Canadian Nuclear Safety Commission

Commission canadienne de sûreté nucléaire

Public hearing

Audience publique

December 3rd, 2012

Le 3 décembre 2012

Hope Fellowship Church
1685 Bloor Street
Courtice, Ontario

Église Hope Fellowship
1685, rue Bloor
Courtice (Ontario)

Commission Members present

Dr. Michael Binder
Dr. Moyra McDill
Mr. Dan Tolgyesi
Ms. Rumina Velshi
Dr. Ronald Barriault
Mr. André Harvey

Commissaires présents

M. Michael Binder
Mme Moyra McDill
M. Dan Tolgyesi
Mme Rumina Velshi
M. Ronald Barriault
M. André Harvey

Secretary:

Mr. Marc Leblanc

Secrétaire:

M. Marc Leblanc

Senior General Counsel :

Mr. Jacques Lavoie

Avocat général principal:

M. Jacques Lavoie

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Courtice, Ontario

--- Upon commencing at 9:05 a.m.

Opening Remarks

MR. LEBLANC: Good morning ladies and gentlemen. Bonjour à tous. Welcome to the public hearing of the Canadian Nuclear Safety Commission.

My name is Marc Leblanc. Je suis le secrétaire la commission et j'aimerais aborder certains aspects touchant le déroulement des audiences.

The Canadian Nuclear Safety Commission is about to start a public hearing on the Darlington Nuclear site regarding the environmental assessment of OPG's proposed refurbishment and continued operation of the Darlington Nuclear Generating Station. The application by OPG to renew the Darlington Waste Management Facility licence and the application by OPG to renew the nuclear power reactor operating licence for the Darlington Nuclear Generating Station until December 31st, 2014.

During today's business we have simultaneous translation in English and French.

Des appareils de traduction sont disponibles à la réception. La version française est au

poste 2, and the English version is on channel 1. Please keep the pace of your speech relatively slow so that the translators have a chance to keep up.

L'audience est enregistrée et transcrite textuellement. Les transcriptions se font dans l'une ou l'autre des langues officielles.

I'd also like you to know 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. The transcripts will be available on the website of the Commission in about 10 to 14 days.

To make the transcripts as meaningful as possible, we would ask everyone to identify themselves before speaking. As a courtesy to others in the room, please silence your cell phones and other electronic devices.

M. Binder, président et premier dirigeant de la CCSN, présidera l'audience publique d'aujourd'hui.

Mister President.

THE CHAIRMAN: Thank you, Marc, and good morning to everybody. And first of all, let me share with you on behalf of the Commission how delighted we are here to be today in your community. It's a great pleasure for us first to get out of Ottawa, trust me on that one, and to be in a community and allow for the community members

to participate in this hearing.

I'd also like to thank the people of the Hope Fellowship Church for helping us set-up in this facility, so thank you for that.

My name is Michael Binder. I'm the President of the Canadian Nuclear Safety Commission. And welcome to all of you who are joining us through the webcast and some will be joining us through teleconference.

So let me start by introducing Members of the Commission. On my right are Dr. Moyra McDill and Monsieur Dan Tolgyesi. On my left are Ms. Rumina Velshi, Dr. Ronald Barriault and Monsieur André Harvey. We heard from Marc Leblanc, the Secretary of the Commission, and we have Jacques Lavoie, Senior General Counsel of the Commission with us here today.

Before we start, I'd like to make some few remarks. We are in Clarington, Courtice the next four days to consider the written submissions and oral presentations for a large number of citizens and organizations who wish to express their opinion on the three matters that are our focus -- that are the focus of the hearing this week.

I'd like to clarify a few things before we getting this hearing underway. First of all, I wish to

emphasize that the Commission is a quasi-judicial administrative tribunal and that consequently, it is independent; any political, government or private-sector influence. In fact, each Commission Member is independent of one another and also independent of the CNSC staff.

Interventions for this hearing include recommendations to the Commission. CNSC staff also make recommendations to the Commission and it is the Commission Members who will render a decision based on all the evidence presented in the context of the hearing process.

The Commission Members are appointed by the gouvernor-in-council on the basis of their achievement in their respective fields of endeavour as well as their excellent reputation among their peers.

The mandate is simple; ensure that the use of nuclear is done in a manner that protects the environment as well as the health, safety and security of the workers and the public.

Several intervenors have raised important questions on the future of nuclear energy in the Province of Ontario. Many are making -- many are asking why more consideration is not given to wind and solar and other renewable energy sources instead of nuclear energy.

I trust that you will understand that the Commission, as an administrative tribunal, does not have

the statutory authority and will not consider questions that are of a political nature and that it is the Ontario Provincial Government that must address these fundamental energy policy questions.

I would also like to emphasize that the CNSC has no economic mandate and will not base its decision on the economic impact of the facility. I will repeat it. It is the health, safety and security of the public and the protection of the environment that guides our decision.

Finally, as I stated earlier, the Commission is an administrative tribunal. It is willing to conduct its hearing in the affected community and to provide the forum where members of the public can express their views on the matter at hand. As the Commission is a tribunal and wishes to hear the more than 90 oral presentations and ask questions of these -- on these, we ask that everyone respect the decorum and assists with the orderly conduct of these proceedings.

Thank you for your attention.

So with this information, I would like now to call for the adoption of the agenda of the Commission Members as outlined in Commission Member Document 12-H16.A. Do I have concurrence?

For the record, the agenda is adopted.

Marc?

12-H16.A

Adoption of Agenda

MR. LEBLANC: Thank you. So a notice of public hearing was published on September 4th, 2012 to announce the public hearing on OPG's Darlington Nuclear site. A revised notice was published on October 25th to announce the new dates of hearing in light of the large number of submissions received from the public.

The submissions filed by OPG and the recommendations filed by CNSC staff were made available on September 14th.

The public was invited to participate either by oral presentation or written submissions. October 15 was the revised deadline set for filing by intervenors. The Commission received 212 requests for intervention, including 90 oral presentations and 478 similar email submissions from a later campaign.

CNSC staff filed two supplementary documents on November 15; these documents were sent to all intervenors.

November 26 was the deadline for filing of supplementary information and we know that supplementary

submissions and presentations had been filed by CNSC staff, OPG, and several intervenors.

Participant funding was available to intervenors to prepare for and participate in the hearing. The Commission received six requests for funding. The Funding Review Committee, which is independent of the Commission, reviewed the applications. Funding was provided to the six applicants as per a decision issued on May 17, 2012 by that independent Committee.

Further to a request that was received on November 30th pursuant to Section 20 of the CNSC Rules and Procedures, there was a request that Member Rumina Velshi recuse herself. The requestor was informed, in writing, on November 30th that Member Velshi was not recusing herself as it has been more than three years since her association with OPG and that, since her retirement, she was appointed to two different tribunals reflecting a significant passage of time and a difference of focus.

All documents in this hearing are available at the reception desk, either on CDs or in paper format, as well as the Commission members' biographies.

The way that -- I'll give you an idea of how the day will proceed. We will first hear the presentations by OPG and CNSC staff, and we'll then provide with a very short first round of questions from

the Commission members.

Then, we are going to hear from intervenors, which is the purpose of us being here in the community. Commission Members will have the opportunity to ask questions after each presentation.

As stated, presentations have been limited as a summary of the key points in the 10-minute period, but no time has been ascribed for the question period.

Ninety (90) intervenors are scheduled to present this week. Time allowing at the end of each day, we will be addressing some of the written submissions; if not, these have been scheduled to be done on Thursday afternoon.

We have in attendance or by teleconference available for questions from the Commission representatives from different departments, including Fisheries and Oceans, Environment Canada, Natural Resources Canada, Health Canada, the Durham Emergency Management Office, the Durham Medical Health Office, and Emergency Management Ontario.

Your key contact persons here in the room will be Ms. Louise Levert and Ms. Julie Bouchard from the CNSC.

Raise your hands, wherever you are. Oh! They’re on the back table.

Thank you.

And, you'll see them going around or -- and if you need any information regarding your timing of your presentation, how the days are unfolding, how we're doing against the agenda, they're your contact persons.

The break for lunch will be from 12:30 till 1:30 today, and there will be short breaks in mid-morning and in the afternoon.

We anticipate ending every day at approximately 7:00 p.m.

We will begin at 8:30 a.m. for the next three days, and we'll follow the order that is listed on the agenda and copies of the agenda are also available at the back desk.

Mr. President.

Ontario Power Generation Inc.:
- Environmental Assessment of
OPG's proposed Refurbishment
and Continued Operation of the
Darlington Nuclear Generating
Station (DNGS);
- Application by OPG to renew the
Darlington Waste Management
Facility licence; and,

- Application by OPG to renew the Nuclear Power Reactor Operating Licence for the DNGS until December 31, 2014

THE CHAIRMAN: Okay. Thank you, Marc.

So, I would like to start the hearing by calling on the presentation from OPG as outlined in Commission Member document 12-H13.1, H13.1A, H14.A, and H15.1.

I understand that Mr. Tremblay will make the presentation.

Please proceed.

12-H13.1 / 12-H14.1 / 12-H15.1 / 12-H15.13A
Oral presentation by
Ontario Power Generation Inc.

MR. TREMBLAY: Good morning, Chairman Binder and Members of the Commission.

For the record, I am Pierre Tremblay, Deputy Chief, Nuclear Officer, Ontario Power Generation.

I appreciate this opportunity to speak to you today about the environmental assessment carried out for refurbishment and continued operation of the

Darlington Nuclear Generating Station and about the performance of our licensed facilities at the Darlington Nuclear Site.

With me, I have Dietmar Reiner, Senior Vice President, Nuclear Refurbishment; Terry Doran, Vice President, Nuclear Waste Management; Brian Duncan, Senior Vice President, Darlington Nuclear; Lauri Swami, Vice President, Nuclear Services; Mark Elliot, Senior Vice President and Chief Nuclear Engineer for OPG; and John Peters, Manager, Environmental Assessment.

Other representatives of OPG are also here today to assist in responding to your questions.

Over the duration of the hearing, from time to time, some of our senior executives may be called away; however, OPG will remain available to answer questions.

The Darlington Nuclear Generating Station is recognized by industries peers as being one of the top performing stations in the world.

The station meets almost 20 per cent of Ontario’s electrical needs. It has an excellent safety record, outstanding environmental performance, and strong community support.

OPG plans to refurbish the station and continue operations to about 2055.

One of the first steps was completing an

environmental assessment to consider the effects of refurbishment and continued operations. Extensive information was provided to the CNSC demonstrating that there will be no significant adverse effects given available mitigations. Dietmar Reiner will provide an overview of OPG's assessment.

We're also here today for the renewal of two operating licenses.

We are seeking a short licence renewal for the Darlington Nuclear Generating Station. This will allow us to complete the work necessary for a new licence spanning the refurbishment period.

In addition, we require a licence renewal for the Darlington Waste Management Facility. The new licence will allow us to construct facilities for interim storage of waste generated during the refurbishment and used fuel generated during continued operation.

Terry Doran and Brian Duncan will provide an overview of the performance of the licensed facilities at the Darlington Site and future plans to drive for continuous improvements.

But first, I would like to take a few minutes to reflect on the work done by OPG following the event at the Fukushima Daiichi Generating Station last year.

On March 11th, 2011, a powerful earthquake off the coast of Japan and subsequent tsunami caused enormous damage and killed or injured over 20,000 people. Eleven nuclear reactors shut down automatically during the earthquake, including those at the Fukushima Daiichi Nuclear Power Plant in Northeast Japan.

The nuclear industry, and OPG specifically, acted immediately to provide whatever support was needed and obtain the information in order to understand what had happened.

Based on this information, OPG responded with diligence and urgency to assure the site communities, the Government regulators and the people of Ontario of the safety and stability of our nuclear stations and waste management facilities.

We confirmed that the Darlington Nuclear Site is an area of low seismic activity and plants structures and systems are seismically robust in relation to the assessed risk.

The Darlington Nuclear Generating Station was built to withstand tornadoes and other postulated severe weather events.

Existing flood protection at the station has been enhanced and with this enhanced installation, additional hydrogen mitigation features are currently

under way.

Emergency response capability has been expanded to include extreme events, as shown on the slide. Equipment that can supply power and cooling during such an emergency is now on site and available for service.

As stated before this Commission on several occasions, we will continue to monitor the follow-up at the Fukushima Daiichi Generating Station and apply lessons learned to reinforce our response capability.

We will keep the Commission and members of the public apprised of our progress on these matters.

I am now going to ask Dietmar Reiner to review the key findings of the environmental assessment completed by Ontario Power Generation.

MR. REINER: Thank you, Pierre, and good morning Chairman Binder and Members of the Commission.

For the record, my name is Dietmar Reiner. I am accountable for the planning and execution of the Darlington Refurbishment Project.

Today, I'll speak about the environmental assessment, a key milestone in refurbishment planning. In February 2010, OPG announced its intention to proceed with the detailed planning phase for the midlife refurbishment of the Darlington Station. This will involve the refurbishment or replacement of major reactor components

over a period of about 10 years as well as construction of additional radioactive waste storage and other support buildings.

Once refurbished, the 4 reactors at Darlington will continue to operate until approximately 2055. OPG has submitted the environmental impact statement and 15 technical support documents to the CNSC in December of 2011.

Since that time a thorough review has taken place by federal and provincial agencies and members of the public, including OPG responses to over 110 questions arising from the environmental impact statement in the lead up to this hearing.

Many detailed studies were completed on all aspects of the environmental assessment. These studies built on a wealth of baseline data, available for the Darlington site, as a result of more than two decades of operating experience and previous environmental assessments including new nuclear at Darlington.

