.9, so it might be much less than 1.9 Becquerels per litres and we might be three or four times background along the shore of Lake Ontario.

MEMBER McDILL: But also answer within the context of the proposed 20 Becquerels per litre and the intake at the various water plants.

MR. DONE: Well, I propose you'll find with regulations like with chlorine basically we're looking to get back to background level in Lake Superior. That's a good place to focus on. And we really think there should be a phase-out of the nuclear industry if these kinds of smaller effects are damaging the environment, having an impact on human health.

But that 20, it's almost as if they're

looking at what's along the shore of Lake Ontario, saying, well, that's background, so let's make it 20. That's the way the Ministry sets its regulations.

It's like with dioxin. It's now felt by Paul Connett, the American chemist, that dioxin should not even be detectable in, say, gaseous submissions or in the water supply. And we feel it's the same way with tritium.

THE CHAIRMAN: Can we let some staff and maybe OPG answer some of those questions?

Why don't you start with the ways that tritium objective from the Ministry of Ontario?

DR. THOMPSON: Patsy Thompson, for the record.

I'll speak about the regulatory aspects and perhaps OPG can talk about the discharges and the monitoring that's being done.

In terms of the regulations that are in place, we have looked at recommendations made by various organizations for drinking water standards, and we have looked at the scientific basis for those standards.

And in terms of the recommendations for 20 Becquerels per litre, I think we've given a lot of information over the past few days, but also on our website that the measured values that are a consequence of the operation of nuclear power plants in Canada are less

than 20, and certainly around Darlington they've been less than 10, so the recommendation by the regulatory framework that's in place keeping emissions as low as possible has effectively met and exceeded those standards.

But those standards are -- represent by some calculation methods a very low risk of -- a calculated risk of cancer using, again, the linear no threshold relationship.

There are different standard-setting approaches, and one of them has been mentioned in terms of looking at background and looking at some increase above background to set the standard. But that's certainly not what the Ontario Drinking Water Advisory Committee was basing its recommendation on.

The information we have from the Ontario Ministry of the Environment is that the recommendation is still being considered and there's no time line yet in terms of how and when it will move forward.

But certainly the controls that are in place by the CNSC on facilities allows, you know, very low levels of tritium in drinking water.

THE CHAIRMAN: Do municipalities have an obligation to report their drinking water? For example, I know that another chemical being used like fluoride, right, fluoride is another controversial kind of a thing.

Do municipalities annually or monthly or quarterly report what's in the drinking water? I've not seen -- I haven't seen them.

Do they report? Do they have to report? They don't report? What's the answer?

DR. THOMPSON: Patsy Thompson, for the record.

I'll ask for some support from Mike Rinker if he has anything to add, and I think OPG is familiar with municipal monitoring around their facility.

My understanding is that the municipalities have a suite of chemicals that are typically found in drinking waters that need to be monitored for human health and for -- and they monitor that suite of chemicals.

Depending on the types of industrial activities or agricultural activities on their territory, then they can add certain parameters to their monitoring suite.

THE CHAIRMAN: But do they publish them? That's what I'm trying to find out. Or do I have to go -- it seems to me like if I want to know what's my drinking water at home is, I have to go and have a test done privately.

DR. THOMPSON: We -- there is information available from the Ontario Ministry of Environment for

certain municipalities, and we would agree that it's not necessarily information that's easily found. But I don't know if Mr. Rinker ---

THE CHAIRMAN: Is Mr. Rinker around?

DR. THOMPSON: --- would add. He is around.

THE CHAIRMAN: Go ahead, please.

MR. RINKER: Mike Rinker, for the record.

I don't have much to add other than to acknowledge that we usually get that data by requesting it from the water treatment plants or from the municipalities responsible for treatment.

THE CHAIRMAN: OPG?

MR. TREMBLAY: Pierre Tremblay, for the record.

We've certainly talked about the health issues around tritium, but I'll ask Laurie Swami to talk about the sampling regimen and what is reported and so forth.

MS. SWAMI: Laurie Swami, for the record.

So I think the intervenor asked questions about background levels, and that's certainly something that's of interest to us.

We have -- in our radiological environmental report, we discuss the contributions to

tritium in the Great Lakes. And we recognize that we have our current emissions, we have past emissions as well as some naturally occurring components that contribute to the tritium levels.

We use that information together with sampling programs further from our facilities and we estimate that the background concentration would be 1.6 Becquerels per litre. So that's what we would use in terms of calculating a public dose.

From a monitoring of the water supply plants, depending on the shift schedules for those plants, the sample is taken once per shift. And we analyse or the analysis is done on a weekly composite basis.

If there was something that would indicate a higher release from our facilities, those samples are analysed immediately and we would be reporting that to the public.

THE CHAIRMAN: But the question, I thought, was at home in the municipality, do -- does anybody publish information about the drinking water itself that comes from your tap.

MS. SWAMI: Laurie Swami.

The report that we provide is the radiological environmental monitoring program. That's on an annual basis and I don't think that -- you know --

specifically addresses your question. The information from the municipality is made available; I don't believe it's available online or on a system that someone could go to. We can confirm that but I don't think it's available like that.

I think the issue here is that the water supply, when we look at the numbers, is so low that it is not an impact on health or on consumption. And so, there would be no real reason to have that information readily available but we can verify what the availability of the data is.

THE CHAIRMAN: Thank you.

Anybody else has -- kind of a last question?

You have the floor. Last question.

MS. BUCK: The last word.

THE CHAIRMAN: The last word.

MS. BUCK: Okay. Just to let you know --

MR. LEBLANC: With the mic.

MS. BUCK: It's on, thank you. Somebody keeps on doing that magically.

Anyway, there is no acceptable level or safe dose for radiation, so that there is always going to be a health effect of some kind. And the other thing is that Lake Ontario is two to five times greater, more

greatly affected that the other Great Lakes and lakes across Canada.

In Toronto, that -- OPG is the one who actually measures the levels of tritium but it is not required to be reported and so, therefore, because we're not measuring it, it's not in our annual reports.

And the other thing is that I understand that your look at the radiological, biological effects and the risk assessments, you are still using tritium as a one factor. In fact, the recent BEIR VII Report out of the U.S. Academies of Science is suggesting that, because it's a beta emitter, that it be raised to two.

So, I think -- and we're not really looking at the cumulative effects that people are actually getting which was brought up about the CT scans.

It's almost like we need to keep track of every radiation that we get individually to actually say this is the dose that we're being hit with.

Thank you.

THE CHAIRMAN: Thank you. Thank you very much.

MR. LEBLANC: So, for those who follow the Agenda, the next submission was to be an oral presentation by Mr. Kalevar. Unfortunately, he had to leave for another commitment so we will proceed with the next

submission.

THE CHAIRMAN: So the next submission is by the Power Workers' Union, as outlined in CMD 13.79 and 13.79A.

And I understand that Mr. Shier will make the presentation.

No? I got the wrong name?

12-H13.79 / 12-H13.79A

**Oral presentation by the
Power Workers' Union**

MR. WALKER: Just the wrong order.

Good afternoon, Mr. President, and Members of the Commission.

My name is Bob Walker. I am the Nuclear Vice-President for the Power Workers' Union and with me today, to my immediate right, is Andrew Clunis; he is our Executive Board Representative from the Darlington Station. Howard Phorson, to his right, is one of our Chief Stewards from Bruce. He's here in case there are any specific questions that he could answer. And to my left is Scott Thompson; he's the Chief Steward at Darlington.

So, first, I'd like to say thank you for

the opportunity to make this presentation. We do have a written submission as well.

We will highlight the following topics which are detailed in our written submission: First, who we are; next, our involvement in the regulatory process; environmental assessment of OPG's refurbishment; health and safety; lessons from Fukushima; effect of the relationships; OPG's license renewal applications, and then our conclusion.

So who are we? The Power Workers' Union is represented by the majority of the skilled workers in Ontario electricity generation, transmission, and distribution sector for the last 60 years. We represent workers that operate and maintain all of Ontario's nuclear power plants and have done so since their inception.

The Power Workers' Union is affiliated with other labour organizations such as Canadian Union of Public Employees, the Ontario Federation Labour, Canadian Labour Congress, and a new global federation called Industrial.

We're also member of the Canadian Nuclear Workers' Council, the International Nuclear Workers' Union Network, and several labour councils across Ontario, including the Durham Region Labour Council.

Our knowledge, experience, and history

qualify us as a vital and credible voice in the public nuclear discussion, and specifically to these hearings.

Our union has a long history of involvement in the nuclear regulatory process and the many other forums. We've been involved with previous environmental assessment hearings in regards to nuclear plant refurbishments, waste management facilities, as well as power reactor operating license renewal hearings

Processes like this one are valuable tools to ensuring that the best interests of the public are assessed and acted upon appropriately.

We've heard criticism that as workers in the nuclear industry, our motivation is strictly out of self-interest, not in the interest of public safety or environmental safety. Nothing could be further from the truth.

We believe it is our responsibility and obligation to bring forward to these forums the views and experience of the people who perform the day-to-day work in our nuclear facilities.

If there is a risk to the public or environmental safety is a risk to the workers on site first. We also live in the community and our families live in the community; we will not do anything to harm the safety of our community.

The views of the workers we suggest are very important in ensuring the public that our nuclear facilities are in fact the most highly regulated industrial workplaces in Canada and our safety record speaks for itself.

We've had the information submitted by OPG and CNSC staff reviewed and the Power Workers' Union is in full support of the environmental assessment, and the fact that refurbishment can take place without any detrimental effect on the environment.

The existing plant is safely operated. The PWU is fully involved in the safety programs at the site which we believe helps ensure the plant is operated very safely.

Darlington has been recognized internationally by industry peers for its outstanding performance. People now come from other parts of the world to see what OGP is doing so well at Darlington. We are fully supportive of extending the life of that facility.

Health and Safety; There's an obvious convergence of safety interests between the industry's employees and the general public. The Power Workers' Union believes that uncompromising approaches to workers' safety and health sets the table for public and

environmental safety. That's why we feel it's appropriate in these submissions to consider nuclear safety from the workers' perspective.

Over the years, we have worked with OPG to create mechanisms and forums to address and improve workplace safety issues and our concerns. PWU representatives participate fully on local and corporate levels committees. You can see them listed up above.

Tripartite Advisory Committee, that's the committee made up of the President of the company, the President of the Society of Energy Professionals, and the President of the Power Workers' Union, along with direct reports. A Joint Working Committee is the advisory to the Tripartite Advisory Committee; that's a corporate-level committee.

The Joint Health and Safety Committee at Darlington is extremely active. We have a corporate-level Joint Radiation Protection Committee which is extremely active and we have local ALARA Committees which are also very active.

Our written submission outlines the legal and negotiated forums that are currently in place. This is a mature and continuously improving relationship.

We don't just negotiate for wages and benefits. We negotiate for the best safety standards. We

share this with our brothers and sisters nationally and internationally through the Canadian Nuclear Workers Council and the International Nuclear Workers Union Network.

We believe that if workers are safe in the workplace, then the communities and public are safe.

Lessons from Fukushima. Obviously the workers in the nuclear industry took great interest in the events following the earthquake and tsunami in Japan. I give OPG a lot of credit; OPG was extremely thorough in communicating everything as it was happening with their employees. The follow-up from Japan was well-communicated to all employees.

All Canadian nuclear power plants were assessed to ensure they were able to withstand credible natural disasters as prescribed by the Canadian Nuclear Safety Commission.

In October 2011 the Canadian Nuclear Safety Commission Fukushima Task Force said Canadian nuclear power plants were safe. The IAEA assessed the CNSC's response as prompt, robust and comprehensive. Industry preparations are also well underway for far beyond design basis events, including preparation of severe accident management guides for cumulative equipment, training of personnel and drills. Canada emerged as a leader in the

world's response to Fukushima.

Effect of the relationships: Effective and successful labour relations between OPG and the Power Workers' Union has been the track record for more than 60 years. I mentioned before, this is a mature relationship.

OPG's relationships with the construction unions that will supply the thousands of skilled workers needed to refurbish the facility have also been in place for many years.

The Power Workers' Union and the construction unions have good working relations with OPG and with each other. The parties have developed unique processes to resolve issues expeditiously.

The Darlington refurbishment project will bring tremendous economic benefits to the community for many decades to come. The local host communities have been very supportive of this project moving forward as soon as possible. They understand the benefits that this type of facility brings because they've experienced them first hand.

OPG has been a first class corporate citizen in the communities surrounding the existing Darlington plant. Continuous dialogue with the workplace parties as well as local public leaders has proven successful and we have every reason to believe this

dialogue will continue.

Everything we've noted so far in our presentation is applicable to the renewal of the Darlington Waste Management Facility and the Darlington Nuclear Power Reactor operating licence.

The Darlington Waste Management Facility is a first class facility and we fully support the licence renewal. We are also in support of the renewal of the Darlington Nuclear Power Reactor operating licence.

Conclusion: Before closing I want to add a personal note. I worked at Darlington myself for 21 years before taking my current position at the Power Workers' Union. I worked in different jobs in the 10 years before that, before I joined what was then Ontario Hydro. And Darlington is, by far, the safest place I've ever worked, and I say that without any reservation at all.

I don't like relying on statistics, however, Darlington's record speaks for itself.

I can't tell you how many days I went to work in the morning and saw that sign with the increasing millions of hours worked without a loss time accident.

The economic benefits to the region are great. There will be thousands of person years of employment for the refurbishment and thousands of highly skilled good paying jobs for the continued operation and

maintenance for the extended life of Darlington.

It will help minimize our reliance on greenhouse gas emitting fossil fuels to generate electricity. This project will have no significant effect on the environment. The project will provide clean, affordable, reliable, environmentally responsible and secure electricity to the province for decades to come.

We in the Power Workers' Union base our support for this project on the history of the current nuclear plants in Ontario. They have operated safely for over 40 years. This is an excellent technology that has continuously improved without causing any significant detrimental effects to workers, the public, or the environment, safe, clean, reliable CO2 emission free electricity.

Darlington is owned by the people of Ontario and it's an asset the people of Ontario can be proud of.

In conclusion, the PW is in full support of the OPG assessment as supported by the CNSC staff. We encourage the Commission to assess -- to approve this EA and the licence renewals.

We'd be pleased to answer any questions.
Thank you.

THE CHAIRMAN: Thank you.

Okay, it's open. Monsieur Harvey?

MEMBER HARVEY: Merci monsieur le président.

Have you had any discussion with OPG or inside the Union with regard to the protection of the workers in the occurrence of a severe accident?

We have received many information for the equipment, that the equipment will do such and such and such step, but about the workers, what is your opinion?

MR. WALKER: For the record, Bob Walker.

What we have so far is I've talked to some of our operators at Darlington before coming here to ask them and there's a number of things taking place, such as improved documentation, developing severe accident management guides, training of staff, as post-Fukushima's already started, and drills.

I'm not sure if that answers your question. But those are the things I'm aware of so far.

MEMBER HARVEY: Partly but not completely.

I will turn to OPG I think and in your studies what is the place given to the workers when you -- in the two scenario, what has been presented here?

We know how the reactor will react, and what about the workers?

MR. TREMBLAY: Pierre Tremblay, for the

record.

MEMBER HARVEY: Because we'd like to see if you have evaluated the risks. Will there be more risk for the workers in such situations than current risks?

MR. TREMBLAY: Pierre Tremblay, for the record.

Clearly -- and I think Mark eluded a little bit to all the things that have been done, and Bob is indicating that as well.

The principle thing here is around transparency, communicating with their staff, discussing the lessons to be learned, talking about the enhanced processes and procedures, providing increased and improved procedures, drilling those procedures, making people have the inherent understanding and knowledge of where we're going, what are the hazards they're likely to face and then executing them, drilling them. Reference has been made a couple of times to actually testing out the procedures, looking at the equipment, how it is laid out, what people are likely to face.

One of the issues here is that we're talking about something that's beyond design basis, and so you can't really know exactly what it is that you're dealing with. So the key is to provide flexibility options and make sure people understand what is to be

done, what the expectations are, why they're doing it, and providing good solid training.

And that's what we're trying to do. It's a work in progress for sure, but it's well underway, and we've been very urgent and diligent about this to try to make sure that we learn insights. And the staff are going to execute the work and so it's important for them to be in the classroom, to be in the field and practicing those skills, and we've been doing that all along the way.

MEMBER HARVEY: I'm also asking the question because I read in the document that the workers can refuse to do certain tasks if they think it's not secure. So in the event of a catastrophe -- I mean, will they know the nature of the risk to do the work?

MR. TREMBLAY: Pierre Tremblay, for the record.

Absolutely; well-established practice, and you know, you certainly could ask the PW to comment on this, but clearly no one is asking individuals to put their lives or the lives of others at risk. That's the fundamental principle behind a strong training program that makes workers, supervisors aware of the risks and has an expectation for pre-job briefing and so on. I mean, it's a fabric of what we do.

Part of the reason why we drill through

emergencies is so that it becomes second nature, that it is an aspect of how they do business and they understand the risks fully.

So nothing changes in an emergency as long as you've done adequate drilling and practicing. The idea is not to surprise people, and this is no exception.

MEMBER HARVEY: Thank you.

Just turning to the staff, was that point

THE CHAIRMAN: Can we -- before we go there, can we allow the Union to tell it to answer your question? I'd like to hear what they think about that.

MR. WALKER: Bob Walker, for the record.

I was taking notes when Pierre stole some of my thunder already. But it really comes down to training, training, training. Our members are trained not just for the day how things work when things are working right but how things work when things aren't going right. So they do have the training to back them up.

And as was mentioned, there are drills and there is also pre-job briefings so that you know what the current situation is before you go out to do any task. That would be true in an emergency situation as well.

And as you mentioned, people -- at the end of the day, you have a right to refuse unsafe work. If

you don't think that you've been trained properly or do something you have the right to refuse that.

THE CHAIRMAN: Monsieur Harvey?

MEMBER HARVEY: Yes. I want to have the answer, if that point has been analyzed and it's part of the - well, safety analysis or the ---

MR. JAMMAL: Okay, Mr. Harvey, it's a very valid question. You're asking the question, is what -- what there is in place from programs in order to protect the workers, in normal conditions, and in exceptional condition.

Before I pass on the microphone to Ms. Kathleen Heppell-Masys, is we --- do have the program in place where we evaluate, we evaluate the response -- not the response itself, but the -- what does OPG has as emergency program in place, and we verified -- as a matter of fact, we carried out the inspections to verify.

In the case of a response, you asked the question, is there protective equipment for the workers. The answer is, we do validate, we do ensure that as the workers responding in an emergency, that they have the adequate PPEs, or protective equipment, and -- and everything else encompassing with respect to the emergency.

And post-Fukushima, the training is a key

factor, and the training with respect to the severe accident management guideline, which is beyond -- beyond design basis accident. I'll pass it on to Madam Heppell-Masys to provide any complement to the answer, or anything I missed.

MS. HEPPELL-MASYS: For the record, Kathleen Heppell-Masys. I hope my voice carries this time.

So Mr. Jammal addressed two important points. One is the training program, and also the -- he alluded to another program, which we call the "Minimum Staff Complement."

Let me describe it a little bit, the training program oversight that we do. We require the licensee to have a systematic approach to training, and in -- that approach considers the difficulty and importance and frequency of certain tasks. So, which means, emergency-related tasks are trained -- would be trained more in-depth, and to address the scenarios that are being proposed here. So we do a lot of oversight of those programs, including emergency response and so on.

I also mention about Minimum Staff Complement. Those are the numbers that we expect -- the minimum staff numbers, and to determine those numbers, a solid analysis has to be conducted. As well, in the case

of OPG, they are in the process of reviewing some of those numbers, and they are actually conducting validations, so real scenarios are actually exercised and, again, the CNSC is there monitoring all those things as well.

I hope that helps.

MEMBER HARVEY: Thank you. I was concerned, because we saw in Japan that the workers have been obliged to perform certain tasks. Well, everything you practice, all -- it's much more easy to practice something that is current, but in the doomsday scenario, when everything -- it's a blackout and you've got to -- to put -- to get the water to the core, so it's much more difficult to practice that.

So the essence of my question, was the -- was that evaluated, and then -- that's all.

MR. WALKER: Bob Walker, for the record.

Yes, we -- I wouldn't say there's any valuation beyond what we have talked about. We are involved with -- in discussions on minimum shift complement, on training for those people, on drills, and the main -- that's the main thing, is that people on the shift have emergency response roles, and that emergency response organization is -- is trained for all those scenarios.

So I hope that we're prepared for all the

scenarios ---

MEMBER HARVEY: Because at the limit, we need people to do what has to be done ---

MR. WALKER: Yes.

MEMBER HARVEY: --- so it's very important.

MR. WALKER: And at the end of the day, the -- our members are -- are professionals who take pride in what they do, and they take -- and that includes training. They take the training very seriously, and they're prepared to respond as required.

MR. TREMBLAY: Pierre Tremblay, for the record.

Maybe just to punctuate this a little more, we did talk about having the right protective equipment, and so on - it's important to do that. If I could add just one final element, and that is, as we implemented the SAMGS or the beyond design, we did specifically look at the safety and some of the issues that would be faced by staff, and looked at the habitability of areas, given certain set of conditions in it, in an event, if you will.

So that was explicitly looked at, in terms of developing the procedures. And so, as I say, it's difficult to assure yourself that you've looked at all things, given that you're looking at beyond design accident, but that was an element that was actually

physically looked at by our team.

THE CHAIRMAN: Okay, thank you. Ms. Velshi?

MS. VELSHI: Over the last couple of days we've had a number of interventions on the health impact of radiation, and to workers in particular, and the CNSC has discussed a health study that has been done, that involved, I think it was about 40 -- 42,000 workers, nuclear energy workers.

Are you aware of this study, and I just wondered what response you've got from your membership on that study.

MR. WALKER: Bob Walker, for the record.

I would say, yes, we're aware of it. We've talked about it at the joint committee radiation protection, but I don't really remember enough to talk about it with any -- with any detail.

Our radiation protection committee does talk about the health effects of radiation, and makes sure that we're compliant with the best standards, and, in fact, the dose our members are receiving are well below any regulatory standards, and we've negotiated contract language to make sure that our limits are much lower than any standards.

So, beyond that, I don't -- I couldn't say

much more than that.

MS. VELSHI: Well, you know, the conclusion from this study was that, in fact, it hasn't had an impact on the health of the nuclear energy workers, and I think that will be extremely reassuring to your membership, and it's something that, you know, should be communicated through different channels, including the union leadership, so -- I know it's going through peer review and you'll probably get -- I see Dr. Thompson has something to say.

DR. THOMPSON: Well, actually, if I could, we have different products that have been done to date, so we have a research report that's available. There's an information document on our web site, and I don't remember the exact date, but sometime in the fall of 2011, our epidemiologist, Rachel Lane, made her presentation of the study findings to OPG.

MR. WALKER: Yes, Bob Walker, for the record.

Yes, we did a presentation -- a presentation was made to OPG, and including the joint committee radiation protection, and we were invited to that, but I -- as I say, I just can't remember enough of the details.

And I know there was a previous study done

that was misleading mostly because it wasn't -- there weren't enough people that were involved in the study, when they went back and looked at -- at more up-to-date information, or more complete information, the results were quite a bit different. Like I said, I just can't speak to the details.

THE CHAIRMAN: I guess it didn't leave any scary impression on you, that's -- that's why.

Look, we need to break, but I've got one last question, and quick reply -- you keep always mentioning, when you appear in front of us, how you are free to point the finger at anything wrong, et cetera; you have a safety culture in which anybody can point anything wrong without fear of repercussions.

You know, it's -- again, this is one of the lessons from Fukushima. The Japanese hierarchy did not allow for free flow. I want to know, is it truly free flow, and is it truly there's no fear of repercussions, and how often do you actually exercise this?

MR. WALKER: Bob Walker, for the record.

It's going to be very difficult to quantify your last question, and I'll try to explain why.

There's always going to be a little bit of fear of people going forward. It's not fear of retaliations; it's just human nature to be cautious

sometimes about raising our hand.

But people do have the opportunity to go to their -- to their joint health and safety committee member, every worker group has a joint health and safety committee member, to their chief steward, and those people are at the site all the time.

They have -- we strongly encourage -- they talk to their supervisor first about -- about any concern they have. They do have pre-job briefings before jobs are -- in the process of assigning work, and they can raise questions at that time, and they do.

That's where almost every question is addressed, is at that pre-job brief in work-assignment stage. And we also have the SCR process that I know you've heard quite a bit about, and there are thousands, tens of thousands of SCRs put in.

People have feel no concern about raising an SCR on anything. It could be as simple as, "My lunch wasn't on the shelf where I left it this morning when I came to work." I mean, people will put an SCR in about -- about anything.

And we have negotiated -- everyone has the right to refuse unsafe work in the Province of Ontario, but we have the contractual language about just raising a safety concern as well, something that would be -- even

though it's not a work refusal, work still stops until the question is answered.

So, we've negotiated language around that.

And I guess the last thing I'd leave you with is everything is in -- people are strongly encouraged to report. We don't investigate incidents very often because incidents don't happen. What we investigate most of the time is something could have happened, something potentially could have happened if something was slightly different, and those are investigated.

So we strongly encourage a reporting culture so that those concerns are investigated before they become real incidents.

THE CHAIRMAN: Okay. Thank you very much. You're the last word. I don't know if that was the last word.

MR. BARKER: Bob Barker for the record.

Again, like I said, I've been at Darlington for a long time, up until almost exactly one year ago, I went to my new job in Toronto, and I know it's not the right place to say this but if I had my way we'd be talking about Darlington B right now.

THE CHAIRMAN: Thank you. We're going to break now for 15 minutes.

MR. LEBLANC: We'll be back at 6:30.

THE CHAIRMAN: At 6:30? Okay. I guess ---

MEMBER VELSHI: Just 10 minutes.

THE CHAIRMAN: Less than 10 -- than 15
minutes -- 6:30.

--- Upon recessing at 6:18 p.m./

L'audience est suspendue à 18h18

--- Upon resuming at 6:30 p.m./

L'audience est reprise à 18h30

MR. LEBLANC: Thank you. We are now ready
to resume the hearing. Thank you very much.

THE CHAIRMAN: Okay, the next submission is
by the Canadian Nuclear Workers Council as outlined in CMD
H13.80 and 13.80A.

And I apologize, Mr. Shire, for placing you
with the other guys, but I just read what is put in front
of me here. So over to you please.