We have assessed the potential for environmental effects and have identified a number of mitigation measures that we will implement to eliminate, reduce or control the potential for adverse effects.

An environmental assessment follow-up program is also proposed to ensure the measures necessary

are applied and are effective in minimizing or eliminating the potential effects.

Through our assessment we have also noted the potential for some baseline conditions to change over the life of the refurbished station.

In these situations we have proposed to undertake a periodic review and to implement an adaptive management response as warranted through the normal licensing process.

In the slides that follow, I'll provide an overview of the specific results in key areas of our environmental impact statement.

As part of our environmental assessment, we undertook a communications and consultation program built on existing robust community relations program in place for the Darlington Nuclear site as well as the extensive consultations held for the new nuclear project.

We used a variety of communications and outreach tools to ensure the community was both aware of the project and had the opportunity to participate in our studies.

This included six direct mail-outs to 96,000 homes and businesses in Clarington and Oshawa, 16 newspaper ads placed in local newspapers, a dedicated project website where we posted our work as well as

relevant CNSC materials and workshops and round table discussions with key stakeholders.

We provided regular updates to municipal and regional councils and held four community information sessions in Clarington and Oshawa.

We adjusted our work to incorporate the feedback we received and we are confident in saying there is a high degree of community support for the project and general recognition of the benefits that the project will provide.

We also worked with First Nations and Métis Councils that may have a historical relationship with or interest in the lands within the project study area.

While there are a number of areas of interest and potential concern based on the information available to OPG we have concluded that the project is unlikely to have an adverse effect on Aboriginal communities or affect Aboriginal interests, title or treaty rights.

We’re committed to keeping all communities informed and we will continue to address any concerns in a timely manner and work closely with the municipalities to ensure their areas of interest are addressed.

Environmental impact statement describes how the environmental effects identified in our assessment

will be effectively mitigated and managed.

Examples include sediment fencing to protect waterways from ground disturbance activities and water washing of pavement to eliminate dirt track out from construction vehicles.

These methods are good industry management practices that have been proven to work on previous projects.

The quality of existing surface water in the vicinity of the Darlington site will be maintained through the use of sediment and erosion control, secondary containment of storage tanks and testing and treating of effluent streams.

We will maintain our focus on Safety with comprehensive programs, practices and procedures for protecting workers and the public from both conventional and radiological health effects.

The environmental impact statement notes the OPG will prescribe the performance standards required of all contractors working on the refurbishment project.

Important among these requirements is full compliance with all applicable health and safety legislation as it pertains to contract work performed for OPG.

During the refurbishment project we will

carry out the necessary oversight to ensure contractor compliance with health and safety requirements.

We will continue to publish the monitored results of our health and safety program throughout the life of the station.

OPG is engaged with the Provincial Ministry of Transportation, Durham Region and the municipality of Clarington in the development and implementation of a coordinated approach to making any necessary improvements to the transportation system, for example upgrades to the Hope road interchange.

This will also be aimed at ensuring safe and efficient traffic operations in South Clarington, important for both workers and members of the local community.

The interaction of the Darlington Station with the aquatic ecosystem is an important area of study for us.

Our aquatic assessment if supported by over 30 years of studies that began with the original baseline environmental data collection that determined the stations advanced intake and discharge designs.

The offshore, low flow, lake bottom design of the cooling water intake meets modern standards for fish protection and minimizes impingement and entrainment

of species important to the Lake Ontario fishery.

Of the total annual impinged fish, 97 percent are comprised of Round Goby and Alewife which are of no commercial or recreational value.

Recent entrainment sampling conducted in the Darlington forebay in the spring and summer, showed that not surprisingly the entrained eggs and larvae were primarily associated with the most common impinged species, Round Goby and Alewife.

We have demonstrated and concluded that the annual loss of fish through impingement and entrainment from stations operation is minor and not a significant residual effect of continued operation.

The offshore multiport discharge diffuser minimizes thermal interactions with the lake bottom.

Our studies and analysis confirm that the discharge maintains the natural thermal conditions necessary to nurture round white fish eggs and larvae growth through the Winter.

Our conclusion is that Darlington’s advanced offshore intake and diffuser design meets the intent of regulatory requirements today and the effects on the aquatic ecosystem are not significant.

This conclusion has been independently confirmed by CNSC and Fisheries and Oceans Canada aquatic

specialists.

We're committed to monitoring the impingement and entrainment and thermal effects during the extended life of the station and to take an adaptive management approach should the lake environment change in the future.

In addition to assessing the potential environmental effects of the project, we undertook a rigorous analysis of wide range of potential malfunctions and accidents.

Our review considered lessons learned and experience gained over many years of nuclear power plant operation, including the recent Fukushima Daiichi event.

Credible accidents that could result in a measurable adverse environmental effect were identified in several accident categories, including conventional accidents, radiological accidents and nuclear accidents.

For each accident category, representative bounding accidents were identified and analysed to characterize the consequences for workers, members of the public and the environment.

Our analysis indicates that conventional accidents would be unlikely to result in long term adverse effects.

Existing mitigations are in place, such as

the presence of automatic fire suppression systems and highly trained on site emergency response team poised to take action in the event of any such emergency.

Similarly, radiological accidents are very well understood and largely addressed by the stations existing design basis and safety systems.

While Darlington currently meets the existing safety goal for large offsite releases, safety improvements will be implemented as part of the refurbishment project to further enhance the robustness and effectiveness of the containment envelope of the plant and further reduce the risk of consequences of a severe beyond design basis accident. Work on these safety improvements has already begun. While the potential for a severe accident is very low, a thorough analysis of a very severe accident was undertaken with an estimated frequency of once in 1 million years. The reason for assessing such an event is to determine the potential consequences of an offsite radiological release associated with a representative bounding accident.

The bounding accident assessed in the environmental assessment was based on an event that leads to some impairment of containment within 24 hours of the event, followed by several days of controlled venting through a filtered discharge from a single unit. The

environmental assessment illustrates the potential effects on members of the public and the environment from an event such as this.

Most members of the public within 10 kilometres of the Darlington site would be unlikely to receive a radiation exposure that would require protective actions in either the short or the long term. At the low-exposure levels anticipated, the radiological release does not trigger Emergency Management Ontario's Provincial Action Level for Consideration of Evacuation. Short-term sheltering for persons living up to three kilometres of the plant would be an option for the Province to consider.

Should a severe accident occur, in addition to Darlington's robust safety and design features, the Provincial Nuclear Emergency Response Plan would be triggered within 15 minutes of the initial event. OPG trains and plans for such a response, working with representative from Clarington, Durham Region, Emergency Management Ontario and the CNSC to ensure robust emergency response plans and trained responders are in place.

Throughout the event the response team would work to further reduce or eliminate the risks from radiological exposure, working to contain and control emissions and monitor and report results on an ongoing basis.

External to OPG efforts, the Province may initiate additional measures based on the Emergency Response Plans. For example, evacuation plans are in place and, should it be warranted, would facilitate movement of the local populations out of the 10 kilometre protective zones, within six and a half hours, well before the initial offsite release. The public radiation dose within 100 kilometres of the event would be less than a 1 percent increase in the radiation dose they would normally be exposed to from natural sources over their lifetime.

With regard to the overall risk associated with accidents, the environmental assessment demonstrates how the design and safety systems in place at Darlington protect public health and the environment today and how the refurbishment project is adding additional safety systems that will be present for the next 30 years of operation. Our Fukushima lessons learned, as described by Pierre earlier in the presentation, are being implemented now and they too will further enhance public safety. We’re confident that Darlington is very safe today and will be very safe going forward.

In summary, this environmental assessment is grounded in over 30 years of environmental studies, 20 years of safe station operating performance, and the associated environmental monitoring. The detailed studies

and reviews carried out in this assessment have confirmed that refurbishment and continued operation of the Darlington station will have very few environmental effects, and none of these will result in a significant adverse impact, given the proposed mitigation.

We have not identified any outstanding issues or concerns that cannot be addressed through the ongoing licensing process. My team looks forward to implementing the refurbishment project with all of the commitments to performance as described in the environmental assessment. In refurbishing the plant at its mid-life, we plan to fully prepare for another 30 years of safe, reliable, environmentally sound and cost effective electricity production.

I will now turn the presentation over to Terry Doran.

MR. DORAN: Thank you, Dietmar.

For the record, my name is Terry Doran. Together with my management team and staff, I'm accountable for the safe, reliable operation of OPG's three nuclear waste management facilities, including the Darlington Waste Management Facility. The Darlington Waste Management facility received its first operating licence in November of 2007. As shown on this slide, it consists of a used fuel dry storage processing building

and a used fuel dry storage building.

The Darlington Waste Management Facility operating licence includes authorization to construct two additional used fuel dry storage buildings. Their construction will be staged in land already allocated, with an additional storage -- when additional storage space is required.

Today's presentation is in support of our request for a 10 year operating licence to April 30th, 2023, for the approved facility. In addition to licence renewal, we're also requesting authorization to construct a building to store retube waste from the reactors during refurbishment, and authorization to construct a fourth storage building for used fuel and dry storage containers to support continued operations of the Darlington Nuclear Generating Station, post-refurbishment.

The expansion of the facility and related activities are included in the scope of the Darlington refurbishment and continued operation environmental assessment.

Ontario Power Generation is committed to the safe management of nuclear waste at all of our facilities. We have been storing nuclear waste at our waste management facilities for over 40 years. Our dry storage containers have proven to be a safe and reliable

system.

One of our commitments as an industry is to ensure that future generations are not burdened with managing and disposing of waste from our nuclear facilities. To accomplish this, OPG contributes every year to two segregated funds. These funds are designed to pay the full cost of managing nuclear waste and decommissioning our nuclear facilities. OPG appeared before the Commission in October of this year to update the financial guarantees.

The Darlington Waste Management Facility has an excellent safety record over the past five years. In 2003, we completed an environmental assessment for the construction and operation of the Darlington Waste Management Facility. Various activities of the environmental assessment follow up and monitoring program were completed between 2004 and 2009. The results confirmed the predictions made. There were no significant residual effects due to the construction and operation of the facility.

Safety is a cornerstone of nuclear operations at Ontario Power Generation and the Darlington Waste Management Facility has had a strong safety and environmental performances since operating in 2007. There has been no medically treated or lost-time accidents.

Radiation dose to our workers has consistently been below 1 percent of the regulatory limits. Our regulatory emissions have been so low, they have not been detectible.

Finally, the Darlington Waste Management Facility contributions to public does are accounted for in the Darlington station dose to public. Over the last five years public dose from the Darlington site has been less than 1 percent of the regulatory limits.

We have extensive operating experience managing used fuel. Since 1997 OPG has safely processed over 1,500 dry storage containers at the three waste management facilities. Our industry is exceptional in that we control every used fuel bundle that we've ever produced. At Darlington, we have safely transferred over 80,000 used fuel bundles from the irradiated fuel bays into dry storage containers and processed over 211 containers for storage at the Darlington Waste Management Facility.

We are committed to continuous improvement. Since 2010, we've been transitioning to a process used within Ontario Power Generation Nuclear. This transition is a major undertaking towards reducing, simplifying, and aligning our processes that will also improve efficiencies of our operation and introduce greater rigor to our engineering processes.

We have strengthened our human performance by adopting a nuclear human performance program. Another area of improvement has been the application of the nuclear pressure boundary, CSA Standard 28501, for fire protection systems. We continue to learn from our operating experience at our waste management facilities, and have made improvements to the Darlington Waste Management Facility operation over the past five years. We have upgraded our fire detection systems to eliminate false alarms and to improve our overall performance.

We even changed our inspection technique for examining dry storage container lid to base containment weld from radiography to ultrasonic testing. This eliminated the potential worker health and safety hazards associated with using x-rays while maintaining the quality of inspections

Our nuclear waste management facilities, including the Darlington Waste Management Facility, were successfully re-registered to the Environmental Management system and the Health and Safety Management systems to the ISO 14001 and OHSAS 18001 standards respectively. This followed an external audit by an accredited third-party register in September of this year.

Recertification confirms our ongoing commitment to maintaining and continuously improving the

environmental and health and safety management of our nuclear waste management systems.

Our future plans include expansion of the Darlington Waste Management Facility, a re-tube waste storage building will be constructed to accommodate the irradiated fuel components resulting from the refurbishment of the Darlington reactors. Operating experience for both the Pickering and western sites are used in these planning activities.

To summarize, we have an established and mature program to safely management nuclear waste at the Darlington site. The Darlington waste management facility has a proven record of safe and reliable performance. We have an excellent record of worker and public safety. The follow-up and monitoring program has confirmed the operation of the facility resulted in no significant environmental effects. Finally, we are committed to continuous improvement.

I'd now like to hand the presentation over to Brian Duncan, who will be speaking to the performance of the Darlington Nuclear Generating Station. Brian?

MR. DUNCAN: Thank you, Terry. For the record, my name is Brian Duncan.

The Darlington Station consists of four 935-megawatt nuclear reactors that were commissioned and

put in service in the early 1990s. We have approximately 2,500 highly skilled staff on site.

The current power reactor operating licence expires on February 28th, 2013. We are requesting a short renewal to December 31st, 2014 to allow us to complete the studies necessary to support a 10-year operating licence that would run until December 31st, 2024.

Darlington has demonstrated strong operational performance over the licensing period. We have focused on improving human performance, as evidenced by the reduction in the number of a site event-free day resets. During this licensing period, we undertook major initiatives to address two new requirements that were added to our licence in 2008.

In 2011, we completed the transition to the new CNSC standard S294. This three-year $20 million project involved the development of new methodologies for carrying out risk assessments at nuclear power plants and the completion of the associated analysis. The current Darlington risk assessment is world class and is used to assist in the operational decision-making process.

Also in 2011, we completed the work required to meet the new requirements of the updated fire protection standard CSAS -- CSA N293. This four-year $10 million project included re-analysis and assessments that

resulted in station improvements.

Another highlight of the current licensing period is completion of the environmental qualification reconstitution program, including equipment upgrades.

Since 2008, the Darlington Station has generated 131 terawatt hours of clean, safe and economical electrical power for the people of Ontario.

Safety is a cornerstone of nuclear operations at OPG. We are proud of our safety record and we work very hard to maintain it. Between May of 2008 and March of 2012, we worked almost 13 million hours without a lost-time accident. Although Darlington's conventional safety performance is very good, the station's target is to achieve zero injuries. To that end, we track and trend minor issues to put pre-emptive actions in place to avoid more serious events.

During the licensing period, there were no radiation exposures at Darlington that exceeded regulatory limits and no incidents resulting in reportable doses in excess of OPG action levels. Darlington's external and internal dose performance continues to among the best in the CANDU industry.

Darlington's environmental emissions have been well below regulatory limits and station action levels. And finally, dose to the public has been a

fraction of 1 percent of regulatory limits for the entire licence period; this takes into account the impact from all licence facilities on site.

Darlington has shown a strong operational performance over the current licensing period. The reactor trip rate continues to be better than the industry benchmark of 0.5 reactor trips per 7,000 hours critical. The number of unplanned automatic reactor trips while operating is a measure of process system reliability and, more generally, the quality and caretaking in operating and maintaining process and shutdown systems. Last year, Darlington operated at high power with minimal unplanned losses and each unit ended the year with a top quartile forced loss rate of less than 1 percent.

Darlington’s system chemistry has improved during the current licensing period and last year was in specification 99.9 percent of the time. Maintaining good chemistry control preserves equipment, allowing for continued, reliable station operation.

Over 2011 and 2012, we have reduced our maintenance backlogs. We will continue to focus on backlog reduction to drive improvements and equipment reliability.

During the current licensing period, there have been significant accomplishments for the Darlington

Generating Station. We received a CNSC rating of “fully satisfactory” for the fourth year in a row. Three of our reactors were ranked in the top five performing CANDU reactors worldwide in 2011. Our performance in the areas of nuclear, conventional, and radiological safety have been very good, and in 2012 we received our best ever rating during an international industry peer evaluation. We are very proud of these accomplishments and plan to sustain this performance through our commitment to continuous improvement.

Darlington’s objective for the business plan is to continue to focus on achieving high performance, while positioning the station for refurbishment and beyond. We are working closely with the refurbishment project to ensure the right scope will be executed to sustain station performance to 2055.

An OPG training excellence strategy has been set up to focus on sustaining the improvements made in nuclear training. Training is key to improving and maintaining performance of staff and to developing the next generation of workers. Darlington’s focus areas for continuing improvement include outage performance, supervisory effectiveness, and equipment reliability. To further improve equipment reliability, we have an initiative underway to address timely completion of

preventive and corrective critical maintenance activities.

In summary, Darlington's performance remains strong in the areas of nuclear and conventional safety, radiological protection and environmental protection. Our operating performance has improved over the licensing period and this improvement has been recognized across the industry. Improvement plans are in place to continue our drive for excellence and safe, reliable, and cost-effective generation.

I'll now turn it back over to Pierre for his closing comments.

MR. TREMBLAY: Pierre Tremblay, for the record.

You've now heard from our senior leaders about performance of licensed facilities at the Darlington site and plans for future improvements. I'd like to take a moment to point out that since 2010, the OPG nuclear fleet has been rated either "satisfactory" or "fully satisfactory" by the CNSC in all 14 safety and control areas.

In addition to our efforts to continually improve performance, we have listened carefully to the feedback from CNSC staff and have worked closely with them to ensure that their expectations are being met. We will continue in our efforts to achieve and maintain industry

excellence in all areas.

To recap our presentation, the Darlington Nuclear Generating Station and the Darlington Waste Management Facility, have shown excellent performance, operating safely and reliably. At midlife, the Darlington station has been recognized by industry peers as one of the top performing stations in the world. The environmental assessment carried out by OPG confirms that refurbishment and continued operation of the Darlington station will not result in any significant adverse environmental effects, given available mitigations.

OPG plans to make a significant investment in Darlington, to ensure another 30 years of safe and efficient operation.

Our extensive community outreach and engagement program has found broad support in the local and regional communities for the project.

In conclusion, with respect to our request for renewal of the two operating licences, OPG has provided the required documentation demonstrating that we are qualified to carry out the licence activities, and we have made, and will continue to make, adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security, and measures required to implement international

obligations.

We have reviewed the draft new licences and can confirm that OPG is capable of implementing the new licence conditions.

With respect to the draft environmental assessment screening report, I encourage you to accept the CNSC staff conclusions and recommendations. I and my team will be pleased to answer any questions that the Commission has. Thank you.

THE CHAIRMAN: Thank you. I'd like now to proceed to the presentation from CNSC staff, as outlined in CMD 12H-13, 13.A, 14, 15, and 15.A, and I understand that Mr. Jammal will make the presentation. Please proceed.

12-H13 / 12-H13.A / 12-H14 / 12-H15 / 12-H15.A
Oral presentation by
CNSC staff

MR. JAMMAL: Merci Monsieur le président et membres de la commission.

My name is Ramzi Jammal. I am the Executive Vice-President and Chief Regulatory Operations officer of the regulatory operations at the CNSC.

With me today is Dr. Patsy Thompson,

Director General of the Directorate of Environmental and Radiation Protection and Assessment; Mr. Peter Elder, Director General of the Directorate of Nuclear Cycle and Facilities and Regulations; and Dr. Greg Rzentkowski, Director General of the Directorate of Power Reactor Regulations. We are supported by our technical staff, here and at our head office in Ottawa.

The three matters before you are: First, the renewal of OPG current nuclear power reactor operating licence for a period of 22 months, in order to allow OPG to complete the submission of the necessary information for the refurbishment.

This proposed licence does not - and let me repeat - it does not authorize any refurbishment activities. There will be a dedicated public hearing in 2014 for the Commission to consider the approval of a licence to authorize OPG to do the refurbishment.

Second, OPG applied for a waste licence renewal for a period of 10 years, that, if approved by the Commission, this waste licence will authorize OPG to construct and operate two additional storage buildings associated with the future refurbishment project.

Third, the environmental Assessment relating to refurbishment activities, and continued operations of the existing reactors, are developed on-

site.

In response to the Fukushima-Daichi incident, the CNSC has developed an action plan with specific action items relating to the lessons learned from the Fukushima-Daichi incident. Thirty-six (36) site-specific action items were imposed on all nuclear power plants licensed by the CNSC, to include Darlington nuclear power plants.

Darlington has completed 15 action items to date, 12 are planned to be completed by the end of December, this calendar year, and 9 items by 2015. Staff will be providing annual updates to the Commission on the progress and the implementation of the action items.

Now, in order to allow the public to understand the multiple layers of safety systems at the Canadian nuclear power plants, we would like to present a video simulating the accident progression with respect to nuclear power plants.

(VIDEO PRESENTATION)

All our nuclear power plants in Canada use CANDU reactors, a safe, reliable reactor design that has multiple safety systems to minimize the likelihood of an accident, and, in the even that an accident occurs,

minimizes consequences.

It’s important to understand that however severe an accident, nuclear reactors in this country can safety shut down and contain radioactivity. This video will explain how this works.

Nuclear power plants have several safety systems that act as backups to each other. They perform three fundamental safety functions: controlling the reactor and shutting it down, cooling the reactor, and containing radiation.

But, first, let’s look at how a nuclear power plant works. CANDU nuclear reactors produce heat by splitting atoms of natural uranium. This produces heat, to convert water into steam, which spins a turbine or a generator to make electricity.

Once used, the uranium, or nuclear fuel, is kept in pools for about six to 10 years, to keep it cool and provide shielding against radiation. Unlike Fukushima, spent fuel pools of CANDU nuclear power plants are constructed in the ground.

To help you understand how the different safety systems work in an accident, let’s look at an

accident scenario where there is a total station blackout. This is what happened in Japan, at the Fukushima-Daichi nuclear power plant after a 15-metre high tsunami flooded it in 2011.

A total station blackout means there are no longer any power sources available to the station. It’s important to note that this type of accident would take several days to develop and is extremely unlikely, given the safety systems in place.

When off-site or grid power is lost, the station itself produces enough electricity to maintain all of its systems. At a multi-unit nuclear power plant, one reactor can provide enough power to maintain all of the other units. If on-site power is also lost for some reason, shutdown systems are activated automatically and the reactor stops within two to three seconds.

CANDU reactors have two independent fast-acting shutdown systems that work without power or worker intervention.

Even though the reactor is shut down, the fuel inside the reactor continues to produce heat and needs to be cooled. This heat is called decay heat, and represents a small fraction of the heat produced during

normal operation.

To reduce this heat, natural circulation takes over, when the pumps that normally push the coolant through the heat transport system lose power and stop working. For natural circulation to continue over time, the steam generators need to be filled with cool water.

Standby power generators operate pumps that provide this cool water to the steam generators. A nuclear power plant needs one or two standby power generators, depending on the size of the plant, but, as a precaution, all plants in Canada have three or four available.

If, for some reason, standby power generators stop working, emergency power generators are then used. A nuclear power plant requires only one emergency power generator to provide enough electricity to power all of the important safety systems. But, again, as a precaution, all nuclear power plants have at least two emergency power generators on-site.

At this point, to maintain natural circulation, pressure relief valves on the steam generator system open automatically to remove heat. The steam that is vented into the environment is clean, and not

radioactive. Water continues to be added in the steam generators, by pumps powered by the emergency power generators. Together, the pressure relief valves and the added water maintain natural circulation to safely cool the reactor.

Though unlikely, let’s keep going and assume the emergency power generators stop working. We now have a total station blackout. This means all power sources used to cool the reactor and spent fuel pool, including off-site power, on-site power, and the standby and emergency power generators, are all unavailable. Batteries are now powering emergency lighting and essential instrumentation. Water is now being added by a gravity driven system connected to a reserve water storage tank. This keeps enough water in the steam generator to maintain natural circulation. This also allows time for emergency mitigation equipment to be put in place.

Emergency mitigation equipment includes portable pumps, portable power generators and fire trucks. These can be used to add water directly into the plant systems and ensure vital monitoring equipment is available. This is a new layer of protection that was added to Canadian nuclear power plants as part of Canada’s response to the accident in Japan.

In a total station blackout, the large amount of water in the spent fuel pools would slowly heat up. Workers would manually add water as necessary to keep the spent fuel covered by water and cooled.

It is important to remember that up to this point, there have been no releases of radiation into the environment and no damage to the reactor.

With the situation under control, the reactor can return to normal operation after a number of safety checks are performed.

Though extremely unlikely, let’s say all of these systems fail. The emergency mitigation equipment stops working and the water in the steam generators evaporates. The heavy water in the heat transport system starts to boil and radioactive steam is released and contained in the reactor building. Once the water in that system boils away, there is limited fuel damage.

If nothing is done at this point, the 250,000 litres of heavy water inside the calandria starts to heat up. The calandria is what holds the fuel. Supplying water to the calandria using emergency equipment such as fire trucks would stop the accident. Assuming the accident is not stopped, the reactor begins to overheat and the heavy water boils away. Radioactive steam is released automatically into the reactor building. The

fuel continues to overheat and the reactor is significantly damaged.

At this point, internal pressure inside the reactor building must be lowered. In a single unit station, internal pressure is lowered by spraying water from the dowsing tank.

In a multi-unit station, pressure is lowered by releasing steam and hot gases from the reactor building to the vacuum building. The vacuum building is a structure specifically designed to quickly and safely lower pressure inside the reactor buildings.

Both systems work without power. Again, supplying water to the calandria using emergency equipment such as fire trucks would stop the accident.

Assuming the accident is not stopped, all remaining heavy water evaporates. The exposed fuel begins to melt and the reactor core starts to collapse inside the calandria. The vault that holds the calandria also holds about 500,000 litres of additional water. That water now starts to heat up.

When nuclear fuel melts, it creates hydrogen, an explosive gas. You may remember this from the events in Japan. In Canada, special devices that convert the hydrogen to water have been installed at nuclear power plants to reduce the risk of explosion.

These devices also work without power.

At this point, federal, provincial and municipal emergency plans have been activated. To protect the public, health officials have evacuated the area to prepare for controlled venting of either the vacuum building or reactor building.

Controlled filtered venting lowers the internal pressure and reduces the amount of radiation being let out into the environment, once again supplying water to the calandria and vault using emergency equipment such as fire trucks would stop the accident.

Assuming the accident is not stopped, all remaining water in the reactor vault would evaporate and the reactor fuel would melt onto a thick concrete slab. In this extremely unlikely but severe scenario, the reactor building would continue to isolate the reactor from the environment and contain radioactivity.

After the accident, recovery operations would begin to secure the site for its eventual cleanup and decontamination. The Canadian Nuclear Safety Commission regulates the use of nuclear energy and materials in Canada to protect the health and safety of Canadians and the environment.

We ensure every nuclear power plant meets rigorous safety and operation standards to prevent

accidents in the first place and should one occur, minimize its consequences.

(**END OF VIDEO PRESENTATION)**

MR. JAMMAL: Now I will continue with my presentation. The new licence format reflects the continuous safety improvements and the licence conditions are aligned with the CNSC 14 safety controlled areas that will encompass CNSC regulatory documents, national and international standards.

New requirements have been added to the current proposed licence such as enhancement for the accident management procedures for design and beyond design basis accidents. In addition, the public information and disclosure program in accordance with CNSC regulatory document RD-99.3 Public Information and Disclosures.