12-H13.80 / 12-H13.80A

Oral presentation by the

Canadian Nuclear

Workers Council

MR. SHIER: Thank you. No problem getting me confused with that group.

Fortunately my presentation will be short. Being late in the day, a lot of our points have already been covered, but we do have some comments on our written submission to kind of highlight for you.

With me is, to my right, is Joanne Archer. Joanne is one of our executive members of our Nuclear Council and she'll be doing -- giving you her views from a person where the rubber hits the road, that lives in the community, and so on and so forth.

And my far right is Mr. Chris Leavitt, he's also executive member of our Council and he lives in the vicinity just a little further east, and then he'll provide some basic facts and thoughts for you as well.

We are here in full support of the three issues that are before us and we have reviewed them and we encourage you to support them at the end of the day.

So just a little brief on who we actually are. We're a council of unions across Canada, across the five provinces, and the unions have members that work in the industry, and we were formed many years ago to ensure

the voice of unionized nuclear workers is heard in a nuclear debate.

I'd just like to comment and pick up on the last presentation where Mr. Walker explained the perspective of unionized workers speaking out at these hearings. I think he did a good job of echoing that, and all the Unions in our Council support that issue that it is our responsibility to speak out and work within, mainly within labour and the public to talk about what we do.

Just a quick overview, as indicated, we talked about support, to give the CNWC perspective.

Joanne and Chris will provide kind of a members' perspective and we'll kind of sum up with some labourer perspectives and socioeconomic effects which a lot of these you have already heard.

So the CNWC is in full support. All our member unions are in full support of these -- the EA and the license for the waste management facility and also the operating license.

We support the ideas being good for the environment, good for the economy, good for Ontario and overall good for the whole country of Canada.

What I'd like to do now is turn it over to my colleague Joanne to give her perspective. She'll give you a bit of an introduction and some what we call real

grass roots views.

Joanne?

MS. USHER: Good afternoon, Mr. President and Members of the Commission.

My name is Joanne Usher and I would like to share my views on the issues that we are addressing.

I was born in Oshawa and have resided in Clarington my whole life, within two miles of this building that we are sitting in here today.

I have worked for OPG for close to 25 years, both at Darlington and Pickering Nuclear power plants.

I have a vested interest in the region, as my family, including children and grandchildren, live and work in close proximity to the Darlington Nuclear site.

I also have a daughter who is a highly trained and experienced woman who works for OPG. She supports these applications and sees the future potential that the industry offers in social and economic benefits.

I suggest that as well as my family and neighbours, that a high majority, the silent majority, of the local residents are in full support of these applications and support the view that the refurbishment will not create any detrimental effects to the environment.

The environmental benefits of a renewed nuclear station are compelling giving the importance of reducing greenhouse gas emissions.

A September 2011 national round table report on the environment and economy concluded that unless greenhouse gas emissions are reduced, the economic impacts of climate change to Canada could be billions of dollars per year.

Annually about 90 million tons of greenhouse gas emissions, equivalent to the exhaust of 18 million cars, is avoided. Since 1972 this has helped Canada avoid over 2.4 billion tonnes of greenhouse gas emissions.

Refurbishing Ontario's existing nuclear reactor fleet offers a much better way to deliver clean based energy, clean energy jobs, and clean air.

As an executive member of Durham Region Labour Council I defend OPG's initiatives in the area of safety jobs and energy production.

As a labour activist for many years in this community I have gotten to know many people both inside and outside of the nuclear industry, and I have had many conversations about the safe operation of the plants and how imperative it is for the workers, the safety of all residents and the health of Ontario residents.

I have stated in previous hearings, I personally believe that the nuclear industry is one of the safest if not the safest industry in the world to work in.

I'm an active steward for the Power Workers' Union and I'm very proud of what our union, along with my employer, has accomplished in promoting a safe workplace and consequently a clean safe environment for our neighbours.

I became involved with the Canadian Nuclear Workers Council more than 10 years ago to communicate and inform the public from a worker's perspective, my thoughts about working in the nuclear industry and its benefits.

Being a member of the Durham Region Labour Council is another resource I use as a unionized worker to communicate and provide information to facilitate a better informed public about nuclear safety.

On a regular basis I'm asked questions by community members about nuclear power, what it is like to be a woman in the industry, and how safe I feel as a worker.

From my experience once people are more aware of the facts in regards to a nuclear facility they get answers to their questions and they become supporters.

OPG has run many community information sessions concerning this refurbishment. I have attended

many EA sessions, listened and asked questions about the projects, and I have been involved in the discussions as both a worker and as an interested community member.

OPG again has taken a transparent approach in the preparation for this assessment.

Speaking on behalf of myself, my family and the Canadian Nuclear Workers Council. I therefore fully support these submissions for Darlington nuclear generating station.

Thank you.

MR. SHIER: Thank you Joanne. Chris?

MR. LEAVITT: Yeah, for the record Chris Leavitt. I'm employed at CAMECO Corporation in Port Hope, from the Field Service Division there. I've been at my work site now for over 34 years. I'm entering my 35th. I'm union president of my local, USW Local 13173. I'm in my fifth term as a union president also.

I'm here also too to give the report that I'm also vice president of the Northumberland Labour Council representing workers all across Northumberland County.

We do give full support from both our membership as well as the members that live within Northumberland County as part of our labour organization that exists within.

We feel safe and confident to both family and friends. I do have -- like Joanne, I've got three grandchildren and three family member's children that live within the immediate vicinity, and we feel quite confident that Darlington operates a very safe facility.

And that's about it Dave.

MR. SHIER: Thank you Chris. Dave Shier for the record. I would -- both Chris and Joanne talked about the labour council. I'd just like to give a little flavour of what the labour councils are.

They are a labour council organization that consists of representatives from unions in a regional geographic area such as Durham Region or as Chris mentioned, Northumberland where he is.

These unions participating on labour councils are community activist and are active on a wide variety of local issues in their communities and across their region.

We find they're kind of a good barometer for some of the general feelings and opinions on some of these issues.

As our labour council, we have been -- through our members, work with these labour councils and brief them on some of the issues.

And to date, the three in the areas here --

we did have a support letter from the Durham and District Labour Council which we included with our written submission. We've also now have a support letter from the Northumberland District Labour Council which I can provide if necessary. And the Lindsay and District Labour Council has also -- we've requested one from them. Their meeting is this evening. So they will hopefully pass that along to us as well.

Our point here is that these are community groups. And years gone by whether they were briefed or not briefed, sometimes they used to oppose nuclear issues. Now once they understand them and have been briefed on them, they are supportive.

Several of these labour council people, we've been able to tour them through for example Darlington or Pickering.

Another area which is changing too, and this has happened since our written submission went in. We are involved in an international organization of nuclear workers which had their annual meeting in Turkey back in early November. And there's a resolution there which I will not read the whole thing that was passed and discussed there, but I think the key part is that:

"We further support the timely refurbishment of such plants and their free exchange of

operation, engineering, maintenance, information, support, continued safe operation." (As read)

Again the key here, this is a large global union called IndustriALL, which has about 50 million members world-wide -- a large energy sector and even there we are making some headways of letting people understand that nuclear power has to be part of the mix as we go forward.

So we looked at that as some success. Before I go to my next slide, the idea of a picture is worth a thousands words -- we come across this slide which shows then and now. And I'll comment on that.

But before we get to that, we do all due respect to the intervenors that are opposed. We draw different conclusions. We believe in democracy. It's good to have the debate of pro and con. But we'd actually disagree. We feel that there's a change that the public is coming onboard. There's a -- we hear from the people that are opposed but we don't hear -- the silent majority we don't hear from the -- or we hear from the vocal minority not the silent majority.

And one thing I'd like to say here too, is and I'd like to take the opportunity to commend the CNSC on their recent video that they put out on how the nuclear power plants operate and how they shut down which

addresses a lot of the issues I've heard here today from some of the groups saying well, "what if Fukushima." So I'd -- my message to the people who are opposed: make sure you take a look at that video. And I'm assuming lots questions -- of all the commissioners looked at it.

I see a few nods. If you haven't, look at it.

So that moves us to the next one, then and now. Again, this is our -- from a unionized perspective talking to a lot of people. The old adage there of the, you know, dangerous and transferrable. Now we're seeing lots of going the other way. Even some of the greens are saying not too bad all things considered. So we feel that is what the majority are in favour of.

Basically in conclusion, as we've heard, no environmental effects, improvements the environment (sic), good for the economy and good for Canada.

So the Canadian Nuclear Workers Council respectively encourages the Commission to move on and approve the EA and grant the licences that are requested by OPG.

Thank you and we'd be happy to take any questions.

THE CHAIRMAN: Thank you. Anybody has any questions? Mr. Tolgyesi.

MEMBER TOLGYESI: I have just have one. How Canadian Nuclear Workers Council react to the Fukushima accident? Do you have any discussions with your member unions?

Because you have member unions and nuclear power plant facilities management.

MR. SHIER: Dave Shier for the record. Yes. So my role as the President of the Canadian Nuclear Workers Council, I provided as best I could as much information as we could to our -- all our member unions to keep them up to date on what was happening.

I am very active in our IndustriALL energy-nuclear sector. So we were in contact to our staff people in Geneva with the Japanese unions so that we were able to provide some -- you know, shop floor realities on what was happening there.

And since the days moving forward, we get reports from the Japanese unions on a regular basis. I was actually in Japan last September with a contingent from our international union. We didn't get to the plant site, but we did get briefings from the people there, which we were able to commute back to -- or communicate back to our unions at home.

And next year our annual international nuclear meeting is going to be in Japan and we're hoping

to be able to go right to the sight for our delegates to see it first-hand.

So we do communicate what's happened there and try to get through the media hype and also did a lot of other information sessions to some of the other unions as well.

MEMBER TOLGYESI: Did you have any technical suggestions or regulatory proposals, you know?

MR. SHIER: Dave Shier. In recommendations on the Fukushima -- we have reviewed what the recommendations are and what the different modifications that are happening with OPG and Bruce Power and the other facilities. And we are very satisfied that a lot of things are being addressed. A lot of lessons learned.

And again, I think the way your video explains it, I think it should be reassuring once people have some understanding of what happened. And then what Canada is doing to prevent the thing from happening there. I think all that helps. But there's got to be a lot of communication, a lot of information getting out to people to make sure their concerns are addressed.

THE CHAIRMAN: Anybody else? Okay. Thank you. Thank you very much.

The next submission is an oral presentation from Mr. Leistner. I hope I am pronouncing this right.

As outlined in CMD 12-H13.64. Sir, the floor is yours.

12-H13.64

Oral presentation by

Raymond Leistner

MR. LEISTNER: I'll just summarize two recommendations which I thought of.

One is to include on the list of credible accidents, an impact by a cargo plane as opposed to just a passenger plane.

And number two is that the reactors be designed or retro-fitted to survive an extended economic downturn which may occur in the next couple of decades.

We don't know. We can't forecast the future. If there is an economic downturn, people tend to be lax on maintenance and inspections. And we have to make sure that the systems are able to survive any changes. For example after the fall of the U.S.S.R. the local economy and where the Chernobyl incident occurred, they were unable to deal with the maintenance of the sarcophagus structure and it required an international consortium to build the new protective enclosure. We should be looking at that for the future, for planning for the future.

And with regard to the cargo planes, southern Ontario has a big heavy industry and there may be some large equipment that is shipped via cargo plane. And there is a certain -- it's low probability, but the consequences would be greater than what I believe that the current accident is a passenger plane hitting the reactor with no loss of containment. But let's say a 5000 kilogram plate of steel is being shipped from Europe or something for the automotive industry here, what would happen if that hit a building at six or eight hundred kilometres per hour? Is it possible to prevent these items from being shipped within the air space of the reactor facility? And Transport Canada is apparently working on a new airport in Pickering which will bring -- it's slated to take the cargo plane traffic away from Pearson and it'll bring the flight paths a little bit closer to this region. So there is a slightly higher probability of this happening. That's about it.

THE CHAIRMAN: All right.

MR. LEISTNER: Ah, Raymond Leistner, for the record.

THE CHAIRMAN: Thank you. Who wants to ask questions here? Dr. McDill?

DR. MCDILL: Thank you. Let's start with Pickering because it is something that's been around and

maybe, possibly, will someday and then it fades away for a while and comes back. So can we start with the possibility of Pickering? I don't even know where to start because I think we last asked this question about four years ago. I'll start with Mr. Jammal because he smiled.

MR. JAMMAL: Sorry, again the question is, in precision what is it you're looking for?

DR. MCDILL: Is there going to be a Pickering?

MR. TREMBLAY: Pierre Tremblay, for the record. Maybe we'll just take this one. Thanks.

I'll ask John Peters to comment on the proposal of the airport.

MR. PETERS: John Peters, for the record. I just, I think what I'm gonna try and do is just summarize what has happened in the last number of EAs and I'll go back Pickering B. There was some -- also some discussion of this issue in the new nuclear project and I think the story is really the same for Darlington as new nuclear.

In Pickering B, this question of what is the potential accident risk and how severe might it be was discussed. And at the time, we had a presentation by Transport Canada to the Commission that specifically

examined runway, flights, flight lines and slopes of aircraft ascent and descent. And the point that has always been made is that the risk of accident is always in the first few minutes of take-off or landing and that the further distance you are away from an airport, the much lower risks are therefore found and the possibility of accidents decreases too, incredible essentially.