As I previously mentioned, in 2014 there will be a dedicated public hearing for the Commission to consider the authorization of OPG to conduct refurbishment activity. The integrated improvement plan will be part of the licence in accordance with Regulatory Document 360.

In the next slide, I would like to explain the regulatory process on the Regulatory Document 360. In 2010, an administrative protocol was signed between the CNSC and OPG outlining the timeline relating to the

refurbishment projects. Now in generic terms, I would like to explain this process.

When a licensee decides to carry out a refurbishment or life extension for commercial life, the requirements under RD-360 are triggered. One, environmental assessment, which is currently before you for consideration. Second, Integrated Safety Review, which I will refer to as ISR, which is a review against modern safety codes and standards. These reviews will result in an Integrated Improvement Plan known as IIP to include follow-up actions arising from the environmental assessment, and in 2014, this IIP will be presented to the Commission for its consideration.

Where are we now? In 2012, OPG has submitted its ISR to CNSC staff. OPG's ISR consists of hundreds of code reviews and thousands of references. CNSC staff are currently conducting the final revision of the ISR submitted by OPG. Staff will produce a final assessment report by the end of summer of 2012.

Again, these reviews will result in an Integrated Improvement Plan which becomes refurbishment activities to be considered by the Commission in 2014.

Extensive public consultations were carried out for the environmental assessment as per CNSC's EA process. CNSC staff sought comments on the draft scoping

information document and on the subsequent draft EA screening report. For this hearing process, over 200 interventions were received from the public.

With respect to Aboriginal consultation, where possible, CNSC staff coordinated Aboriginal consultation activities for the three regulatory matters before the Commission.

The CNSC is committed to continuing engaging and building a relationship with interested Aboriginal groups for these and other projects at the Darlington site. Based on information reviewed to date CNSC staff are not aware of any adverse impacts that may have on any potential or established Aboriginal or Treaty rights.

I would now like to pass on the presentation to Dr. Rzentkowski to discuss the power reactor operating licence renewal.

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

This part of the presentation is to provide information in regards to OPG’s application for a licence renewal to the Darlington Nuclear Generating Station as described in CMD 12-H15 and CMD 12-H15.A

During the license period, the overall safety performance rating for this station has been fully

satisfactory. This means that all the programs implemented and maintained by OPG at the Darlington Station to ensure its safe operation such as, for example, operating performance, fitness for service or radiation and environmental protection, met and in many instances, exceeded our regulatory requirements.

Before turning to the next slide, I would like to stress that the Darlington Station is the only station in Canada which has consistently achieved the fully satisfactory rating over the past five years.

As shown here, CNSC staff reviews of OPG's performance in the 14 safety and control areas. Please note that the waste management and packaging and transport safety and control areas were first introduced in 2010 as separate part of performance reviews.

It can be seen that all safety and control areas were rated fully satisfactory or satisfactory during the current licensing period. In each year, this performance led to the fully satisfactory integrated plant rating which is shown at the bottom of the table. In general, an integrated plant rating of fully satisfactory is assigned if a licensee has at least satisfactory performance ratings in all (14) fourteen safety and control areas with a sufficient number that are fully satisfactory, indicating a highly effective overall

program.

The next slide will focus on the performance assessment of some specific areas; namely, radiation and environmental protection and emergency preparedness which are of particular interest to the public.

The Radiation Protection Program was rated fully satisfactory during the current licence period except the satisfactory rating in 2009, due to the collective findings from inspections and not as a result of a significant deficiency in the overall performance of the program; therefore, as the result of effective implementation of the Radiation Protection Program, no worker or member of the public received a dose in excess of the regulatory limits.

The Environmental Protection Program at the Darlington Station was rated satisfactory during the current licensing period. CNSC staff noted that gas and liquid emissions were kept as low as reasonably achievable. This means that environmental releases were well below the regulatory limits and the action levels which are set at 10 percent of the release limits.

The onsite and offsite emergency preparedness and response measures were rated satisfactory during the current licensing period. The satisfactory

rating in 2010 and 2011, in comparison to fully satisfactory rating in 2008 and 2009, does not reflect a reduction in performance in emergency response. This is the combined results of the requirements of two programs; emergency preparedness and fire protection which were merged together in 2010.

Nevertheless, to further enhance emergency response, the CNSC Fukushima Task Force recommended that licensees reassess emergency plans to ensure emergency response organizations are capable of responding effectively in a severe event and a multi-unit accident. CNSC staff are satisfied with the progress made by OPG to date in addressing the recommendations of the Fukushima Task Force.

For the Darlington Station, OPG has tentatively scheduled conducting a multi-unit beyond design basis exercise in the fall of 2013. A full-scale federal exercise is being planned for early 2014. This will be the first good opportunity to involve all levels of participation.

The over arching safety performance of the CNSC regulatory framework is continued safety improvements. The CNSC has the authority and flexibility to impose additional requirements, either through the licence renewal or amendment, in order to continuously

improve the safety performance of the nuclear facility.

This slide presents further safety enhancements being proposed for the Darlington Station. These CNSC regulatory documents and Canadian standards now appear in the proposed Darlington operating licence as described in CMD 12-H15. Implementation of these new requirements will be imposed on OPG upon the issuance of the licence by the Commission.

To provide overall performance summary, I would like to re-emphasize that the Darlington Station received a fully satisfactory rating which indicates that the relevant safety and control measures implemented by the licensee are highly effective. More specifically, I would like to provide the following performance highlights.

The Darlington Station has been operating safely. OPG’s programs were implemented and maintained effectively in accordance with the regulatory requirements. No worker or member of the public received a dose in excess of regulatory limits. OPG has established and implemented program enhancements during the current licence period and further improvements are planned.

Many Fukushima-related station design upgrades and improvements, including those for the

emergency response, have recently been made at the Darlington Station. The subsequent licence renewal in 2014 will provide CNSC staff's assessment of OPG's performance in 2012 to 2014 and consider regulatory strategy for all refurbishment activities, including remaining Fukushima-related upgrades. The Commission hearing will provide the public with an opportunity to fully examine the scope and process of the refurbishment.

This concludes the presentation on the licence renewal for the nuclear station.

I would now like to pass the presentation to Mr. Elder to discuss the waste facility operating licence.

MR. ELDER: Thank you, Greg.

OPG has always managed the Darlington Waste Management Facility as a separate licensed facility on the Darlington site. This facility began operation in November 2007 and was developed for the processing and dry storage of used nuclear fuel after it has decayed for at least 10 years in the station's used fuel bays.

As you can see by the slide, the current -- it currently consists of one processing facility and one storage building. The current licence allows the construction of two additional storage buildings which would allow capacity for approximately 600,000 used fuel

bundles.

OPG applied for the renewal of this licence for a 10-year period. Staff would like to note the initial licence was issued for a 5-year period on the recommendation of CNSC staff and allow -- in order to allow a proper assessment of operations of a new facility. As the facility has consistently operated safely and CNSC staff have now agreed that a 10-year licence is appropriate for this type of facility, noting that 10-year licences have been issued to OPG’s other waste management facilities at Pickering and at the Western Waste Management Facility.

CNSC’s complete assessment of OPG’s application for renewal is recluded (sic) in CMD 12-H14, including a review of OPG’s performance over the licence period and the assessment of the proposed changes to the operating licence.

CNSC staff have confirmed that the Darlington Waste Management Facility has operated safely since 2007 and that the provisions for protection of the environment, health and safety of persons and national security remain in place.

As has been noted, OPG is also requesting authorization to construct and operate two additional storage buildings associated with the refurbishment

project. One building will be a new building for storage and refurbishment waste and the other will be a fourth building for the storage and used nuclear fuel. Both buildings will be required to be constructed in accordance with the national building and fire codes of Canada in place at the time of construction.

The refurbishment waste consists of reactor components such as pressure tubes and calandrian tubes. CNSC staff confirmed that the -– that the design and –- of the building at Darlington is appropriate for this type of waste and consistent with waste management practices currently being used to store this type of waste at OPG’s Pickering and Western facilities. This type of waste will be loaded and sealed at the station in specially designed shielded containers prior to be transferred to the waste management facility.

The licensee has demonstrated the shielding design will be sufficient to meet the operational requirements. The containers will be stored in a single story concrete building similar to the low-level storage buildings currently in operation at Western waste management facilities shown here at the top of the slide. As noted, the other storage facility will be to extend the dry storage capacity for used nuclear fuel. This building will be similar to the existing dry storage building

containers that are built and operational at Darlington shown here at the bottom of the slide. The dry storage containers will be the same as currently used. Steel plaid concrete that are welded closed. Similar to the Darlington Nuclear Station CNSC staff reviews OPG's performance at the waste management facilities in the 14 safety and control areas.

Please not that while OPG has common programs, the rankings take into account the performance of these programs at the specific facilities and therefore don't completely match nuclear power plant ratings. Nevertheless it can be seen that the safety in all safety and control performance areas are rated either fully satisfactory or satisfactory. And this has been the case since operation began.

Also note that OPG is required to monitor for loose contamination within the waste management facility. To date, no lose contamination has been detected within the facility or on the dry storage containers within the facilities. An inspection in 2011 verified the accuracy –- adequacy of OPG's emergency prepares program for waste management facility, and this was found was to be acceptable.

In conclusion based on inspections and reviews, CNSC staff have confirmed that the Darlington

waste management facility is operating safety and securely. OPG's operating performance are well established and are maintaining worker and public doses well below regulatory limits.

With the renewed license, a number of new requirements have added that OPG must adhere to, similar to that for the Nuclear Power Plant. OPG has provided implementation plans where appropriate to address new or changing standards, and this governs and – to get governs operations. And any transmission – transition plans are captured in the license condition handbook. CNSC staff conclude that the OPG has the program so that the Darlington Waste Management Facilities is capable of effectively managing the waste streams of used nuclear fuel, and refurbishment waste that are associated with refurbishment in continued operation of the Darlington Nuclear Generating Station.

I will pass the presentation now on to Dr. Thompson to discuss Environmental Assessment Screening Report.

DR. THOMPSON: Messieurs et Mesdames les commissaires; In July 2012, as part of the governance plan for responsible resource development, the Canadian Environmental Assessment Act was repealed and the Canadian Environmental Assessment Act 2012 was introduced. This

new act makes the CNSC solely responsible for conducting environmental assessments for nuclear projects. Another change is that the Federal Government will not longer conduct –- conduct screening type environmental assessments. However, the Minister of the Environment has designated this environmental assessment to be continued. Therefore, the environmental assessment presented to the Commission today will be completed under the repealed Canadian Environmental Protection – Environmental Assessment Act. As such, the CNSC and the Department of Fisheries and Oceans are responsible authorities because of the need to take regulatory actions under our respective legislation.

Environment Canada, Natural Resources Canada, and Health Canada provided expertise for the purposes of this environmental assessment. Please also note that no provincial environmental assessment was required for this project. The following slides will highlight some of the key findings of the Environmental Assessment submitted to the Commission in CMD 12-H13. The environmental assessment examined various environmental components and other matters as per section 16 of the Canadian Environmental Assessment Act. This includes various biological and physical components, and related human, aboriginal, and socio-economic aspects that might

arise from bio-physical effects. In addition, all environmental assessments require an examination of cumulative effects, of malfunctions and accidents, and effects of the environment on the project. For most of these aspects –- of the aspects listed on this slide, no adverse effects were predicted. In this presentation, the aquatic environment, malfunctions and accidents, effects of the environment on the project, and cumulative effects will all be examined in further detail either because of adverse effects were predicted, or because these are matters of public interest. The operation of the condenser cooling water system was thoroughly evaluated because of its adverse effects on fish from impingement, entrainment, and thermal discharges. I will first provide a quick explanation of the terms “impingement” and “entrainment”.

Impingement refers to when fish in the cooling water intake flow is too large to pass through the debris screen and the fish are deposited on the screen house, in the screen house trash bin. Entrainment refers to when a fish egg, larva, or invertebrate in the cooling water intake flow is small enough to pass through the screen and is transported through the cooling water system and return to the lake via the thermal diffuser. All Canadian Nuclear Power Plants have once through cooling

systems and Darlington is no exception. However, the Darlington Station has a unique design that reduces intake velocity to below the swimming speed of most species of fish. For the cooling water discharge, the submerged off shore diffuser provides effective mixing of the warm water with lake water and results in a very localised area of increased water temperature. Some interveners have claimed that the Darlington Station is resulting in the mortality in millions of fish, eggs, and larva per year. As indicated in the screening report, an estimated annual total of approximately 275 thousand fish, consisting of 13 species were impinged in 2010 and 2011. For entrainment, millions of fish eggs and larva are entrained each year and the majority – about 90 percent - would not survive from passage through the cooling water system. However, this is not dissimilar to what happens in nature. In aquatic eco system, fish eggs and larva have natural high mortality. For example, for every million fish eggs, only 100 would survive to the end of the first year of life in nature. The entrainment amounts to less then 2% of the impingement losses, giving the –- given the high natural mortality rates of eggs and larva relative to large fish. Therefore, the small incremental mortality does not represent a significant adverse effect. Recent impingement results are nominated by two prey species,

Alewife and Round Goby. Alewife are abundant, the losses attributed to impingement are too small to measure and populations of Alewife in lake Ontario show no preference for breeding grounds resulting in a wide geographic distribution. Round Goby is an invasive species causing shifts in ecosystem in the great lakes. Currently in Ontario, it is illegal to posses live Round Goby and anglers are advised that if they catch Round Goby, they should be destroyed and not released back into any waters. For entrainment, results indicated that numbers were negligible and had low population risk to the effective -- to the effected native species such as the fresh water Drum or abundant and widely distributed non-native species such as the Smelt, the Alewife, and the Carp. For example it is estimated that the Darlington cooling water intake entrains less than 0.005 % of the Alewife eggs in Lake Ontario. Given the low levels of impingement and entrainment and low risk, towers were not considered to be reasonably practicable for the existing facility that has always had advanced fish protection mitigation relative to other Canadian nuclear power plants. Habitat projects are a plan to offset or compensate the non-significant residual adverse affects from entrainment and impingement. An NEA follow-up programme will be established to verify the predictions of no significant effects from impingement

and entrainment. As well the need for data management has been identified and this is consistent with the Canadian Environmental Assessment Agency's operating policy statement for this type of situation.

Given the type of species affected, the levels of impact, the implementation of follow-up programme, as well as adaptive management the conclusion is that adverse effects are predicted to be not significant. The Department of Fisheries and Oceans, also a responsible authority for this project, has reached a similar conclusion.

This slide is on temperature effects. Last winter was one of the warmest on record and gives us a snapshot of what future winters may be like as a result of climate change. The key aspect when looking at elevated water temperature is its effects on survival of round whitefish eggs that overwinter on the lake bottom. The reason for the focus on round whitefish is that it is a terminally sensitive species and it is a fisheries management concern.

The technical assessment predicted that for 1.4 a hectare area, higher water temperatures would represent an elevated risk to round whitefish embryos if they occurred there. What we mean by elevated risk is a greater than 10 percent reduction in survival relative to

reference locations. This 1.4 hectare area was conservatively assessed to represent slightly less than 1 percent of available potential spawning habitat in the site study area. An environmental assessment follow-up programme will be established again to verify the predictions that there are no significant effects from thermal effects.

The need for adaptive management has been identified again consistent with the Canadian Environmental Assessment Agency's operating policy statement to deal with potential changes in Lake Ontario water temperatures that may result from climate change.

Given the above, the conclusion is that effects are predicted to be not significant. The benchmarking conducted by CNC staff allows us to conclude that overall the level of fish protection at Darlington is consistent with the United States and international best practices. And what we mean by that is as follows: The U.S. federal regulatory policy for intake fish protection is different for existing and new facilities.

The new facilities rule requires performance equivalent to mechanical draft towers. Existing facilities rule is not final yet and is not anticipated to be final until next summer. But it is proposing an 88 percent reduction in impingement and site-

specific regulatory determination of the type of mitigation for entrainment.

Darlington refurbishment is an existing facility and would meet the proposed rule for the existing facility in the States.

Impingement is less than Pickering Nuclear Generating Station situated 35 kilometres west, which by recent scientific surveys have shown an 80 percent reduction in impingement with barrier-net mitigation.

Site-specific regulatory determination of entrainment mitigation for Darlington will be through fish habitat offsets determined by Fisheries and Oceans Canada in consultation with the Ontario Ministries of Natural Resources and the CNSC.

International best practice is defined within the last decade only for new facilities and only in the United Kingdom for coastal ocean sites and estuaries since no freshwater locations are expected. It is for once-through cooling using an off-shore submerged intake velocity cap with best mitigation methods to meet site fish conservation objectives. This is similar to Darlington intake fish protection. The thermal requirement in the United States is to assure a balanced indigenous population. In Europe and the United Kingdom the guidance is for optimal location of a diffuser such as

there is a difference of 2 degrees centigrade relative to ambient temperatures. The Darlington condensing cooling water system meets both of these modern standards.

As was done in previous EA's, including those for the Pickering refurbishment and continued operation, OPG was directed by CNSC staff to look at nuclear accidents with a probability of one in a million. This is further discussed in the supplemental CMD 12H 13.8. Given the scope of the environmental assessment included the continued operations of the plant, the plant was examined in a post-refurbishment state; that is, the assessment assumed that the safety improvements were in place.

Safety improvements and lessons learned from Fukushima were included in the staff's assessment. For example, a third emergency power generator was considered. The implementation of safety improvements resulted in a reduction in the frequencies of small and/or large releases relative to the current plant configuration.

In this assessment, the accident scenario considered was a controlled release through a filtered pathway system of largely noble gases over an approximate one-week period. From this postulated release the doses to animals and plants were below international guidelines.

The off-site release for this postulated accident with a probability of one in a million resulted in an estimated dose of 5.7 millisievert at one kilometre from the release point, this is approximately three times the background radiation dose. The dose decreases quite rapidly with distance. Based on a provincial nuclear emergency response plan such a release would invoke -- could invoke the need for sheltering up to three kilometres from the plant.

The potential sheltering distance of three kilometres from the release point extends geographically just beyond the Darlington Nuclear site boundary.

There could be potential psychosocial effects; however, OPG’s public attitude research undertaken as part of this environmental assessment and for the Darlington new build environmental assessment along with post-Fukushima community consultation efforts have shown little concern from the residents living in close proximity to the Darlington Station.

In the event of an accident similar to the one considered for this environmental assessment, there could also be a number of actions that OPG could take to mitigate potential psychological and social effects such as regular publication of radiation monitoring results.

Given the above, the conclusion is that

predicted effects are not significant.

There are a number of biological and physical natural hazards in the environment that may potentially affect the project. These are listed on the slide and were examined during the environment assessment. The reactors and important safety systems and structures are designed to limit the consequences of such natural hazards, thereby reducing the potential for the environment to have effects on the project that would in turn adversely affect the environment.

As part of the ongoing integrated safety review for the Darlington Station, a detailed examination of all potential external hazards is being undertaken against current codes and standards.

For this environmental assessment, the assessment of cumulative effects was focused largely on aquatic biota. The combined operations of the Darlington and Pickering Nuclear Stations, along with the potential Darlington new build, account for 99 percent of future flows from water intakes in the regional study area.

The cumulative effects assessment assume that the Pickering Station units are shut down starting around 2018 until the early 2020s, the Darlington Station units are refurbished between 2016 and 2024, and the Darlington new build units come online at some point

during this time.

Should a once-through cooling system be built for the Darlington new build, a number of joint review panel recommendations meant to mitigate the effects of once-through cooling will need to be fulfilled.

Given the diminished impact from Pickering and the implementation of joint review panel recommendations for the Darlington new build, no significant cumulative effects are predicted on aquatic biota.

From a human health perspective, when looking at other ongoing and future nuclear-related activities in the area, it can be seen that the cumulative radiation dose remains very low, consistent with the low doses from operation of each of these facilities.

For most screenings conducted by the CNSC, a follow-up program is required. This environmental assessment is no exception. Should the project advance to the regulatory approval stage, the CNSC’s licensing and compliance process, as well as Fisheries and Oceans authorization process, would be used to require the implementation of a follow-up program.

As mentioned earlier in our presentation, as part of the life-extension project, the results of the environmental assessment will form part of the integrated

improvement plan which will be part of the 2014 licence renewal, which will include refurbishment activities.

In 2011, the estimated dose to the public from activities of the Darlington Site was 0.0006 millisieverts, which is more than a thousand times lower than the public dose limit of one millisievert per year. This is depicted o the right side of the slide with the extremely low public dose on the bottom right and the one millisievert public dose limit on the upper right of the slide.

To put the public dose at the Darlington Site into perspective, on the left, we've indicated some common known activities.

The public dose at the Darlington Site is a fraction of natural background, which is about 1.8 millisieverts; the dose from conventional abdominal x-ray, about .6 millisieverts; and the typical dose received from a returned cross-Canada air flight, of about 0.12 millisieverts.

But, we should know that all of these values do not represent a health risk.

There have been a number of concerns raised regarding tritium and drinking water. The tritium levels measured in the drinking water of communities near the Canadian nuclear facilities do not pose a health risk.

Health Canada recommends 7,000 becquerels per litre as the maximum amount of tritium in drinking water. Ontario, like other provinces, has adopted this value as a legal standard.

It can be seen on this slide, for Darlington in 2009, that tritium concentrations at three water supply plants were 5 to 6.2 becquerels per litre. This is below OPG's voluntary commitment level for trillium of 100 becquerels per litre. It is also below the proposed Ontario Drinking Water Advisory Council level of 20 becquerels per litre.

I would now like to pass the presentation to Mr. Jammal.

MR. JAMMAL: Thank you.

Mr. President, Members of the Commission, CNSC staff conclude that OPG is qualified to operation of Darlington Waste Management Facility and the Darlington Nuclear Generating Station.

OPG will make adequate provisions for the protection of the environment, the health and safety of persons, the maintenance of national security, and measures to implement international obligations to which Canada has agreed.

The EA Screening Report and the conclusions contained therein that the Refurbishment Project and

continued operation will not likely cause significant adverse environmental effect.

In regard to the regulatory activities on the Darlington Site, CNSC staff recommends that the Commission renew the nuclear power reactor operating license with an expiry date of December 31st, 2014, and accept delegation of authority as set out in CMB 12-H15, renew the Waste Management Operating Licence with an expiry date of April 30th, 2023, adopt and improve of the EA Screening Report and accept the conclusions contained therein that the project will not likely cause significant adverse environmental effect.

Mr. President, I would like to apologize for the length of our presentation, but we felt it is very important to confirm and translate scientific data into a language that the public will be able to relate to.

So now we are available to respond to any questions you may have.

THE CHAIRMAN: Okay. Thank you.

I would like now to start some of the questions and I would like to -- everybody -- quick round and -- because we really, really would like to get the interveners to appear in front of us and then open up a discussion more in depth.

So, why don’t we start with some short

round with Dr. McDill?

DR. MCDILL: Thank you. Good morning.

Okay now?

I will reiterate how good it is to be back in the community. I'll have many questions over the week, but today, in this first general round, I have two: one for Fisheries and Oceans, if they're here, and another for -- to be shared by OPG and CNSC.

The Nuclear Safety Commission is one of two federal responsible authorities on this matter and the other is the Department of Fisheries and Oceans, and at this very early stage of the week, I think it would be good to hear from DFO, appropriately from DFO, to comment on the conclusions presented in particular in the draft Environmental Assessment Screening Report as a planning tool to a later licence, and also in the renewals in general.

Thank you.

MR. HOGGARTH: For the record, it's Tom Hoggarth from Fisheries and Oceans Canada. Last name is spelled H-O-G-G-A-R-T-H.

My colleagues at CNSC summarized very well the impacts of impingement and entrainment on the fish species so I won't go at this point in any details on that, but what I will do is describe our mandate and then

state our final conclusions for the Environmental Assessment.

So, Fisheries and Oceans Canada gets its mandate through Section 91 of the Canadian Constitution and that gives the Federal Government exclusive legislation or a legislative authority from sea coasts and inland fisheries.

Well, Section 92 of the Constitution gives the province exclusive jurisdiction over property and several rights which include the right to fish and who can fish. So, in other words, the Federal Government has jurisdiction to set fishing rules in non-tidal waters while the province has the jurisdiction to decide who gets the fish.

Because of the shared jurisdiction over fisheries in non-tidal waters in many provinces, federal administration has been delegated to the province to facilitate management of fisheries. Although the management of the fisheries has been delegated to the province, the Federal Government has jurisdiction with respect to the protection of fish habitat and water frequented by fish.

So, in other words, the province manages the fisheries while the Federal Government manages the habitat.

So, our primary focus in reviewing the proposed Refurbishment Project is to ensure that the works and undertakings are conducted in such a way that ensures compliance with the applicable provisions to the Fisheries Act.

For DFO, in particular Section 35 of the Fisheries Act which prohibits harmful alteration, disruption or destruction of fish habitat unless authorized, and Section 32 of the Fisheries Act which prohibits the destruction of fish by means other than fishing, again unless authorized by the Minister.

As well, our Minister of Fisheries and Oceans is one of the competent ministers under the Species at Risk Act for a list of aquatic species including fish and marine plants.

As I indicated, we have a joint responsibility with the province for the management of the fisheries. Therefore, when Fisheries and Oceans Canada is making decisions under Section 35 and Section 32 of the Fisheries Act, we must take into account the management of objectives set by the province. We support the province through our legislative authority in their fish management goals.

In the Refurbishment and Continued Operation Project, Fisheries and Oceans Canada received a

letter from Ontario Power Generation informing of their intent to apply for Section 32 authorization for the killing of fish by other means than fishing for the continued operation. As a result of that, we were a responsible authority for the Environmental Assessment.

So, Fisheries and Oceans Canada concur with the conclusions in the Pre-Screening Report that Darlington Nuclear Generation Station Refurbishment continue the Operation Project, that is: taking into account the findings in the Environmental Assessment and supporting information including identified mitigation measures that works and activities associated with the Refurbishment Continued Operation Project are not likely to cause significant adverse effect on the environment.

As indicated earlier, we were closely working with the Provincial Ministry of Natural Resources to make sure our decisions conform with their management objectives. The Ontario Minister of Natural Resources concurred with our conclusions that based on the numbers and species composition of fish, larvae and eggs at the Darlington generating station, refurbishment would have no measurable impact on fish populations lakewide.

Thank you.

THE CHAIRMAN: Just -- you will be a person of great interest to all of us for the next three

or four days. You're going to stick around, right?

MR. HOGGARTH: Yes, I'll be here.

THE CHAIRMAN: Good, thank you.

Dr. MacDill?

MEMBER McDILL: Then I'll leave my follow-up questions for the next few days, thank you.

My second question relates to the Fukushima response which figures prominently in many intervenors' comments and concerns.

In particular, it's not clear on some of the slides -- and I'll go to staff slides because they're -- have just been up a few minutes ago -- just how the Fukushima response figures into the forward-looking timetable.

So for example, on your Slide 6 -- maybe we could bring that up?

On Slide 6, you have some very general kind of timetabling going on there.

Yes, that one.