There is a design basis discussion of this. And OPG has filed both for Darlington and Pickering, and for the new nuclear project, a discussion of the potential effects of aircraft crashes as an effect of external hazards to the plant. And those are characterized as being accidents which are more conventional in nature and do not lead to off-site releases.

The suggestion here that maybe there is a heavier plane available today and that the events might be more severe is undoubtedly being considered. You know, as time goes on these reviews are done as I said, the current -- I don't know the exact situation with new nuclear, but that was an updated report done in the last couple of years as part of the license documentation that was necessary for the site preparation license to be issued. And I believe that has been filed and accepted by the Commission.

MR. JAMMAL: Ramzi Jammal for the

record. The reason I was smiling is I was trying to balance between the security aspect and the public information. So again, the reactors which are done safely with respect to the impact, but however, I will pass it on to Mr. Gerry Frappier in order to provide the details.

MR. FRAPPIER: Thank you. Gerry Frappier, Director General of Assessment of Analysis at CNSC.

So the question here being with respect to large commercial aircraft crashing into nuclear power plant. As was mentioned, Transport Canada has done an awful lot of studies with respect to the chance or probability of an accident of a large aircraft coming off of the airports around the nuclear plants. The -- one of the truisms if you like, as far as aircraft, excuse me, flight is that larger aircrafts tend to have much, much more experienced pilots and so the occasion of them crashing is much, much, much less. And certainly very low probability for them to crash into a nuclear plant.

However, having said that, nuclear plants, we have required them to do analysis as we have just mentioned by OPG on the impact of various types of aircrafts. The facilities themselves, of course, we've just, we talked a little bit about all their seismic qualifications and their general robustness. They do have a design that is -- that is very, very strong and able to

withstand various external events including the, excuse me, including the impact of small aircrafts that have been analyzed in detail. The very large aircraft that's being referenced here, the two of the largest aircrafts in the world, those studies we're still -- we're still reviewing, however, the -- and they would be considered certainly beyond design based type accidents, but the enhancements that we are talking about throughout the sessions the past couple of days with respect to severe accident management that are being implemented, are the upgrades that are being put together by OPG for the Darlington refurbishment, would again be very useful and increase the ability to manage such an accident.

DR. MCDILL: Thank you and there would be no difference if this plane were coming out of a potential newer proposed airport in Pickering versus the existence of Pearson as it is now. That's correct?

MR. FRAPPIER: That's correct. I mean the key thing here is the size of the aircraft, the mass of it and the velocity.

DR. MCDILL: And one more question. If there were a hypothetical downturn in the economy, I'm assuming the reactors can go into an extended long-term guaranteed shut-down state. Is that something that's ever been looked at? I know it's been done in effect, both

Bruce and Pickering?

MR. TREMBLAY: Pierre Tremblay for the record --- Yeah, Pierre Tremblay for the record.

You know I think the question was around our ability to maintain and manage the sites. Clearly the program is well-funded, well-supported. Our direction quite, in fact, is to continue to improve the performance of the facility so it's bit speculative for me to talk about, you know, other conditions. But we have an obligation and a careful watchdog in the CNSC in terms of taking the appropriate steps and so on and so there are periods where we have outages; we are required to maintain the same standards at that time. Yeah, and I guess for most people in Ontario there is a bit of a downturn that we are in already and we're managing just fine. Thank you.

THE CHAIRMAN: Can I jump on this? But there are indicators for maintenance that are -- the regulate (sic) is kind of monitoring, and there was, if there were downturn and would start affecting the minimum compliment of people and maintenance, that will become known very, very quickly. And I assume the regulator will shut them down.

MR. JAMMAL: Ramzi Jammal, for the record. It's before we shut them down Sir, we make sure that they

have enough for safety requirements with respect to the operations. It doesn't matter what it is. From what Dr. McDill mentioned a guaranteed safe shut down, long term storage, even decommissioning at every step of the licensed activity, the Commission ensures there is enough adequate resource in order to maintain safety.

THE CHAIRMAN: Okay. Anybody else? You have the last word.

MR. LEISTNER: I believe with the cargo plane scenario, it's not the total weight of the aircraft that matters, but the weight of the largest solid strong object on the aircraft as opposed to the total mass.

THE CHAIRMAN: I think that's what they meant by don't know if you want to add in sci-fi.

MR. FRAPPIER: Yea but if we want to get real technical yes, I agree it's the density actually of the material so the key component is usually the engines themselves which are highly, highly dense as far as being very heavy and very solid, but those things can be modelled and have been.

THE CHAIRMAN: Okay, thank you very much. We'll move to the next submission which is an oral presentation by -- from Ms. Haines or Hayward?

MS. HAYWARD-HAINES: Jo Hayward-Haines.

THE CHAIRMAN: Okay. Jo Hayward-Haines, as

outlined in CMD 12-H13.65.

12-H13.65

Oral presentation by

Jo Hayward-Haines

MS. HAINES: Yes.

THE CHAIRMAN: Please proceed.

MS. HAINES: I will.

I reside at 127 Shanagary Drive in Ennismore, and though I'm not speaking on behalf of any organization, I am a member of the Council Canadians, Transition Town, and Safe and Green Energy.

My thanks to the Panel assembled here at the Hope Church for hearings on OPG's proposed Darlington new build and refurbishment projects and the waste management facility.

Polls sway like new weather patterns. Still the fact that a recent -- it was in October 12th of this year -- poll in the Wall Street Journal reveals a 4 percent gap in favour of shutting down the nuclear industry through attrition is presciently relevant. Investors are taking note.

We are in a transition time occasioned by the depletion of easily accessible energy sources like

coal, oil, and uranium. These energy sources have fueled impressive innovations in all sectors and have raised the standard of material wealth amongst many.

However, the opposite is also true. Grave risks to all life forms are increasing exponentially and all living forms share risks to the environment, regardless of perpetrator.

Furthermore, these underground energy sources are limited and the irresponsible exploitation of them has fueled many social problems.

So, we have some challenges to face together. As a teacher, artist, mother, and person long engaged in issues of social and environmental justice, I want to address what Einstein might have met when he advised that we need a new way of thinking to fulfill our responsibilities as humans to the vast and intricate ecosystems of which we are a conscious part.

With this issue of new nuclear reactors and our refurbishments on Lake Ontario, we face critical problems. I hope at least to show that the challenges we face are also opportunities for us to discover alternatives to our energy needs that are all encompassing based on sound environmental policies that our grandchildren and great-grandchildren would be proud of.

The first item I want to talk about is the

protection of our natural resources on which all life depends.

The interconnected Great Lakes and all the interconnected ecosystems nourished and sustained by these waters must be respected. This must include rigorous and independent environmental assessments at all stages of a project.

A question we might ask is one posed by Dr. Suzuki; how is our energy use leading to an over-investment in potentially dangerous energy sources and technologies? Does the OPG's proposal include conservation?

The Ontario Power Authority states:

"The Ministry of Energy is guided by a vision of a new, clean energy economy that provides 21st century jobs and sustainable, livable communities for all Ontarians and for generations to come."

Since the GEGEA was passed, more than 30 companies have announced plans to build or expand solar and wind turbine manufacturing facilities in Ontario. By the end of 2010, 13,000 direct and indirect jobs were created, and by the end of 2012, 50,000 direct or indirect jobs were estimated to be created.

That the new energy cycle has only a 30.7 percent efficiency in steam engine generators in the face of damage to our environment, health, and the waste requirements is a staggering realization.

Risk management -- risk assessment of management extending to many generations while the risks have been covered, I think that no one has mentioned the extent to many generations, so I would just like to mention that we know the degrees of gamma radiation which are dangerous to human health. What we do not yet fully realize is the danger of low-level radiation alpha and beta rays which can penetrate deep into cellular tissue and into the fabric of our DNA.

These effects are harder to measure but the evidence accumulated so far must be carefully weighed against what we don't yet know and in light of the scientific practice known as the precautionary principle.

Climate change poses significant risks to all sectors of our lives and the nuclear power industry is no exception. We have seen recently examples of the violent storms predicted to occur much later in time by Dr. James Hansen, the NASA Climatologist and author of "Storms of my Grandchildren".

Disturbances in ecosystems and the migratory and living habits of those living in them,

changes in our economic and political relations with other nations, all will affect the nuclear industry.

As the NASA astronomer and founder of the website Astronomy Cafe, Dr. Sten Odenwald states:

"There is also a disturbing tendency of denial. In both the electrical power industry and the satellite business, there seems to be a tendency not to recognize that certain ventures are inherently risky and intrinsically susceptible to solar and geophysical influences. At the same time that the emplacement of vital communications systems, and human activities in space have escalated, our scientific understanding of how the sun affects us has not kept up due to cutbacks in research."

That's the end of the quote.

We were at a peak of a 11-year cycle of solar flares called "Solar Cycle 24", electromagnetic storms of a magnitude equal to or exceeding the storm causing the Quebec blackout of 1989 could cause an over-surge of energy in the power lines and the transmission infrastructure with resulting breakdown of power and

electrical delivery systems.

This is an event predicted by NASA. What would occur in those nuclear reactors then?

It's already been mentioned, the potential costs resulting from a nuclear accident. I'll just refer to it briefly.

One caused by a terrorist attack or a nuclear disaster so great that no nuclear power plant would be built if the owner had to pay for liability insurance that fully covered these costs.

And as Dr. Rosalie Bertell, the eminent scientist, author, and expert on low-level radiation states:

"There is no such thing as a radiation exposure that will not do damage. There is a hundred percent possibility that there will be damage to cells. The next question is: which damage do you care about?"

I'd like to make a quote from Dr. Gordon Edwards, the President of the Canadian Coalition for Nuclear Responsibility, who states:

"The Seaborn panel recommended unanimously that a nuclear waste agency should be formed that is

independent of the nuclear industry and accountable directly to the Parliament of Canada."

That's democracy.

The industry-owned and nuclear waste management organizations is neither. As a result, Canadians are being manipulated by an agency that has no inherent conflict of -- sorry -- that has an inherent conflict of interest. The government and Parliament have abdicated their responsibilities to the citizens that elected them. This is a dangerous situation, you know? I mean, we can all have -- make errors in this order, but when we're -- if we are living in a democracy, we really have to consider these kinds of conflicts.

A few examples I'd like to site, and there are many, many more, of current and future alternatives, the Ontario Clean Air Alliance lists cost of power per kilowatt hour as follows. Energy conservation and efficiency, 2.3 to 4.6 cents. Watt or power imports from Quebec, 5.8 cents. Combined heat and power, 6 cents. Wind, 13.5 cents. Nuclear new and rebuild, 19 to 37 cents.

The current estimated cost of two new reactors and four refurbishments at an estimated 36 billion is over budget by 10 billion dollars. Yet,

positive alternatives to madness are in evidence.

The University of Toronto, Saint George campus is served by a combined heat and power system that can provide 6 Megawatts of electricity to the campus. The medical sciences building features two absorption chillers that use a system steam for cooling. The Woodward Avenue Wastewater Treatment Plant is now a valuable source of renewable energy, thanks to a biogas CHP system.

Markham's Warden Energy ---

THE CHAIRMAN: Can you please wind up, please?

MS. HAYWARD-HAINES: --- Centre has since 2008 been serving the heating and cooling needs of more than 300,000 square metres of space.

In summation, I'd like to say that the way we address the issue of climate change and the sources of energy we use as a result, illuminates the divisions that beset us. Either the resources of the earth are ours to exploit as we wish, or we realize we have but one earth and we all have a responsibility to protect it.

This transitional time is marked by a recognition that we must graduate from obsolete ways of measuring success. Once it was how good we were at exploiting the Earth's resources. Now success will be how creatively we can find ways to meet our common needs while

respecting the life around us. The life we have. There's a new crime, let's not commit it. That crime is ecocide.

THE CHAIRMAN: Thank you.

MS. HAYWARD-HAINES: Thank you very much.

THE CHAIRMAN: Any questions? Anybody has any questions? Questions? Okay, thank you, thank you very much.

I'd like to move on to the next submission by -- okay. Still by Eclipsall Energy. Did I get it right? Eclipsall Energy as outlined in CMD 12-H13.66, and I understand that Mr. David Orchard will make the presentation.

MR. ARCHER: Yeah.

THE CHAIRMAN: Over to you.

MR. ARCHER: That's Dave Archer.

THE CHAIRMAN: Archer? Sorry.

12-H13.66

**Oral presentation by
Eclipsall Energy Corp.**

MR. ARCHER: And I won't really be following the outline that closely. I don't know if that's a problem. I would like to talk about some of the disconnects between the pro-nuclear side and the anti-

nuclear side as it's observed in the international media by making a few observations and/or points.

We have a lack of public awareness, which means we have a lack of informed consent. The nuclear industry has a business model that doesn't take into account surviving without subsidy, surviving without insurance, which is basically covered by the taxpayer, and that's time to take the training wheels off.

So something that occurred to me was when I was in school here in Ontario, we were taken to Pickering and Darlington and being a precocious kid, I actually had two questions and a supplementary and I must have been 10 or 12. I don't know how old I was, maybe 12. I asked, "What are you going to do with the nuclear waste?" And the person giving the tour said that we were five years away from a geological repository. This to a child.