If I were to ask you to draw in how the Fukushima response fits, from the initiation to the completion, and then going forward to the operational use of it, could it be a vertical bar, from top to bottom? Is there some way of -- and I'll ask OPG a similar question.

DR. JAMMAL: Ramzi Jammal, for the record.

I will start from the CNSC perspective. Yes, it is -- I mean, very briefly, to clarify and to make sure everybody understands, correct, it’s a vertical bar. It’s an ongoing implementation and improvement.

And if you allow me, as the public knows, the CNSC staff and the task force has given recommendations, and there is a CNSC action plan that incorporated in it all of the input from the external advisory committees struck by the President of the CNSC, as an independent review, and so is recommendations from the international review by the IAEA.

Each site has its own specific action items that fit under a global and 36 action items applicable to every nuclear power plant in Canada.

So as we mentioned in the presentation, there is progress in implementing those action items, and by 2014, the majority of the action items will be implemented, and some of them will require a long-term research aspect that will go beyond 2014, but this is all highlighted in the action item.

In the action plan report and the action items. The CNSC staff will be providing updates on a yearly basis dedicated for the Fukushima implementation of the action items, and then, will be providing a

progress report on every and each site, as they are implementing and progressing the action items.

Sorry, I'm giving a long answer here, but the intent is to -- by the time the IIP, or the integrated improvement plan in place, most of the action items should be implemented, and any outstanding elements or future requirements will be followed up accordingly.

MEMBER McDILL: Thank you.

And I'm assuming OPG concurs with that? You haven't got a similar slide, so that's why I was asking.

MR. TREMBLAY: Pierre Tremblay, for the record.

No, we don't have that precise slide, but we -- I certainly concur with the presentation by the staff. The industries responded very quickly and OPG has been part of the international work as well as working with our partners in Canada.

I would ask, perhaps for illustrative purposes, Mark Elliott, our chief engineer, just to give you a couple of the specific statuses, but this is ongoing work and, as I say, we're on that.

MR. ELLIOTT: For the record, Mark Elliott, Chief Nuclear Engineer for Ontario Power Generation.

I agree with what Dr. Jammal mentioned. I would say that the progress of the action items are focused in the early stages on physical work; in the later stages, on research and modelling, and that type of work.

So what we've done right away is install the emergency mitigating equipment, the equipment of generators, the pumps, the hoses; we've done the drills to practice those things. Recently, we've put in service the building that the equipment will be housed in; it's housed in a high area above the plant, and -- so that kind of physical work is the first of the action items.

We get into making that physical work easier to apply, as a second priority, basically plug and play, with modifications to the plant, and then we carry on further into modelling and research.

MEMBER McDILL: Thank you, Mr. Chair.

THE CHAIRMAN: Thank you.

Monsieur Tolgyesi?

MEMBRE TOLGYESI: Merci, monsieur le président.

I understand, Mr. President, that we have a representative from Environment Canada?

MS. ALI: Good morning. I'm Nardia Ali, for the record, from Environment Canada, and Sandro

Leonardelli, as well.

MEMBER TOLGYESI: Considering that the Minister of the Environment designated the screening level environmental assessment to continue under the old *Canadian Environmental Assessment Act*, to what extent Environment Canada was involved, and what is Environment Canada's position and comments on this environmental assessment screening report?

MR. LEONARDELLI: Sandro Leonardelli, for the record. The spelling of the last name is L-E-O-N-A-R-D-E-L-L-I.

Environment Canada has been involved in the review from the very beginning of this, so the changes to the *Canadian Environmental Assessment Act* haven't really affected our involvement in this review.

Does that answer the first part of your question?

MEMBER TOLGYESI: Yes.

MR. LEONARDELLI: In terms of the position, the overall position on the application is that the project can proceed with -- hang on a second here ---

MS. ALI: Nardia Ali, for the record.

Environment Canada -- as a result of our science-based reviewed, Environment Canada is of the view that with appropriate design and mitigation measures, the

project could be planned, built and operated in a manner that is protective of the environment.

MEMBER TOLGYESI: And what -- we were talking about refurbishment which will come in the next stage. How far you will participate; what will be your involvement?

MR. LEONARDELLI: There are a number of follow-up programs that are identified as part of this, so we will continue to be involved in the follow-up programs, both in terms of any development of follow-up programs and also the examination of the data that comes out of the follow-up program.

I mean, we'll be involved, for example, in the follow-up program for the thermal monitoring; that would be one example.

THE CHAIRMAN: Dr. Thompson, you want to answer?

DR. THOMPSON: Perhaps just to add a bit of information relative to Mr. Tolgyesi's first question, is that the decision by the Minister of the Environment, under the *Canadian Environmental Assessment Act,* is related to the Canadian Environmental Assessment Agency, not necessarily to this group at Environment Canada.

And, just to confirm the last statement, is that for projects -- Pickering is a good example, the

Darlington new build if it moves forward as well.

We have a technical working group with representatives from DFO, Department of Fisheries and Oceans; Environment Canada; and other technical experts, to support the development of the follow-up program and adaptive management plans.

MEMBER TOLGYESI: My second to last question is that, why is it to OPG, and maybe after the staff comments, you were considering the severe accident risk on the basis of probability as one to 1 million.

Why it's 1 to 1 million? What's the reasons why it's not to 10 million, or 100,000, or whatever other?

MR. TREMBLAY: Pierre Tremblay, for the record. I'm going to ask Mark Elliot to deal with that but, you know, essentially we're dealing with what is credible, what is a credible incident. And so, Mark?

MR. ELLIOTT: Mark Elliott, for the record.

A couple of reasons why that was used, one is it's the international standard for doing this type of work. Second of all, it was part of the environmental assessment approach, regulations on how to do environmental assessments. That approach is used, that one in a million is the standard. So we were following the process for environmental assessments.

MEMBER TOLGYESI: Does staff have a comment?

DR. THOMPSON: Patsy Thompson.

Just to remind the Commission that the rationale for the one in a million risk is documented in the Staff Supplemental CMD, and it was developed out of consideration of the probability of accidents in relation to accidents and malfunctions under the *Canadian Environmental Assessment Act* in 1998, when we were planning for the Pickering -- the first environmental assessment conducted for power reactors.

Mr. Andrew McAllister will provide a bit more information.

MR. McALLISTER: Andrew McAllister, for the record.

I guess more just to reiterate some of the points that were made by Dr. Thompson and by OPG, we have looked at this frequency of occurrence of one in a million in previous nuclear-related environmental assessments and the main purpose is to look at a scenario that results in offsite radiological release. It's a conservative approach, however as outlined in CMD12 H-13A, though we look at, in that perspective at 1×10^{-6} is to not necessarily limit what we look at within a regulatory framework, and I'll pass it to Mr. Jammal to elaborate on

that.

THE CHAIRMAN: No, actually, I'm sorry to correct. This subject will come up during the next few days.

MR. McALLISTER: Yes.

THE CHAIRMAN: There's a lot of interveners that have opinions about this and I'd like to hear from them and then maybe engage into this discussion. So let -- I think we have heard enough at this particular time, for this one. Let me move on.

Ms. Velshi, please?

MEMBER VELSHI: Thank you, Mr. President. My first question is to the CNSC staff. Just give us a sense of how -- we want to get a sense of how well the consultation process worked. And for many of the interventions the comments that were submitted seemed very similar to what had been submitted for the draft screening report.

Can you give some specific examples of substantive changes that were made to the screening report as a result of interventions or comments received, please?

MR. McALLISTER: Andrew McAllister, for the record; Environmental Assessments Specialist with the CNSC.

For example, there was matters raised in

the submission by the Canadian Environmental Law Association with respect to the degree of information related to emergency response. We took those comments into consideration and, as a result, added additional sections in the screening report in Section 7 with response to that elaborating on details around sheltering, around offsite monitoring, and implementation of emergency response plans.

MEMBER VEHSHI: Other than including information did it result in additional analysis, for instance?

MR. McALLISTER: I would say it involved us in re-examining the analyses for which the conclusions were based on; however, the conclusions weren't changed as a result of that.

MEMBER VEHSHI: Thank you.

A second, very short question to the CNSC, you mentioned in your presentation that there is a large-scale emergency exercise planned in early 2014. Is this a prerequisite to any potential refurbishment licensing activities that may come, you know, sometime in 2014?

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

It is not a prerequisite as such; however, as part of the action plan and the CNSC taskforce

recommendations that the licensee will be carrying out this activity. Is it a prerequisite? It is not a regulatory requirement for now, but I will call on Mr. Luc Sigouin to describe the -- what it's going to take and the integration, the testing of integration from the onsite and offsite exercise.

MR. SIGOUIN: Luc Sigouin, for the record.

As Mr. Jammal has said, the 2014 large-scale exercise will not be a prerequisite, but it is part of the licensee's and the Province's and Health Canada's expanded activities as a result of the Fukushima event and the CNSC action plan in response to that.

So the 2014 proposed exercise will be an integrated exercise with the licensee, the municipal and provincial participants, as well as Federal Government participants, and the CNSC to be able to test and demonstrate the capability of the whole system for a beyond design basis accident.

MR. JAMMAL: Ramzi Jammal, for the record.

To complement Mr. Sigouin's comments, we have -- did, as I mentioned in my presentation, we put requirements in the licence conditions to enhance the existing procedures and programs in order to take into consideration design -- beyond-design basis. So those are requirements in order to enhance the procedures and

response for emergency events.

So that is a requirement and then the testing in 2014 will be the implementation, and staff will be present in order to evaluate the implementation of those enhancements and these programs.

THE CHAIRMAN: Can I take advantage? I understand that Ms. Allison Stuart is here with us; is she? She's the ADM Emergency Management Ontario, and maybe a quick overview of your position on the emergency plan, because this is going to be, again, a topic that's going to be discussed in the next few days.

MS. STUART: Allison Stuart, for the record. That's A-l-l-i-s-o-n; S-t-u-a-r-t. I'm the Assistant Deputy Minister-in-Chief at Emergency Management Ontario.

In terms of Emergency Management activities, and specifically the exercise that's been talked about for 2014, this is certainly something that EMO, Emergency Management Ontario, fully supports and will be actively engaged in. It is part of the broader inclusion of nuclear exercises into all of our exercise activities.

THE CHAIRMAN: So are you satisfied with the emergency plans as they are now articulated for that particular facility? And the last thing is; are you going

to be with us here for the next few days?

MS. STUART: Certainly, we're satisfied with the plans as we've seen them to date. We do think it's important to look at the more extreme events that could occur. As it -- recognizing, as we all do, that the likelihood of such is very low.

In terms of my availability, I'm certainly here for the balance of the day, my staff are here for the balance of the hearings, and my throat and voice is beyond my control.

THE CHAIRMAN: So far it sounds good. Thank you.

Dr. Barriault?

MEMBER BARRIAULT: Thank you, Mr. Chairman.

This is to OPG, and in your waste management plan you've got plans for improvement. What is your long-term plan for your waste management? We're looking down the road.

MR. TREMBLAY: I -- Pierre Tremblay, for the record.

There are two separate longer term plans beyond the storage and the current operations that we have.

The first is the -- is a plan for the low and intermediate waste and there is a geological

repository and an environmental assessment that will take place next year on that subject.

And the second relates to the high level waste including the spent fuel. And there, we're engaged in a long-term adaptive phase management project and plan. And that has longer timelines with a proposed date in service in around 2035. And of course, that will be subject to considerable discussion and dialogue. And that's being led by the NWMO.

MEMBER BARRIAULT: So by 2035, you would dream of having everything off-site. Is that correct?

MR. TREMBLAY: Pierre Tremblay, for the record.

That level of granularity and planning in actual movement is a part of a more specific plan that's yet to be produced.

I would simply say that the matter before us is around the refurbishment of the Darlington plant and the plans for waste management. And those I'm certain will be discussed at length over the hearings.

MEMBER BARRIAULT: And just one brief question, on your Slide 23, you spoke of maintenance backlog. What's happening to your maintenance backlog? Is it getting longer or shorter? When do you dream of having no maintenance backlog?

MR. TREMBLAY: Pierre Tremblay, for the record.

I presume that is related to the operating plant itself as opposed to ---

MEMBER BARRIAULT: That's correct.

MR. TREMBLAY: So certainly we endeavour to continue to reduce maintenance backlogs to enhance future reliability of the plant. We've made a major move in all of our facilities to reduce that backlog and you know, the live zero is the dream certainly for a maintenance manager.

What I would tell you is that over the next five years we intend to continually drive those backlogs down and we're approaching industry best in that regard.

MEMBER BARRIAULT: Thank you.

That's all for now Mr. Chairman.

THE CHAIRMAN: Thank you.

Monsieur Harvey?

MEMBER HARVEY: Merci monsieur le président. My question's addressed to staff.

You ask us today to adopt the environmental assessment and to accept the conclusions.

What is the duration of such a decision? My point is I don't know if the decision to refurbish is a firm decision, if it could be changed in the future; and

for example, if the refurbishment could be delayed.

So what would be the value of the EA? For example, if we have a delay of five or 10 years before the work starts?

DR. THOMPSON: Patsy Thompson.

Your question is essentially whether an environmental assessment has sort of a shelf life?

The purpose of doing an environmental assessment is to use it as a planning tool. And so the environmental assessment was done taking into consideration the plans for refurbishment. The assessment of impacts considered the timeframe that has been identified by OPG in their project plan.

The -- and the conclusions were based on a description of those activities, their interactions with the environment as we know it today as well as the mitigation measures that were identified to mitigate those impacts.

The purpose of the environmental assessment as I said, is a planning tool. So moving forward, if the project that OPG described under -- for the purpose of the EA, were to change significantly or be postponed then there would be a requirement for the CNSC to consider those changes under the *Nuclear Safety and Control Act* where we have the obligation to look at the impacts of the

project on the health, safety and environment before the Commission issues a licence.

So our obligation would be to review the project, look at mitigation measures, look at any changes in science, any changes in the environment from the time that we've done the assessment. And make adjustments and require additional mitigation measures if necessary. And the purpose of the follow-up program in the attachment of the management plan serves part of that purpose.

MEMBER HARVEY: Who will decide to do that? The Commission or the staff? Or --

THE CHAIRMAN: Can I jump in? Let me understand if I -- isn't it correct that every time you do a licensing decision, you have to make sure that there's -- the environmental assessment is still relevant?

So in 2014 or 2024, if it so happens, you'll have to again show the Commission that still the environmental assessment or environmental studies are -- is okay. Is that not correct?

MR. JAMMAL: Ramzi Jammal, for the record.

That is correct.

Monsieur Harvey, just to recapture your -- the answers complement Dr. Thompson's answer to you is, the link from the environmental assessment to the actual refurbishment activity is identified in what we mentioned,

in the Integrated Improvement Plan. So it will have any adaptive management based on the proposed activity for refurbishment. Those become an integral part of the licence condition handbook and the activity that the Commission approves.

So the environmental assessment findings and if there is any need for follow-up or any adaptive management implementation, those will be incorporated into the Integrated Improvement Plan and becomes a part of our regulatory oversight on a day-to-day basis. And any changes will come back and be adjusted accordingly.

MEMBER HARVEY: Thank you.

Just a quick question to Monsieur Tremblay. In your submission, in the CMD on page five, you mentioned that the -- you have initiated a transition to the central and metrics organization structure as part of your business transformation. What does it mean for us? I mean, will that increase the performance or the security? Could you just say more about that?

MR. TREMBLAY: Pierre Tremblay, for the record.

Business transformation within OPG really refers to a focussed look at the support around the power plants and the operating facilities. The focus of the attention is on enhancing the efficiency and the way

services are provided.

The focus has not been on the power plants themselves. They are driving their own sets of efficiencies. And so what I would say is while the services will change, the level of service and the quality of what's being provided will not.

MEMBER HARVEY: Thank you.

THE CHAIRMAN: Okay.

I think it's a good time to break for 15-minute period. And I will start the intervention so that will make it 11:40. Close enough.

--- Upon recessing at 11:21 a.m./
L'audience est suspendue à 11h21
--- Upon resuming at 11:41 a.m./
L'audience est reprise à 11h41

MR. LEBLANC: Okay. If you could take your seats please. Thank you.

THE CHAIRMAN: Okay. We are going to move on to the interventions. And before I start, I'd like to remind everybody that believe it or not we have read every piece of paper submitted, any email, all the documents. And what we normally ask for is a 10-minute summary so we can engage in a conversation with you. And get into some

of the detail, try to find out why you say certain things and try to get the explanation.

So with that in -- with that kind of background, I'd like to welcome the first oral presentation from the Sierra Club of Canada and the Sierra Club, Ontario Chapter, as outlined in CMD 12-H13.2.

I understand there is three representatives here. So the floor is yours.

12-H13.2
Oral Presentation by the
Sierra Club Canada and
The Sierra Club Canada
Ontario Chapter

MS. ELWELL: Good morning Commissioners.

My name is Christine Elwell; I'm the Chair of Sierra Club Ontario, and I bring greetings and a letter from my counterpart at Sierra Club Atlantic Canada, New York. I've provided a copy of this letter to your Louise -- your Secretariat. And I don't see it up there, but I'm happy to tell you -– oh lovely -– happy to tell you what's in it.

I'm here with my colleagues, Kristina Jackson, Staff Coordinator who will be speaking to the

issue of tritium; and my colleague, Benny Cheng, who will be discussing the topic of concrete integrity. In the letter from Sierra Club New York, grave concern is raised about the purposely for both the refurbishment and the build. And in fact they invoke Article 5 of the Canada-U.S. Air Quality Agreement because they fear transboundary air pollution is likely to be significant from those proposals. Appleton, New York is 60 kilometres shore to shore from the site and Sierra Club New York is the chapter that has jurisdiction over that area.

Commission staff deny that there is likely to be any transboundary air pollution and yet in our opinion, based on the Environmental Impact Assessment, there’s been no assessment done beyond one kilometre into Lake Ontario, that’s for air. For water a mere 5 kilometres, so to say there is no transboundary impacts when the homework hasn’t been done is sadly inadequate.

In fact, we also see OPG’s report indicating many examples where there is likely to be transboundary air pollution. I refer you to Table 2.1.2 of the technical support document on radiation for a long list of examples where air pollution is said to be likely possible with measurable change to the environment. The environmental assessment is inadequate in terms of taking that into account.

The Radiation Environment Monitoring Program is limited to the local vicinity; it does not consider anything beyond that. So in that letter the Club is requesting a full and comprehensive environmental impact assessment that would consider transboundary air and water pollution. In addition to this request, we're also recommending that the International Joint Commission cause its nuclear taskforce to compile a public inventory of all current relicensing applications, applications for refurbishment and new build. Because currently you cannot say with any certainty what would be the cumulative impacts on the Great Lakes when the public level on the regulators have a comprehensive view of the total loadings from all of the plants in the Great Lakes. And finally that registry should be public so that -– and updated so that we can meaningfully participate in the process, which we cannot right now. We would be pleased to help the IGC in doing that work. There's nine chapters in the Great Lakes area which would be helpful in terms of putting together that information. So with that opening comment I'd now like to turn to my colleague, Kristina Jackson.

MS. JACKSON: For the record I'm Kristina Jackson. I'd like to speak to tritium.

There is no defined safe exposure to tritium. Tritium is a known carcinogen, also known to

cause birth defects. The UK's committee on examining radiation risk of internal emitters calls attention to the dangers especially to pregnant women and foetuses; ingestion, inhalation, or absorption of tritium can lead to stillbirths and malformations. It's also been established that there are higher rates of childhood leukaemia near nuclear plants in Canada, Germany, and the U.S., the results of chronic exposure to radioactive pollution from these reactors.

The acceptable drinking water guideline for tritium in Canada is 7,000 becquerels per litre. In contrast, the European Union guideline is only 100 becquerel per litre, and California's public health goal in the U.S. calls for a limit of 14.8 becquerels per litre. The OPG claims that a voluntary commitment level for annual average tritium concentration is applicable only at nearby water supply plants and at 100 becquerels per litre; again, this is a voluntary commitment.

The Sierra Club asks the Commission to make more stringent standards for tritium and tritium releases. The OPG admits that water quality samplings referred to in this EIS are compromised because of a 2009 spill of tritium-contaminated water. This happened -- an overflow of the injection water storage tank occurred, it resulted in a release of 210,000 litres of water combined from lake

and the storage tank into a drainage system, ultimately releasing into Lake Ontario and this released water contained 44.8 million becquerel per liter of tritium. Groundwater samples collected from monitoring wells and drains, drain sump pumps during this EA indicated that the tritium levels were above the established 7,000 becquerels per litre.

The tritium concentrations released pre-spill were 519 becquerel per litre but ultimately about 10 months later after the spill it was still set at -– still registering at 1,350 Becquerel per litre. So considering the dangerous substances that are on hand at Darlington, Benny Cheng with Sierra Club would now like to address concrete integrity issues.

MR. CHENG: For the record, I'm Benny Cheng.

Today I want to address the issue of concrete degradation caused by alkaline silica reaction. Now, this reaction occurs when water reacts with concrete causing stress and cracking which ultimately would reduce the structural integrity. With the concrete strength reduced, radiation can much easier escape into the atmosphere causing much harm to the environment, general public, and also to the workers at the power plant. So let's first compare other power plants in the world.

In the United States, the Seabrook Nuclear Station has recently drawn global attention. Testings done by the U.S. Nuclear Regulatory Commissions last year has shown that alkaline silica reaction has reduced the strength of the concrete by a great 22 percent. This has significantly reduced the amount of radiation it can block, and so the commission has halted the refurbishment and prompted to conduct further research on this issue. And most recently a bill has actually been introduced in congress to prevent the refurbishment at Seabrook Nuclear Station.

Let’s take another closer look at another example Gentilly II Atomic Station in Quebec which has also caught the CNSC staff’s attention on its refurbishment regarding the eroding concrete. And given the similar situation, has alkaline silica reaction been assessed at Darlington Power Station? Has anyone here read about this reaction in the Environmental Assessment Report? If the CNSC staff says that the Darlington Structures do meet the regulated standards and do not exhibit such reaction, where is the evidence? Why was this reaction not addressed in the EIS? And why is this not transparent to the general public? Surely CNSC would also benefit if they take a closer examination at this application to reassure the public and the Commissioners

that the Darlington Power station is safe. But if there is no clear assessment indicating that Darlington Nuclear Station is safe from concrete degradation by alkaline silica reaction, then this refurbishment must not proceed.

And this concludes our presentation from Sierra Club, Thank you.

MS. ELWELL: Thank you, we are happy to take any question you may have.

THE CHAIRMAN: Thank you. Let’s open it up; who wants to go first? Monsieur Harvey.

MEMBER HARVEY: Merci, Monsieur le président.

My first question refer to the exercise to the consultation time. You provided a huge number of document of questions or comments to the staff. In fact I think it was 42, and there has been a few modification, two or three modifications to the report, but a lot of explanation and many pages of explanation. How would you confine the exercise for you, for your point of view?

MS. ELWELL: Well, it was a long document because there’s a great deal to say about this project, so I found the response back to be somewhat confusing. Without much detail, I didn’t feel that they were responding to the points we were making. I was pleased, however, to see that they’ve reserved on the applicability

of Article 5 of the Canada-U.S. Air Quality Agreement, so we're happy to do further consultations on that document because I think you're going to be seeing a lot more pick-up under that agreement.

MEMBER HARVEY: To resume, were you satisfied -- totally satisfied of the exercise?

MS. ELWELL: I could have -- I would have benefited from more detail. To just baldly say, "Oh, we checked the concrete; it's fine" is just not sufficient.

MEMBER HARVEY: Okay. Talking of concrete, I will turn to maybe OPG or the staff. In fact, there's not so many results. You say in the -- in all the documentation, can read that it satisfied the CNSC standard and -- but what is the nature of the inspection that are done on concrete structure, and in what form we could see those results and see the evolution of those results from year to year? Is there any possibility of providing some tables or figures that would be -- will render explicit what you say?

MR. JAMMAL: Ramzi Jammal, for the record.

Monsieur Harvey, I would like to do two things. First, definitely answer the question with respect to the concrete. Second, I would like to ask my colleague, Mr. Andrew McAllister, to respond on the EA process and the timelines.

So I'll ask Mr. Gerry Frappier to take on the concrete question.

MR. FRAPPIER: Thank you, Mr. Jammal.

My name is Gerry Frappier. I'm the Director General of Assessment and Analysis at the CNSC, responsible for the overall assessment of engineering, physics, and various safety analyses and that would include, in this case, for the conversation, the concrete.

So I want to congratulate the Sierra Club for getting into the fine details, if you like, of concrete and concrete strength.

The reaction that they were talking about -- the alkali aggregate reaction is certainly a well-known degradation mechanism that the CNSC is fully aware of and, in fact, that is part of the reason we have requirements on licensees both from an aging management for nuclear power plants, our RD334, and very specifically on how to go about testing concrete structures for nuclear power plants under the CSA standard 287.7.

So both of those require regular inspection and testing of the concrete, that is not new; it's been ongoing and it'll continue to go on. At this point in time the staff is very confident that the Darlington Nuclear Generating Station does not exhibit any symptom or any signs of alkali aggregate reaction degradation. The

mechanism is not demonstrating itself at this point in time. Perhaps in the future it might and if that were the case, we are very confident that the inspection approach that we have would detect it long before that there was any loss of structural strength.

The Sierra Club also mentioned Seabrook in the United States. We're very aware of that; in fact, we're working very closely with the U.S. NRC on some research, both ourselves and the U.S. and France, actually, to make sure that we fully understand the management of this degradation mechanism should it demonstrate itself. And as they also pointed out, it did demonstrate itself or it does demonstrate itself at the G-II facility and that's why we've implemented specific management actions -- regulatory actions on Hydro-Québec for that facility. But Darlington does not exhibit those symptoms and therefore, there's no need for us to being doing anything more than our usual requirement on inspection of concrete. And if you want more details on exactly how those inspections are done, we can certainly provide those or OPG could provide them.

MEMBER HARVEY: I mentioned it's okay -- you mentioned it's okay and I believe I don't, but would it be possible to provide some data or what -- there is ongoing inspection; what is the product from those

inspection? I suppose you've got data. You've got ---

MR. FRAPPIER: This is Gerry Frappier, again, for the record.

Yes, there is data. We do regular, type-2 inspections be done and those inspection results are available. There's also more in-depth testing that is done on a -- sort of a every few years of pressure testing of structures and core sampling and different non-destructive testing.

As far as making the results available, we have not necessarily in the past sort of put them out there in the public, not because we don't want to; it's just it's a detail of inspection tests that are usually buried, but I'm not sure from a licensing perspective what their approach would be.

THE CHAIRMAN: Let me try to be more specific. So for the 2014, assuming there's going to be an application for refurbishment, will you be able to provide additional kind of engineering data about the status of the concrete throughout the whole plant?

MR. TREMBLAY: Pierre Tremblay, for the record.

The mechanism that's being discussed here is well-known and understood. It's not a nuclear phenomenon, but, clearly, there's a lot of concrete in

nuclear power plants.

We do have an aging management program. We have regular sampling that takes place and can provide that as part of the process moving forward.

I'll just ask perhaps our chief engineer to elaborate a little bit on what's done and why.