And my next question was -- what are we going to do with the waste? -- "How long will the plant last?" And he assured me 35 years, and I thought that was kind of incredible, why couldn't you lengthen the length, lifespan of the plant? And he assured me that concrete degradation, material degradation, that the lifespan of the plant was 35 years. And so 35 years later you've got an annoyed adult right here.

Okay. Lessons from Fukushima. The

Fukushima accident seems to have been caused by damaged pumps, loss of electricity, poorly located generators, cooling located -- generating cooling pumps, pipes that would break in an earthquake, they're clearly not flexible pipes, not the -- it's a plumber's nightmare of complexity.

Apparently, we're told that the accident would have been much worse at Fukushima had it not happened during the week, because they were just hours about to -- going on to the weekend they would have had less staffing. Is that a problem with OPG as well, I would wonder?

Other similarities are that these plants share an ultimate heat sink. In the case of Fukushima, the Pacific Ocean and in the case of Darlington, Lake Ontario, and anything can really interrupt that, a broken pipe, a failed pump, a terrorist act, an earthquake in Lake Ontario that damages the intake pump of the cooling system.

We have a similarity between Fukushima and Darlington in that it's a multi reactor site and so you can have common mode failures, you can have cascading failures. You can have an accident that prevents workers from accessing another plant that's local to the plant that's originally having the problem, which can then

compound the problem. So there's kind of refusal to consider the unexpected is a similarity between the CNSC and NESAs, the former regulator of Japanese nuclear power.

Yesterday, you guys mentioned a doomsday scenario and you gave a probability of one times 10 to the 6 (sic), and I kept scratching my head trying to figure out, how does that work? How do I compare that odds, those odds, to one reactor site, versus a multi-reactor site, and that really messes the mathematics of your odds calculation up.

I'd like to see criminal laws in place so that when a regulator refuses to inform the public clearly, and quickly, and promptly, with all of the bad and damaging facts, that there's got to be some criminal penalty for that. It's politics over public information and that prevents mitigation, which will fall often to the citizen to mitigate on their own behalves in the absence of government to save them, yeah.

Radiation monitoring not shared with the public. We -- guys that's a quote from yesterday. There are these stations that are around Darlington, several of them. They all collect a wide range of data and they're not made accessible to the public. Yet the public is the one who has to bear the risk. I don't think that's fair, and surely the government must realize that the taxpayer

is paying for this equipment that we don't have access to and we could easily -- you brought this -- the Chairman has brought this up. We -- do we have public access to this data? No.

Yesterday, you said the peer review panel came up with no negative impacts. That's just impossible. You can't have a peer-review, an honest objective review of anything without objecting opinions. Fishkill, not seen as an environmental impact, means that this is not a proper environmental impact study and there needs to be maybe a Federal one, or it needs to be impartial. But that's ridiculous. That -- the accidents that you did consider were limited only to design flaws and not other outside catastrophes that are mentioned, like cargo planes, et cetera.

So in light of all this, we now look at the economics of it and the U.S. -- it appears that in the U.S. it costs \$7 billion now to build a new reactor, and I thought that the Darlington refurb was 8 to 10 billion, but does that include new builds, or is that just the refurb. Maybe somebody can catch that answer later, but at \$7 billion apiece, it doesn't add up. Objective regulations, sorry I'm bouncing around a little bit, but there was a CBC story this year, 17 fires at Point Lepreau, a nuclear power plant in New Brunswick in its

previous licence period and it got a green stamp, 17 fires in its previous licence period.

CANDU reactors and Canadian nuclear policy where nuclear power generation's primary client is government policy and when we look at this government policy and the history of CANDU reactors, we see that after exporting CANDU reactors to India in the 60's, India went ahead despite promising us that it wouldn't use the technology to proliferate, exploded its first bomb in 1974 which led to an arms race between India and Pakistan and these days, when we're pointing the finger at proliferation to rogue states, we point that finger at Pakistan. So Canada can be thanked for that and -- and that certainly hurts this argument that there's a disconnect between the military policy and power generation policy. We can see the effect of that internationally.

Environmental impacts beyond the scope of the region of Darlington, for example, the uranium fuel cycle, so maybe somebody can correct me if I'm wrong here, but do we not mine it and every single vehicle at the mine uses a greenhouse gas. We then transport it often to where it is ground up and milled. We then transport it again where it's mixed into a fluorine gas. We then transport it at Port Hope (inaudible). We then transport

it again, but this time to the United States to Kentucky where it is either enriched with gaseous diffusion which you guys are phasing out or centrifuge which will replace the gas diffusion.

But it turns out there's two coal plants right there that serve that enrichment facility and their only purpose is to serve that area, so again, these are greenhouse gases that need to be added to the budget of whether, you know, the greenhouse gases that are produced in the uranium fuel cycle. You guys have ads -- had ads on two weeks ago that were full of lies. I don't know if it was CNSC or OPG, but somebody on 680 News two weeks ago, the ads were saying that no carbon was released by the plant. Well, that's misleading, and so if you're wondering why the public isn't ready to trust you guys, that kind of misleading information doesn't help your cause at all because it's not only is it just not carbon, it's greenhouse gases. And when you say, even implied, that nuclear energy doesn't create greenhouse gases by pointing at a plant, that's not the reality.

Anyway, in this point, the point of all these, the enrichment fuel cycle, the, sorry, uranium fuel cycle was that at each one of these points it has to then be transported from one plant to another and the list of plants is quite amazing. We wound up enriching and then

we have to ship it back to the plant where it's made into pellets much like the plant at Lansdowne and Dupont in downtown Toronto upwind or downwind from Forest Hill.

A pellet-making plant in the middle of a city, that's not, I can't believe this. I'm a little disjointed here.

THE CHAIRMAN: Can you finish please?

MR. ARCHER: Yeah, well, that's, you know, that's basically it in a nutshell. The point is is that there are alternatives that Germany is setting an example for the world, leading the world in alternatives, safe alternatives that require no evacuation zones, that don't have expensive decommission costs, wind, solar, renewable, renewable gas, all kinds of options that don't threaten what would amount to be the permanent evacuation of maybe a third of this province if there was an accident. And -- and the cold war is over. We don't need to live under that fear and so that's why solar companies like Solar and Wind are the wave of the future.

THE CHAIRMAN: Okay, thank you. Anybody has a question? Okay, thank you. Thank you very much. I'd like to move to the next submission by CANDU Energy Inc. as outlined in CMD 12-H13.86. And I understand that Mr. Yee will make the presentation. Hi.

12-H13.86

Oral presentation by

CANDU Energy Inc

MR. YEE: Thank you for this opportunity.

I -- I have some prepared text which I will read from and later on will be prepared to take any questions.

Good afternoon, President Binder, commission members and members of the public. CANDU Energy is here today to speak in support of OPG's environmental assessment of the proposed refurbishment and continued operation of the Darlington Nuclear Generating Station. My name is Frank Yee. I am the Chief Nuclear Engineer at CANDU Energy. I am joined at the table by Bill Pilkington, Senior Vice President of Projects and Services.

Following a short explanation of the background to our submission, I will be making remarks about the life extension projects that our company has taken in other jurisdictions and the reasons why we anticipate OPG will be able to carry out their life extension projects successfully. CANDU Energy, previously AECL, is a nuclear technology company providing nuclear power reactors and services to customers around the world based on proven CANDU technology developed over the last

50 years. CANDU reactors are an important contributor to the province's economy and competitiveness and currently supply approximately 50 percent of Ontario's electricity.

The Darlington CANDU plant has been operating safely and reliably for many years. Heavy water moderated -- moderated reactors based on the CANDU design are in operation, under construction or under refurbishment worldwide. CANDU technology comprises about 10 percent of the nuclear power plants worldwide.

Over the years our company and OPG have built a strong working relationship and we have found OPG to be a capable, experienced and responsible plant operator with highly trained and competent staff including the organizational effectiveness required to make the refurbishment of Darlington a success. CANDU life extension incorporates a refurbishment process which will allow the utility to extend the life of the reactor through a midlife replacement of key reactor components.

During the outage the fuel channels and feeders are replaced. The outage also provides the opportunity for additional modifications and maintenance activities to enhance the safety and reliability of the plant. All major equipment and components in the plant are inspected, assessed, serviced and replaced where necessary. Once refurbished, CANDU reactors are capable

of providing up to a total of 60 years of safe and reliable electricity generation.

CANDU Energy brings extensive and recent experience to retubing the reactor which includes replacement of the fuel channels. Retubing has been successfully completed at Wolsong I in Korea, Bruce Units 1 and 2 in Ontario and Point Lepreau in New Brunswick. During retubing CANDU Energy utilizes remotely controlled tools and shielded machines that allow the work to be conducted in a controlled and safe manner at the reactor phase.

CANDU Energy has worked closely with our partners to minimize the waste generated during the retubing project, ensure that radiation dose limits meet the alara principle. CANDU Energy has a process that allows us to capture lessons learned in a searchable database during project execution so that we can improve for each subsequent project. We will take this accumulated experience and knowledge and apply it during Darlington refurbishment.

Next I would like to make a few remarks about OPG as an experienced and successful operator. CANDU energy and OPG have developed a strong working relationship during the various stages of the plant lifecycle from the original design, construction and

commissioning through to operation and maintenance. Our recent interaction has been through the CANDU Owners Group program as well as through direct technical support to the Darlington organization.

This work ranges from engineering support for design changes, inspection and maintenance services to collaboration of Fukushima lessons learned. Over this period of time, OPG has demonstrated its commitment to safety, stewardship of the environment and in continuous improvement. A testament to this commitment are the high ratings achieved by three of the four units at Darlington which were among the top five performers of all CANDU stations in 2011. This high performing operating record and solid maintenance program provides a good foundation for the four stations to enter the refurbishment process.

OPG's commitment to continuous improvement was highly evident during the recent events following Fukushima. The CANDU plant operating philosophy is based on continuous improvement where the experience gained from the nuclear industry shared and used to make improvements. This approach is embedded in the plant management system as driven by OPEX, a process that captures operating experience, assists in lessons learned and drives improvement.

The OPEX sources include CANDU owners'

group meetings, regulatory positions and international nuclear organizations. The collaboration among CANDU operating stations promotes a culture of learning to achieve industry leading performance as demonstrated by the excellent performance of the Darlington station over the years.

Following last year's Fukushima event on March the 11th, 2011, all sectors of the nuclear industry were vigilant to review the lessons learned that came out of the Fukushima event. A CANDU industry working group organized by COG was mobilized to collectively consider safety improvements, exchange expertise, gain insights, harness lessons learned, and identify any needed research and development.

CANDU Energy participated both in Canadian and international forum and we have directly observed OPG's commitment in taking a leading role in addressing the lessons learned.

The highly proactive role shown by OPG in mobilizing subject matter experts and assigning key leadership staff was exemplary and clearly shows OPG's commitment to the safe operations of its fleet.

Through various project interactions, CANDU Energy has found OPG to be a knowledgeable, responsible and qualified nuclear operator. More recently, CANDU

Energy has begun work on the Darlington refurbishment, retube, and feeder replacement tooling project. We believe Darlington team is well qualified and prepared to manage and deliver a successful project.

In closing, the plan presented by OPG in support of the environmental assessment for Darlington refurbishment is comprehensive and sound. Refurbishment will continue to provide safe, economical and clean energy for the province of Ontario.

The plan addresses environmental considerations, utilization of lessons learned from OPEX, training of personnel and good business practices. It includes waste storage facilities during the refurbishment process.

This upfront planning, together with prior CANDU refurbishment experience, will drive the project to success.

CANDU Energy strongly supports OPG's project for the refurbishment and continued operation of Darlington and encourages the CNSC to approve the environmental assessment in support of the proposed project.

Thank you.

THE CHAIRMAN: Thank you.

Questions? Mr. Tolgyesi?

MEMBER TOLGYESI: It's -- we were waiting for you guys to come and talk to us about thorium. Could you use thorium as a fuel? What's the challenges to be used -- to use thorium in a standard CANDU operation?

MR. FRANK: I'll take some time to answer that question, maybe five or seven minutes.

As you know, CANDU's based on heavy water technology, and we use heavy water in the heat transport system and the moderator system, and that's to preserve these precious neutrons that we have, and we use natural uranium.

So this basic technology also has this added safety feature, which is very good for severe accidents. All the quantities of water that we have in the heat transport system moderator and the shield tank, the biological shield, are built in heat sinks right from the start. So that's a very good safety feature of CANDU.

Now on your question about thorium, because we have such good neutron economy and use natural uranium -- and I'm leaning off the thorium at the end of this discussion -- we are currently looking at fuel cycles, advanced fuel cycles, to see what we can do with our technology.

We have very good partners in China and we're -- we're starting small, we're starting with how to

take recycled or reused fuel from a PWR plant, which has about .9 percent fissile content, U235, and natural uranium has .7. So we can see how we can immediately utilize spent fuel from a PWR plant in a CANDU.

So, in fact, at Chin-chang, our CANDU reactor there, we're down blending the spent fuel from a PWR plant with depleted uranium and we're using it into a CANDU. We're creating a natural uranium equivalent. So that's the first step.

We've put 24 bundles into two channels and we've tested that at Chin-chang, taken them out, and we've inspected them. The behaviour is absolutely normal compared to any other normal natural uranium bundle.

The next step after that is to use, we call it, derivatives of natural uranium, up to about .9 percent. So this would give us higher burn-up. And also in a Canflex fuel bundle carrier -- the 43 element Canflex bundle. And that would be our next stage of using fuel cycles with our Chinese partners.

The last stage, which is what we talked a bit about, which is thorium, thorium, as Mark Elliott mentioned, is not a fissile, it's a fertile element. So what we'd have to do is we take the 43 element bundle, surrounded by slightly enriched uranium on the outer -- on the periphery, and we use thorium in the interior

channels.

So in that way the fertile material is transmuted. It absorbs the neutron. I think there's a beta decay and it becomes fissile. In that way we can use thorium and utilize it in a CANDU.

A bit of a long discussion.

THE CHAIRMAN: I think the intervenor will raise it -- this is a bit out of scope here, but actually this is the miracle, safe, no problem fuel engine, and if that is true, you know, I wonder why no supplier or manufactures jump on it and try to have a unique ---

MR. FRANK: Well, I think where it all comes together is China. It's a very good ideal situation because they have the enrichment capabilities, they have PWR plants with spent fuel, and they have two CANDU units. So all the elements are -- and they have thorium. They have thorium, which is another major consideration.

So you have to have all of that to come up with a viable program to go forward, and I think that that's where we see ourselves in China. They have all those elements.

THE CHAIRMAN: Okay. Thank you.

Anybody else have any questions?

MEMBER VELSHI: I have a question.

THE CHAIRMAN: Ms. Velshi?

MEMBER VELSHI: You spent a fair bit of time talking about the four reactors that you have refurbished and the OPEX that you've built from one to the other. And I recognize that the Darlington units are different from the other four and that the scope of work for refurbishment is different as well.

But is there a general sense that you can give us as to how much less dose or how much less volume of waste would get produced because of OPEX, you know, even if it's a range of percentage? Like how much does one learn from one unit to the other?

MR. FRANK: I'll ask Bill Pilkington to answer that question please.

MR. PILKINGTON: Bill Pilkington for the record.

In the area of the waste produced, there isn't a lot of opportunity because the -- basically the pressure tubes, calandria tubes, the end fittings are intermediate level waste and the volume is fixed by the number of channels in the reactor. Likewise, the feeders represent low level waste, and again the geometry of the reactor really determines the volume of waste to be dealt with. So there isn't a lot of opportunity there.

However, in the area of ALARA and minimizing dose, probably the biggest factors in doing

that are the reliability of the tooling that's being used and the training and efficiency of the crews doing the work on the retubing. And in that area there is a large opportunity for learning.

And at CANDU Energy we have what we call a feedback monitoring system that we've been collecting information through successive retube projects, and that learning then goes into new projects, and it also goes into the tooling because the tooling's a big part. And so, through successive retubes, we've improved on the design of tooling and that's the area that we're focused on now in support of the Darlington retube and feeder replacement program.

And so through using the experience we've gained, and through OPG's decision to go with tooling that's based on proven concepts, we would expect to get very efficient tooling that will help them to reduce the time to do the job and therefore the dose or the radiation exposure involved in the work.

MEMBER VELSHI: Thank you.

We also heard from OPG that they're building a full facility mock-up building. Is that something pretty standard with the other refurbishment projects, or is this pretty unique?

MR. PILKINGTON: So in a way, it's somewhat

unique. Mock-ups have been built for all of the projects, and that is the training ground so that the workers train on the tooling, away from the reactor, and when they're competent, then they move to the reactor.

In the case of the Darlington project, again, OPG's going to a more sophisticated mock-up facility than has been used before, and with four units to refurbish, then it makes good economic sense, as well as good sense from the point of view of schedule and the ALARA principle for the workers.

So they will be doing much more training and qualification of the tooling on their mock-up facility before they actually go to the first reactor unit.

And so in doing that, they should be in a position to be better trained and have more confidence in the tooling and the procedures before they start the actual work.

THE CHAIRMAN: Just to put you on the spot, so did I hear you that since your experience in Point Lepreau refurbishment and the Korean refurbishment, if you get the Darlington job, it will come on time, on budget, less money, right?

MR. PILKINGTON: Sir, I would love to give you a direct answer, but right now our scope of work is only the conceptual design of the tooling for the job.

But with the experience that we've gained and that others have gained, certainly the opportunity is there for all of those involved.

THE CHAIRMAN: Anybody else?

Okay. Thank you. Thank you very much.

I believe this is the final for today for oral presentations, and it's from Ms. Rowland, as outlined in CMD 12-H13.34.

Ms. Rowland, the floor is yours.

12-H13.34

Oral presentation by

Ms. Jessica Rowland

MS. ROWLAND: Hello and thank you so much for listening and being patient right through to the end. I really appreciate it. You must be very tired.

Nuclear radioactivity is a frighteningly modern and recent form in our legacy of world pollution, which has the terrifying potential to invisibly contaminate land and water for unknown numbers of generations to come.

One of the dangers of this legacy of contamination is that records of contaminated areas are not easily accessible to the public and maps showing

different areas with a legacy of contamination of various sorts are not easily available and signs are not posted. These should be as easy to access for the public as roadmaps and road signs.

And what is the measure of a dangerously contaminated area? A friend of mine in Kitchener, Waterloo had a map on their kitchen wall a year ago that showed Peterborough area, where I live, as a radioactive and dangerous zone to live in, but I had no idea of this. I had been living there my entire life.

I found out through some research and other people who had been doing some work that there were apples in that area contaminated with tritium, with more than 800 becquerels per litre of tritium, about as far away from the source as my aunt's apple orchards where I had grown up and been eating apples my entire life and little niece had been eating those apples when she was just a baby, under one year old.

And you very well know the dangers of tritium. It releases over a long period of time in your body and it can stay in your body up to 10 years, and it's especially dangerous to children.

This is indicative of the secrecy, lack of information, lack of responsibility and accountability surrounding most nuclear industries and other polluting

industries that I am aware of.

Is the Canadian government responsible and accountable to protect its citizens from polluted areas, to protect the purity of food, land and water, rivers, lakes and aquifers?

The official attitude seems to be denial and delusion, which is not a reasonable, responsible or even sensible method of dealing with pollution.

Tritium, for example, produced abundantly by power plants such as Darlington and sold to less responsible or accountable businesses such as the one in my community to transform into consumer goods such as glow-in-the-dark signs, it can cause cancer, birth defects and genetic mutations, and it goes everywhere water goes. It becomes a part of the water cycle, goes into food where it can concentrate up the food chain, and it can stay in people's bodies, milk, meat, honey, all kinds of vegetables.

We already spoke about the limit of tritium in water, but I'm still not clear about the regulations and limits and testing procedures for tritium or other radioactivity in food and how stringently this is adhered to.

The nuclear industry, as I understand, like any corporation, has a vested interest in its own

survival. The problem is that money and investment and the powers of government protecting these industries are very powerful and, like any corporation, seem to consider profit and saving face as a company in industry over the lives and health of the citizens affected by their pollution, not to mention the damage pollution and a legacy of radioactive contamination left for future generations to pay for and deal with, a toxic radioactive legacy making water unsafe to drink, food grown in certain soils unsafe to eat.

If you're thirsty and you can't afford to buy water or if the water that's available is untested, you're going to drink it anyways, whether it makes you sick or not.

So plans and waste disposal containment systems, especially for radioactive wastes, will be a legacy for future generations. Are these the gifts we want to leave for our children? I think this is ridiculous.

The use of any nuclear power or technology must be stopped, decommissioned, allowing for innovations and newer, greener alternatives without toxic legacies to take its place.

The signs from Shield Source Incorporated in Peterborough are being created by a company that has a

history and a director who has a history of lack of responsibility or accountability. He's already abandoned one facility in the States, and the United States government had to pay with their Super Clean Fund, which is a major taxpayer dollars -- it uses a lot of taxpayer dollars. They already had to clean up one facility. Now he owns one in Peterborough, Ontario, in my town, and his company doesn't even have the money to do a cleanup of this site.

And the argument would be, because it's built on a dump site, that the legacy of pollution, it's not his responsibility. He's going to abdicate responsibility, which would be a likely argument for him to take, which is the same argument he took at the facility in the States, and the country is footing the bill to clean up this facility.

The source of this material would be Darlington, tritium, right? It's being sent to my town, and lots of it is going up a smokestack, polluting a 20-kilometre radius and more with radioactivity, going down the sewer into the Otonabee River, which goes down into Rice Lake.

People there do not have testing for their wells, right? Who knows how much of this radioactivity people have consumed already.

Ten (10) years ago -- there are incomplete records before 10 years ago from this company, and it's possible that they were putting much more of this tritium into the environment before that time, because there's not enough records.

Plus, they were found to be highly irresponsible and had been miscalculating their emissions, so that it was almost a very dangerous level, and they've been shut down temporarily because of that.

All of this is material sourced from Darlington, sold to an irresponsible company, and put in my community at a very high risk for all kinds of -- as was mentioned before by a few different presentations -- risks of tritium.

Okay, the water quality monitoring agency in Peterborough was completely unaware of the risk of tritium. They said, "We do not have any facilities in our area that are using this, so we don't have to test for it." They didn't even know.

Lots of people who live right across the road didn't know about this company. I walked -- I went around to a few public facilities which cater to children in the Clarington area, and asked for their water quality monitoring reports. Tritium was not listed as one of the things that they test for.

So without strict regulations for industry polluting water and soil, industry will continue to compromise human health and future generations in favour of profit for a few who can afford to live in clean areas and purchase good, pure, tested water.

Nuclear energy, with its relatively short time in existence, only since the Second World War, has left a terrible legacy of pollution, Chernobyl and Fukushima being two of the most dramatic examples. But nuclear power is also inextricably linked to war and weapons testing, and the arms race.

Tritium also happens to be the detonating component, as most of you know, in nuclear weapons, and was used to detonate the atomic bombs over Hiroshima and Nagasaki in 1945.

As a global community, we do not need any more nuclear technology or weapons produced. We do not need nuclear power. There are green alternatives.

Nuclear is a much too expensive power source. There are cheaper and more effective options available, which could provide just as many jobs. If we, as a nation or a global community, said no to nuclear power, no to nuclear weapons, and all of its spin-offs and implications, other greener, more sustainable options would quickly take the place of this nuclear monster.

This is the nature of human ingenuity and innovation. It is unfortunate that we think we are dependent on this industrial nuclear complex, which has the horrible potential to endanger the future of our earth, and even irrevocably mutate our DNA, destroying the hope of future generations' clean water and healthy food.

The danger and risks of nuclear power and any nuclear activity is much too great and should be stopped. Now, as nation, we should cut the losses and move into cleaner, greener alternatives.

The possible consequences of a major nuclear disaster, and even the risks and dangers that were mentioned earlier, and the legacy of storing spent fuel are too great. Nuclear is a dangerous, outmoded technology. We can find better alternatives, with a much smaller impact on the environment.

Even radioactivity from a normally operating nuclear power plant raises the risks of genetic changes in the local population due to tritium. Nuclear power can and is damaging our DNA. This is ridiculous. Nuclear energy is not worth the risk. It's time to decommission the old plant, close it down, and invest in green alternatives.

The Darlington refurbishing plan does not include a risk assessment with effective and reasonable

evacuation plan in the event of a major nuclear accident. As many of you can visualize, the surrounding areas, the 401 and 404, and adjacent roads, do not provide a fraction of the evacuation ability necessary to evacuate ---

THE CHAIRMAN: Can you please ---

MS. ROWLAND: --- Toronto.

THE CHAIRMAN: Can you please wind it up?

MS. ROWLAND: Toronto was ranked recently as one of the top four cities in North America with the worst traffic congestion. That's in North America. So how is a plan to be made to adequately evacuate a city of this size and nature in the event of a major nuclear accident? The real answer is that it's impossible.

It's time to put the water, children, and future generations first. So ethical research needs to be done by arms-length, unbiased groups, as to the most sustainable long-term solution to Canada's energy needs.

Canada needs to invest in Canadian innovation and opportunity, not in nuclear power.

THE CHAIRMAN: Thank you. Anybody has any particular question? A question, Dr. McDill?

MEMBER McDILL: At the beginning of the presentation, the intervenor, I think ---

MS. ROWLAND: My name is Jess.

MEMBER McDILL: Ah -- thank you. I can use

your first name, Jess?

MS. ROWLAND: Thank you.

MEMBER MCDILL: Jess asked or commented that she wasn't certain of the monitoring the foodstuffs around, I'll say, facilities.

MS. ROWLAND: I know there is some monitoring around the facility, but radioactivity isn't just limited to a certain area. And I don't think the monitoring is as complete and extensive as it should be.

MEMBER MCDILL: So what I would do is ask staff if they can discuss that and indicate where these kinds of results can be found, and also OPG, as a follow-up.

DR. THOMPSON: Patsy Thompson, for the record.

The CNSC regulations require that licensees of facilities, like the ones that are at Darlington, the NPPs, and the other facility that the intervenor mentioned, Shield Source, have monitoring programs. So the monitoring program for the environment is a requirement.

And the way the program is designed is we look at all the sources of radioactivity from a facility, look at where those radionuclides will go in the environment, and which parts of the environment can impact

on people. And the design of the program is done that way.

So the emphasis is done on the areas where we expect contamination so that we can have a good handle on the levels of radioactivity, how people might be exposed and to what levels they will be exposed. There's also a number of monitoring locations that are used as reference locations. This is for the requirements for the licensees program.

There's also, as we saw yesterday and today, Health Canada has an independent network of monitoring stations where they do monitor in areas that aren't monitored by OPG, that provide other areas for monitoring.

And the CNSC has also started doing independent monitoring around facilities as a way of verifying the work that the licensees are doing, but also to provide independent information to members of the public.

So there's a regulatory program requirement, there's a technical assessment of the program, and we also do inspections to make sure the licensees actually implement the program the way it's supposed to be. And we do verify, for example, the sampling techniques they use, and the laboratory

measurement methods that are being used to make sure that when numbers are provided that they're reliable numbers.

MS. ROWLAND: I mean, up until last year, Shield Source was collecting and making their own samples, and sending them away. I don't know who was testing them -- which -- there's absolutely no independent monitoring or collection of this company. And there was 10 years in which a major oversight in the calculating of emissions was missed somehow, which ---

THE CHAIRMAN: I really ---

MS. ROWLAND: --- is shocking.

THE CHAIRMAN: Okay, Shield Source is now on their, if you like, shutdown order. I think we'll have plenty of time to discuss Shield Source on its own merits. This is to talk with Darlington ---

MS. ROWLAND: I think -- I'm just saying, as an ---

THE CHAIRMAN: --- and I think it would help ---

MS. ROWLAND: --- example of ---

THE CHAIRMAN: I know, but ---

MS. ROWLAND: --- my experience with the industry, I don't feel I have a lot of faith in the words that are said and the things that are being put forward as truth.

THE CHAIRMAN: Okay, thank you, I heard you.

DR. THOMPSON: Perhaps if I could add, something I was going to mention, as part of the tritium studies, work that the CNSC staff did, we did independent monitoring around SRB. And that information document is on our web site, the data is there.

We also did independent monitoring around Shield Source, Darlington, and G2, and I did the last verifications of the report, that will be put on our website, a couple of weeks ago. And so early in 2013, all the data from the CNSC independent monitoring around Shield Source will be available on our web site.

MS. ROWLAND: My question is how accountable, and what kind of compensation is provided for people who may be victims of some sort of damage as a result of nuclear activity.

DR. THOMPSON: Patsy Thompson, for the record.

As Mr. Binder indicated, Shield Source is being dealt with from a regulatory point of view. But what I would add is that, despite the bad practices that have been in place, the monitoring that we have done, the independent monitoring values that we have indicate that the levels, although higher than we would have expected,

and although higher than had been reported, are not at levels that would cause health effects in people.

MS. ROWLAND: Well, my question is, being new to this, why should I trust what you say and what you are measuring? What is it about your agency that is so ethical that you're absolutely above reproach?

Like I need to know as a citizen of Canada, right. That's all.

THE CHAIRMAN: Listen, were you here the last couple of days? We discussed tritium ad nauseam. Now I think we have heard it.

And by the way, as an aside, if you don't trust the government, you can do your own independent measurement, okay.

MS. ROWLAND: Would you like to give me the money to do that? I'd be happy.

THE CHAIRMAN: No. If you don't trust us, you can actually go and do it yourself.

MEMBER McDILL: Can I suggest, Jess, since you've allowed me to use your first name, that after we hear from OPG on the question that I ask and not maybe today, but I think the staff is always willing to speak to people from the outside. And at a time when it's not Darlington we're talking about, I think it would be good for you to talk to the CNSC.

MS. ROWLAND: Well, I mean, I also have read studies that say that there has been an increased incidence of, you know, DNA changes in children close to Darlington and ---

MEMBER MCDILL: Yeah. But the last few days, we've been talking about that and you will hear conflicting scientific data always. But can I ask OPG to -- do you want to hear more on monitoring around Darlington?

MS. ROWLAND: Not really, thank you.

MEMBER MCDILL: Okay. Then that solves that problem.

THE CHAIRMAN: Okay.

MS. ROWLAND: I mean, I can read up on documents and I can get that at another time. I think that I've already heard that.

THE CHAIRMAN: Okay. Staff, you have last word and then the intervenor. We've got to move on.

MR. JAMMAL: For the record, Jammal.

But one -- there is a critique of the ethical of staff, and our staff sit on the international committee, so the ethics of the Commission is when we became aware of results that we're not happy with, we shut down the operation.

THE CHAIRMAN: Okay, you've got the last

word -- last few words.

MS. ROWLAND: Well, thank you very much for listening. I appreciate your honest and straightforward responses.

I really think that water is even more an important resource, and any company or industry, nuclear, that has the potential to pollute or damage our water should be heavily regulated, even more than any regulations that are in place right now.

THE CHAIRMAN: Thank you for that. Thank you for your submission.

Marc?

MR. LEBLANC: Yes. We're going to take a very short two minute stretch break so that people can go and get their binders. We have more than 120 written submissions.

We won't do it all tonight, but we thought that if we were to do some tonight, then it will allow us to pace ourself for the rest of the hearing. So two minutes to get your binders and then 20 minutes, approximately, we'll be -- we'll just do some tonight.

THE CHAIRMAN: We're going to do half an hour worth, see how far we can go.

--- Upon recessing at 8:02 p.m. /

La séance est suspendue à 20h02

--- Upon resuming at 8:07 p.m. /

La séance est reprise à 20h07

MR. LEBLANC: Okay. So the way we're going to proceed is that I'm going to go through the list of written submission. I'm going to give the number of the CMD.

And I will start with four written submissions that were originally scheduled to be some oral presentations today. So there's four of them you may no longer have in your books. I may have to arrange to you, but in that context I think we should deal with those four that were on the agenda today and then we'll go through the list of the written submissions.

I'll give you in advance the numbers so you can identify them. They'll be H13.31, H13.36, so 31, 36, 43 and 191.

So the first written submission is from Madam Ysabeault d'Valar-Alba. It's CMD number H13.31, and that was originally scheduled for an oral presentation today.

12-H13.31

Written submission by

Ysabeault d'Valar-Alba

MR. LEBLANC: She was scheduled to be the third intervenor today.

MEMBER MCDILL: Can I ask staff, with respect to apricots in Turkey downwind of Chernobyl containing radioactivity, do we have any verification on that or support for that?

It's her point -- or intervenor's point number 1, just the last bullet. First bullet number 1, but the last little bit of it.

DR. THOMPSON: Patsy Thompson, for the record.

I know it's information that's relayed in the NGO literature. We haven't been able to verify the accuracy of that information, so I don't know.

MR. LEBLANC: Any other questions from the Members?

So the next written submission is H13.43. That was from Ms. Karen Loch, and this oral submission was to take place this afternoon.

12-H13.43

Written submission from

Karen Loch

MR. LEBLANC: So any questions from the Members?

THE CHAIRMAN: No.

MR. LEBLANC: No questions?

So the next submission is H13.191, which is from Ms. Natalie Caine and should be just a few submissions after that of Madam Karen Loch. So it's H13.191.

12-H13.191

**Written submission from
Natalie Caine**

MR. LEBLANC: So there's no questions.

The last oral that was transferred into written is H13.36 from Mr. Jack Murphy, and this one should be almost right after the one from Madam Caine.

12-H13.36

**Written submission from
Jack Murphy**

MR. LEBLANC: H13.36.

Sorry. It was previous to Madam Loch, so

just a bit back.

Many of the items that were on those -- in those submissions have dealt -- been dealt with in the last two days and that's why commissions that are in front of me, they have no questions.

So now we're going to go through the list of the written submission that are in the binders for written submissions.

So the next written submission is from the Durham Nuclear Health Committee. It's CMD H13.8. So the Durham Nuclear Health Committee had representatives here and answered many questions in the first -- particularly yesterday.

12-H13.8

Written submission from

Durham Nuclear Health Committee

THE CHAIRMAN: Okay, so start again.

MR. LEBLANC: So it's H13.8, the Durham Nuclear Health Committee. Any questions?

THE CHAIRMAN: No.

MR. LEBLANC: The next written submission is from the Environmental Earth Angels, CMD 12-H13.9.

12-H13.9

Written submission from
Environmental Earth Angels

MR. LEBLANC: Any questions? No. So the next submission is from Ms. Marilyn McKim, CMD 12-H13.10. Mr. Tolgyesi?

12-H13.10

Written submission from
Marilyn McKim

MEMBER TOLGYESI: In the submission, Ms. McKim is saying that Darlington reactor share a safety system in order to save money, whereas the Fukushima plant was constructed -- it separates safety systems for each reactor. That means that Darlington's is more vulnerable. Could you comment on that, OPG and staff?

MR. TREMBLAY: Yeah, Pierre Tremblay for the record.

I think I'll let Mark Elliott talk about the safety system design at Darlington.

MR. ELLIOTT: This safety system design that -- I believe that she's talking about is the containment system. The containment system at Darlington

is one containment envelope for the four reactors. There's a number of advantages to that in terms of efficiency of building, in terms of just the materials and the extent of the building.

There's also some safety benefits of that, in that the volume is larger. A single unit accident would be absorbed in that larger volume and it would be a longer time until you get into controlled venting. So there's some benefits of that in terms of dose to the public, after an accident.

We're continuing to look at various designs for new build, but for Darlington, that is, you know, that is the design.

You know, one of the things we do on the containment side is look at things like hydrogen and so the passive autocatalytic recombiners that we put in are helpful for containment.

So we can't change the overall design but we can enhance containment with that process and with our containment filter venting modification that we're going to do as well.

MEMBER TOLGYESI: You were saying that one of safety advantage is that if one reactor has a problem, the containment is much larger.

MR. ELLIOTT: Yeah.

MEMBER TOLGYESI: But if for any reasons all four reactors have a problem, what's then? What's the capacity -- spare capacity of the containment to make sure that those all four reactors will continue in a safe manner?

MR. ELLIOTT: It would be no longer an advantage but it wouldn't be a disadvantage. It'd be -- it would be -- it's just that that advantage that I spoke about would not be there.

THE CHAIRMAN: I think this is the theme that you may want to find a way of how to explain the difference between the -- pointing to Fukushima as having each kind of a plant, its own independent safety as opposed to Darlington, that shares safety.

This -- I'll repeat, theme, you will hear throughout and I'm not sure that if the only thing you're talking about is the containment of the vacuum building, I'm not sure that's a convincing enough argument, I will argue.

I don't know you how explain it differently but that's why everybody keeps talking about that a four - multiple four unit like this is not as a safe as a single -- four unit if one with the all independent safety.

MR. JAMMAL: Sir. Mr. President, Ramzi

Jammal here.

And for the record, it's the statement being made; the sharing safety system is inaccurate. Every reactor on that site has its own shutdown system independently of the others.

In addition to it, there is the vacuum building, okay, that is used for the in case of venting is required. Then in addition to it, post Fukushima, there are enhancements that Darlington has put in place to filter for venting in case they need to filter.

I'll pass you on to Mr. Frappier. And in addition to it, there is the redundancy for each and every reactor that does exist. So the share of safety system is misleading concept, number one, because each reactor has its own shutdown system independent of the other.

THE CHAIRMAN: Well that's the kind of things I wanted to hear being said because all we heard was because of the vacuum, rather than each one is its own independent and then this in addition to that.

MR. JAMMAL: Correct. I mean, each system

THE CHAIRMAN: If I understand correctly.

MR. JAMMAL: --- Even the cooling is independent from every other system.

THE CHAIRMAN: Okay.

MR. ELLIOTT: The only thing I would add is the -- for the Fukushima modifications, we do have enough equipment for each of the units, separately.

THE CHAIRMAN: Ms. Velshi?

MEMBER VELSHI: Yeah, the other issue she raised, a design flaw, is that on positive reactivity and says that most International Safety Standards spawn such reactors. Can you comment on that please?

MR. JAMMAL: Ramzi Jammal for the record.

I'll start with the high level and pass it on to Mr. Frappier in order to give the more detail.

Again, that is a myth that's being presented with respect to the International Safety Standards. In theory, every reactor has a PCR or Positive Reactivity. In the CANDU itself, you've got to look at it at a systematic approach, not every and each individual system.

So the CANDU, by design, has two separate systems and there are compensation -- compensating measures in order to compensate for the PCR. I will pass it on to Mr. Gerry Frappier to give more detail.

MR. FRAPPIER: Okay, so I'll just step one step back and then I'm going to have Mr. Couture, our Director of Physics and Field talk about -- she makes a connection to Chernobyl but with respect to shared

systems, as Mr. Jammal had mentioned, the Darlington facilities do have their own safety systems for shutting down and controlling and cooling the reactors.

The area that, I believe, that they're making reference to is, as Mr. Elliott had mentioned, is primarily associated with the containment and in particular, the vacuum building.

Generally speaking, we do not like to see shared safety systems but this particular one has been analyzed and continues to be analyzed. And as was mentioned, the improvements that are being put in place for Fukushima are done in a -- with the full awareness of that there's, you know, one vacuum building that's shared between them all but the analysis is including multi-station analysis.

And so to ensure that we understand exactly how things would be managed, should there be an incident that involves multiple units at the same station. And as Mr. Elliott then indicated, that has been looked at and there are some advantages and disadvantages to the system.

On the second question, with respect to the comparison with the positive void reactivity to the Chernobyl, I will ask Mr. Couture to comment.

MR. COUTURE: Michel Couture, Director of Physics and Fuel Division for the record.

On the issue of positive cool and void reactivity, it is true that the CANDU reactor has a positive void reactivity. However, this is not a new phenomenon. It's not something new. It has been known by the industry, by the regulator since early days of commercial CANDUs. So the -- several measures have been taken to address this issue. So we do have two independent effective -- equally effective shutdown systems.

A number of operational constraints have been put in place, and most importantly is that there has been -- this phenomenon is well understood, has been studied for many, many years. There are currently R&D programs on it, and the safety analysis that has been done takes into account the positive radioactivity.

So for the events that are most affected by the fact that the void radioactivity -- the cooling void radioactivity is positive, demonstrates that they meet the safety limits.

The reactor will be closed safely, shut down safely within the safety limits imposed by the regulator.

MEMBER VELSHI: My question was around international safety standards.

MR. COUTURE: Well, we regulate -- we

regulate this phenomenon according international standards. The IAEA does not forbid positive void.

The issue is that if you have a reactivity coefficient that is positive, you have to demonstrate through experiments and analysis that mitigation measures are in place.

So the design of the CANDU takes this into account.

And the thing I'd like to also emphasize, it's not -- you cannot judge the safety of a design strictly by one parameter. You have to look at the whole safety case.

So comparing Chernobyl RBMK-1000 with a CANDU is misleading. Yes, both had positive void reactivity, but the designs -- there are many design differences and it's really -- you assess a safety design as a global assessment. It's not one single parameter.

THE CHAIRMAN: I think this subject will come again in some of the oral presentations, so maybe we should save them and move on with the written material.

MR. LEBLANC: The next written submission is from Don and Heather Ross, CMD H13.11.

12-H13.11

Written submission by

Don and Heather Ross

THE CHAIRMAN: I just -- here it is. It repeats again, on the second page, the paragraph before last, and you can see it's the same argument. And I think we just -- I think we just dealt with that particular issue.

Okay. But what is actually adds here is that such a safety symbol will not be allowed by the International Atomic Energy. Okay? So I assume, from what I understand, it's not correct.

MR. FRAPPIER: Gerry Frappier, for the record.

So the International Atomic Energy Agency has a suite of documents that are not actually requirements on us. One document that, in the past, has indicated that shared systems, while not considered desirable, as long as the overall safety cases explains it, then that's fine.

There are new documents that have come out just recently this year where they are reemphasizing that they would prefer not to have shared safety systems. So in that sense, the IAEA is moving into a stronger viewpoint that we should not allow sharing safety systems.

THE CHAIRMAN: Okay. But again, you see,

when you use this terminology, it's starting to confuse me.

So what shared services is not desirable? Is it a central vacuum building, or if each unit has its own independence, then there's some things like power supply, et cetera, that can be shared?

You see, I don't understand what is it that the IAEA new movement towards is.

MR. FRAPPIER: Well, I think they're looking at shared -- at safety systems in general. So as Mr. Jammal was saying, things like shutdown systems or whatever the safety system would be. Containment would certainly be considered a safety system.

MR. JAMMAL: Ramzi Jammal, for the record. Mr. President, we are playing now with definitions.

Let me start again. Every reactor has its own shutdown system. Every reactor has its own cooling capacity. The only shared part of the design is the vacuum building.

In addition to the vacuum building, let's not forget the fact that even Fukushima, the containment of Fukushima, the structure of the primary containment and the vessel itself is completely different than the CANDU reactor.

The volume of the water in the CANDU reactor with respect to the fuel far exceeds any of the design that currently exists. So the only section -- and it's only part of the -- what we currently have in the multi-site design is the vacuum building.

However, the safety case has taken that into consideration and improvements are being put in place in case you need to use the vacuum building. What you can do? And they ask that they be put in place.

So there are shared safety systems. Each reactor has its own independent capacity to shut down safely and maintain safety.

THE CHAIRMAN: Okay. Thank you.

Dr. Barriault, you wanted to say something?

MEMBER BARRIAULT: Yes, just a brief question.

The last page, top paragraph, it says:

"Chernobyl and Three-Mile Islands have concluded the failure of government institutions to take nuclear risk seriously is what actually caused those accidents."

Any comments?

MR. JAMMAL: Ramzi Jammal, for the record.

As the nuclear regulator, we will not allow

any operations to go beyond its design basis. We have inspectors on site and the failure of the government institutions is probably correct in other international bodies, but not in Canada.

THE CHAIRMAN: Thank you.

MR. LEBLANC: The next written submission is from the Whitby Chamber of Commerce, H13.12.

12-H13.12

**Written submission by the
Whitby Chamber of Commerce**

MR. LEBLANC: Any questions?

The next submission is from Carlene Jimenez, H13.13.

12-H13.13

**Written submission by
Carlene Jimenez**

THE CHAIRMAN: Again, it's the same.

MR. LEBLANC: The next written submission is from the County Sustainability Group, Prince Edward County, H13.14.

12-H13.14

Written submission by the
County Sustainability Group,
Prince Edward County

MR. LEBLANC: Mr. Tolgyesi?

MEMBER TOLGYESI: On the first paragraph --
it's not the first paragraph; it's page 2, first
paragraph:

"The potential failure of storage
pools poses unqualified risk of
unbounded atmospheric and groundwater
contamination."

Could you comment on this potential failure
of storage pools?

MR. ELLIOTT: Mark Elliott, for the record.
Would you like ---

MEMBER TOLGYESI: Yes.

MR. ELLIOTT: We went over this a little
earlier where our seismic -- our spent fuel pools, first
of all, are seismically qualified so they'd withstand
earthquakes. They can have -- the water can go to up to a
100 degrees and the bay is still -- the pool is still
intact.

MEMBER TOLGYESI: Yes.

MR. ELLIOTT: And should there be any loss of cooling, there is ample time for the operators to add water and keep the fuel cool. And we have improved our procedures such that that can take place.

And also, those pumps that you -- those diesel pumps that we've shown you for the emergency mitigated equipment, they can be used in this spent fuel pool as well.

So there's quite a bit of defence against that issue.

THE CHAIRMAN: I've been quiet about some intervenors that already made such statements throughout, but this one, just for the record, this is the second page, the paragraph before item number 2:

"In Canada, the CNSC's lack of independence from the influence of the nuclear industry mirrors the situation in Japan."

I take great exception to that statement, okay? And if somebody feels that we're dependent, they better come and prove it to us or give some other recourse to challenge our decisions.

Thank you.

MR. LEBLANC: The next written submission is from the Emilio Antonio Aljure, H13.15.

12-H13.15

**Written submission by
Emilio Antonio Aljure**

MR. LEBLANC: No questions?

So the next submission is from AECL's Port Hope Area Initiative Management Office.

12-H13.16

**Written submission by
AECL's Port Hope Area Initiative
Management Office**

THE CHAIRMAN: No.

MR. LEBLANC: The next submission is from Rick Norlock, Member of Parliament for Northumberland-Quinte West, H13.17.

12-H13.17

**Written submission by
Rick Norlock, MP
Northumberland-Quinte West**

MR. LEBLANC: The next submission is from

the Green Party of Saskatchewan. Any questions?

12-H13.19

**Written submission from the
Green Party of Saskatchewan**

THE CHAIRMAN: I think this is a practice run for when we travel to Saskatchewan to do with uranium mines, nothing to do with the subject at hand.

MR. LEBLANC: The next submission is from Brenda Thompson, H13.21.

12-H13.21

**Written submission from
Brenda Thompson**

MR. LEBLANC: The next submission is from Timothy Law, H13.22.

12-H13.22

**Written submission from
Timothy Law**

MR. LEBLANC: The next submission is from

the Ajax-Pickering Board of Trade, H13.23.

12-H13-23

**Written submission from
the Ajax-Pickering Board of Trade**

MR. LEBLANC: The next submission is from
the Firehouse Youth Centre, H13.25.

12-H13.25

**Written submission from
The Firehouse Youth Centre**

MR. LEBLANC: The next submission is from
Michelle Xuereb, H13.27.

12-H13.27

**Written submission from
Michelle Xuereb**

MR. LEBLANC: The next submission is from
Ms. Joanna Bruszewski and her grandchildren, H13.28.

12-H13.28

Written submission from

**Joanna Bruszewski
and her grandchildren**

MR. LEBLANC: The next submission is from
the Big Brothers Big Sisters of Clarington, H13.29.

12-H13.29

**Written submission from
Big Brothers Big Sisters of Clarington**

MR. LEBLANC: The next submission is from
Valleys 2000 (Bowmanville) Inc., H13.38.

12-H13.38

**Written submission from
The Valleys 2000 (Bowmanville) Inc.**

MR. LEBLANC: The next submission is from
Melita Fernandes, H13.40.

12-H13.40

**Written submission from
Melita Fernandes**

MR. LEBLANC: The next submission is from

Mike Darmon, H13.41.

12-H13.41

Written submission from

Mike Darmon

MR. LEBLANC: The next submission is from William and Edith Shore, H13.42.

12-H13.42

Written submission from

William and Edith Shore

THE CHAIRMAN: Again, if you look at page 2, the famous French and German studies on childhood leukemia which was discussed many, many times here. So to point out that again, it was many times rebutted by staff here.

Go ahead, Dr. McDill.

MEMBER McDILL: Thank you. On the same page, there is a comment about fracking, and then we had this question for Lepreau as well. Maybe staff can answer if there's any issues with respect to fracking for Darlington. Is there any natural gas that we need -- in fracking that? I hope we've got someone coming up. Thank

you.

MR. LEBLANC: Is OPG staff okay for doing another five or six?

THE CHAIRMAN: Are you okay?

MR. LEBLANC: Yes? Okay.

THE CHAIRMAN: I think with the smiles they'll probably stay here the whole night.

DR. THOMPSON: Mike Rinker will respond to your question before moving on.

MEMBER McDILL: Do we have an answer?

DR. THOMPSON: About the fracking, yes.

MEMBER McDILL: Thank you.

MR. JAMMAL: Yes, Dr. McDill, I think we will provide you an answer.

MR. RINKER: Mike Rinker for the record.

It is known that fracking can cause some seismic events. Usually they've been observed in the order of magnitude 2 or magnitude 3. So low consequence type events.

In discussion with the NEB, there is no known resources of shale gas that would be located along Lake Ontario. So it's not expected that fracking would be a type of industry that would evolve in Ontario but if they were, it would be looked at much the same as the quarry that's located next door where you would look at it

and assess what the risks were and manage it accordingly.

MEMBER McDILL: Thank you.

MR. LEBLANC: I apologize for having interrupted.

So the next submission is from James Ker, H13.44.

12-H13.44

**Written submission from
James M. Ker**

MR. LEBLANC: The next submission is from Harry Blundell, H13.45.

12-H13.45

**Written submission from
Harry Blundell**

MR. LEBLANC: The next submission is from Lilly Noble, H13.46.

12-H13.46

**Written submission from
Lilly Noble**

MR. LEBLANC: The next submission is from Frank Farrell, H13.47.

12-H13.47

**Written submission from
Frank Farrell**

MR. LEBLANC: The next submission is from Barbara Moore, H13.48.

12-H13.48

**Written submission from
Barbara J. Moore**

MR. LEBLANC: Mr. Tolgyesi.

MEMBER TOLGYESI: Yes. This intervenor is saying that radioactive spent fuel rods are dangerous to move on narrow highways which are prone to vehicle accidents.

Do you transport fuel -- spent fuel on highways?

MR. TREMBLAY: Pierre Tremblay for the record.

I'll let Terry Doran speak about that.

MR. DORAN: Terry Doran, for the record.

There are very limited transfers of spent fuel. They do -- we do transport them to AECL Chalk River. These are done in singletons, probably two in a year, and they're done consistent with all the requirements and transportation safety measures that are required for these safe transports.

I might add, this is a matter of record, that our record for transporting radioactive materials is very strong. In the over 40 years we've been doing it for all types of shipments over 30,000 shipments, over 11 million miles, we've never had an incident that's resulted in a release to the environment.

MR. LEBLANC: The next submission is from Larraine Roulston, H13.49.

12-H13.49

**Written submission from
Larraine Roulston**

MR. LEBLANC: The next submission is from Eryl Court, H13.50.

12-H13.50

**Written submission from
Eryl Court**

MR. LEBLANC: The next submission is from
Linda and Gord Hicks and family, H13.51.

12-H13.51

**Written submission from
Linda and Gord Hicks and Family**

MR. LEBLANC: The next submission is from
Shane Mulligan, H13.52.

12-H13.52

**Written submission from
Shane Mulligan**

MR. LEBLANC: The next submission is from
Tony McQuail, H13.53.

12-H13.53

**Written submission from
Tony McQuail**

MR. LEBLANC: The next submission is from
Dan Holtl, H13.54.

12-H13.54

Written submission from

Dan Holtl

MR. LEBLANC: The next submission is from Tania Gill, H13.55.

12-H13.55

Written submission from

Tania Gill

MR. LEBLANC: And if you agree with me, Mr. President, as we stated that we'd finish after a half an hour of written, I think that's our time. So we could resume at H13.56 at the next occasion.

MR. CHAIRMAN: Okay. I guess this concludes today's proceedings and we reconvene tomorrow at 8:30. Thank you.

--- Upon adjourning at 8:40 p.m./

--- La séance est ajournée à 20h40