MR. ELLIOTT: Mark Elliott, for the record.

Just a couple of points. This reaction was known at the time of building of Darlington and the silica that was -- that could cause this was kept out of our concrete, so we expect that we won't have this reaction, but we're looking for it in our inspections and so far haven't seen it.

Our inspections are done under the periodic inspection program governed by the CSA standard that Mr. Frappier talked about. We do report those results. They're available and so far, we have not seen any degradation of our concrete either through this mechanism or others.

And we also do the on-power pressure tests and the shutdown vacuum building outage-type pressure tests and have not seen any weakening of the containment structure.

MEMBER HARVEY: But when doing those tests is there changes from year to year? Can you see that it's

stable or there is a trend?

MR. ELLIOTT: So far it's stable. We've seen no trend.

MEMBER HARVEY: Thank you.

THE CHAIRMAN: Go ahead. Last word on this.

MR. JAMMAL: Last word is to confirm two things. Number one is that we have a robust inspection program that is being carried out at all times, and in specific, during outages. As was mentioned by OPG, they have to conduct pressure testing and so on and so forth.

In addition too -- I would like to clarify one thing. This phenomenon is not an instantaneous phenomenon, it takes time for it to occur, so there is no immediate health and safety. Number one, as Mr. Frappier has mentioned, we have a continuous oversight. In addition, this phenomenon is so well-known that even the CNSC itself right now, regardless of Darlington or not, but based on G-II information, we have a research project that is ongoing in order to determine the -- exactly the effect of the silica with respect to the concrete.

So we are, in addition to all our inspection programs, in addition to the exchange of information we have with the international regulatory community, we are carrying out our own research project.

THE CHAIRMAN: Thank you.

MS. ELWELL: Just one last question on this. Given perhaps restrictions around access, how confident are you in the inspection results and the integrity of the concrete structures?

MR. FRAPPIER: Gerry Frappier, for the record.

We are very, very confident with respect to both the inspection techniques that are being used, the overall program that's in place, and the results of those things which indicate that the concrete is still fully able to undertake its safety functions.

THE CHAIRMAN: It's fine, all right. So the Americans are building a new plant; right, and the first thing they're having the problem is with concrete and the French had problems with concrete and Gentilly-2 has problems with concrete. So, I think it is legitimate to demonstrate that there are no problems or there are problems with the mitigation. I think that it is legitimate to raise this as an issue.

And I assume that when you come in to the, again, to the construction licence, you'll demonstrate the integrity of the thing to everybody's satisfaction.

MR. FRAPPIER: Gerry Frappier, for the record.

I absolutely agree with you. The concrete is absolutely essential to the safety and functioning of the station. We walk by concrete every day and most people don't think about it too much, but in fact there's a lot, a lot of engineering behind it, both when you're first forming it and also when maintaining it over the time.

And we can make sure that in 2014, when we come back, we have a full demonstration of the soundness of the concrete.

THE CHAIRMAN: Okay.

This was your first --- many other issues we'll want to talk to you about, but are you satisfied with the concrete story or do you want to add anything to it?

MR. CHENG: I would just like to say that, because it is such a serious issue, that it should have been in the thousand-page Environmental Assessment Report and it would be really important to include this in other refurbishments or constructions just to -- it's needed to -- now, for the environment, for the public health, for the worker there, I think it's very important.

THE CHAIRMAN: Thank you.

Next?

MEMBER HARVEY: Just one thing.

I think, Mr. Jammal, you wanted to add something about the EA process?

MR. McALLISTER: It's Andrew McAllister, for the record.

Based to -- you had asked about satisfaction with respect to how their comments were considered. It is correct: there are a lot of technical documents that are out there. Those are able to be found on OPG's website on the Refurbishment Project.

The Environmental Assessment Screening Report is a synthesis of those -- that information along with technical review comments and dispositions by OPG; so, a long of technical information that's been synthesized into the Screening Report. When we were dispositioning all of the public comments received in the Public Disposition Table of some 300 pages long, we certainly tried to respond in a manner of level detail that was commensurate with the nature of the question being asked.

Where possible, we tried to answer fully. Where we thought there was complementary information, we provided web links, for example, either to CNSC's website or things like the tritium study's project, or back to specific technical comments that were raised during the course of the Environmental Assessment and those are all

housed on OPG's website.

One matter that the intervenor raised with respect to the Canada-US air quality agreement as a matter under further discussion, we have an update on that that we would like to provide to the Commission.

It's our understanding that Environment Canada and Ontario Power Generation, there's been an exchange of information on that and I understand this matter is resolved.

However, I will allow Environment Canada to elaborate upon that.

MR. LEONARDELLI: Sandro Leonardelli with Environment Canada.

So, let me provide a little bit of context on the overall Canada-US Air Quality Agreement, how it applies to the Project.

It would only apply to the refurbishment of an existing facility if the refurbishment results in a change to the emissions that have previously been occurring at the facility.

So, we have written correspondence from both OPG and the CNSC that confirm that the emissions profile wouldn't change as a result of the refurbishment and, therefore, it wouldn't trigger a notification under the Canada-US Air Quality Agreement.

This is based on the most recent information and we don’t think that OPG is required to submit a notification under Article 5 as a result of that.

Now, some of the substances that are covered by the Canada-US Air Quality Agreement include things like common air pollutants like nitrogen oxide and sulfur oxides, VOCs -- that’s for volatile organic compounds -- things like that. And there’s a threshold limit that applies to that and that’s for a new facility being proposed, it would be 90 tons of those substances.

The Darlington facility doesn’t really release those types of substances except for when they run their diesel generator backup systems for periodic testing. The substances that they do release from the facility from their steam generator circuit are things like hydrazine, ammonia, formic acid, acetic acid, et cetera.

For these substances, a one-time limit applies. But again, that would be for a new facility who could potentially trigger the Canada-US Air Quality Agreement. But, in this case, these emissions have been happening already for a number of years.

To give a little more context on it as well, please be aware that as part of Environment Canada’s mandate and expertise, we did take a look at the air

emissions for the project and we looked at the air dispersion modeling concentrations that are occurring from the facility. So the maximum value relevant to a particular criterion has been 60 per cent of the 24-hour limit and about 4 per cent of an annual limit.

So, the emissions aren't violating local criteria and one would anticipate -- you know, based on air dispersion modeling science -- that over the large distance between, you know, the North shore of Lake Ontario and the South shore where New York State is, that the concentrations would decrease quite significantly by the time it reaches the US border.

So, that should give some assurance that there shouldn't be a significant air quality issue transboundary.

THE CHAIRMAN: I'll give you a minute, but I want to ask a question to anybody in the room here.

So, you know, we've been operating, kind of been operating in those facilities for years and years and years. I'm not aware of any time that the NRC, from their side, I presume it's a two-way street, never heard from NRC telling us, you know, did they want to consult on emissions, emission control, and definitely did not hear from the International Joint Commission.

So, why, all of a sudden, this is new?

What happened to the last 30 years of operation? Are you -- have you been getting any representation from any of those bodies, about staff?

I'm just trying to understand the history of the relationship. Do you know the answer? Go ahead.

MS. ELWELL: Well, historically, the parties have cooperated on acid rain, SO_2.

THE CHAIRMAN: Right.

MS. ELWELL: There's been a lot of activity. In fact, it's a success story more or less in terms of the cooperation. You can expect to have new interest in this Air Quality Agreement from US regulators and the public, so ---

THE CHAIRMAN: Well, our people have been talking to the International Joint Commission, if I understand correctly, so it's never been -- so far, nothing ---

MS. ELWELL: Well, it's a new day, isn't it?

THE CHAIRMAN: Okay. Maybe.

MS. ELWELL: What I would ask, Commissioner, is that you require Environment Canada to put its comments in writing. I mean, when I read the Agreement, it doesn't say "only when a change is occurring". So, what is the authority for the position

that they're taking? Just -- I don't see where they're getting their authority from, so if you could require them to put their submissions in writing, then we would be in a position to respond.

THE CHAIRMAN: You want to reply?

MR. LEONARDELLI: Certainly, we could do that.

I'm trying to remember, over the course of the EA process, whether we had put something in writing to that effect. I'd look at Andrew perhaps.

THE CHAIRMAN: Well, it's not so we can actually dig it up and start to see if there -- I mean, we are all for, believe it or not, transparency and lucky if there is any material that we can share with everybody, we will try to dig it up and find out.

Only, if not, if you can clarify, that would be very good.

MR. LEONARDELLI: How soon would you like that? I mean, we could put this as an undertaking, do this as an undertaking.

THE CHAIRMAN: Well. I'm looking at 2014 when we are going to pound (phonetic) everything to a licence application to refurbish at which time all this material has to be tabled and agreed to by the Commission.

MR. LEONARDELLI: Oh! I could have

something for you much sooner than that.

THE CHAIRMAN: Let’s hope so!

(Laughter)

THE CHAIRMAN: Go. Be my guest. Go ahead.

MR. LEONARDELLI: Just to be clear, the interpretation I’ve given is based on the people who interpret the Canada-US Air Quality Agreement on a regular basis, and it’s based on the -- I guess, the clauses of the agreement.

THE CHAIRMAN: If you’re sending to us, we will try to incorporate into whatever decision we come up with.

MR. LEONARDELLI: Okay, fair enough.

THE CHAIRMAN: Thank you.

MS. ELWELL: May I ask that you let the public have an opportunity to respond to it before you incorporate it in your report?

THE CHAIRMAN: Well, you’ll have a chance to read our decision, you will have a chance to read theirs, and you’ll have a chance to see in their refurbishments, so I ---

MS. ELWELL: What we’re asking for is an opportunity to respond to their document that’s going to outline their authority for the position they’re taking.

THE CHAIRMAN: By all means. I mean, this

-- and you can dialogue with Environment Canada any time; it's independent of the Commission work here.

But if we're talking about the impact on the refurbishment, there will be a different thing. I'm not -- I just not trying to get bogged down in another consultation process before we render a decision; that's really why I'm trying to do.

MS. ELWELL: I'm sure there are going to be a number of undertakings that the proponent's going to be making, and you'll probably have a list of them, and surely that's going to be posted on your web site under this file number so that the public ---

THE CHAIRMAN: No, no, no ---

MS. ELWELL: --- can respond.

THE CHAIRMAN: --- this not adjoined to the -- we take all the recommendation and the advisements and we'll get back to you, you know, whenever the time comes in for our decision.

So, okay.

Dr. Barriault?

MEMBER BARRIAULT: Just a brief question: First of all, thank you for your presentation.

Secondly, really, on page 18 of your presentation, 12-H13, 3.2, 5.2 Water, and it says:

> "OPG admit the changes in surface

water condition as a result of the project may contribute to effect on human health and on non-human biota."

It goes on to explain the situation.

I guess I'd like to get OPG to comment on that. Does that statement belong to you folks at all?

MR. TREMBLAY: Pierre Tremblay, for the record.

We're just checking the specific item here. Page 18 in the document is 12-H13, 3.2, under 5.2 Water, at the bottom of the page. If there's a question in there, I'd like to know what that is.

MEMBER BARRIAULT: Yes, the question is that -- did you people make that statement; that it will have an effect on human health, and on non-human biota?

MR. TREMBLAY: No. No, we did not make that statement.

You know, without specifics -- I mean, I guess what I would say -- Pierre Tremblay, for the record -- is that our emissions from the site, and it's been sort of covered earlier today, is but a fraction of the limits. There's no impact on human health, so I -- we would not make that statement.

MEMBER BARRIAULT: Thank you.

Thank you, Mr. Chairman.

Does CNSC want to comment, please?

MR. ELDER: Just to follow up on that, the key thing we need to keep in mind is, as we've said, this has been a facility that's been in operation for 20-some odd years. We have the radiological environmental monitoring program, which shows us that the public dose is very, very low, which is addressed as an aspect of that, about effects to human health and, from a non-human biota perspective, OPG has conducted ecological risk assessments under both this environmental assessment and the new build environmental assessment, in demonstrating no effects on human biota from those -- at that perspective.

MEMBER BARRIAULT: Thank you.

MS. ELWELL: May we respond?

MR. BARRIAULT: Yes, please, by all means.

MS. ELWELL: We quote from their own document, at 4.3.6, their admission that it could have effects on human health. I also refer to -- at Table 2.1 of the technical support document on radiation effects, that these are likely measurable effects. So I would ask the proponent to re-read its own document for the admission that we cite.

MR. TREMBLAY: All right, we've got the reference here -- Pierre Tremblay, for the record. I'll let John Peters deal with that specific question.

MR. PETERS: John Peters, for the record.

I think the confusion may be in that the intervenor is suggesting that these are effects rather than identifications of things that we have studied in detail. The conclusion of both of our atmospheric technical support work as well as the radiological work which covers both of these aspects is that the doses to members of the public at the nearest possible receptor are below thresholds of any measurable effect.

In some cases, they're not measurable at all. In many cases, as the intervenor points out, they are measurable, but they are very, very low.

Thank you.

MEMBER BARRIAULT: Thank you.

Does that answer your question?

MS. ELLWELL: Well, we give the example of tritium being in the -- in surface water to be ingested by people through their drinking water in Lake Ontario, and to deny that that's a cause and effect is -- is magical.

THE CHAIRMAN: Ms. Velshi? I think we're going again to tritium now, I think.

MEMBER VELSHI: So not yet on tritium.

On page 8 of CMD 12-H13.2, again, question for OPG: On section 2.3 in Air, the last paragraph, the intervenor says, "External gamma dose rates in air due to

the presence of a number of radioactive substances," and then there's a statement that there is no monitoring of the external gamma dose rate in air from these radioactive substances.

Do you want to comment on that?

And I guess the followup question is, if there isn't that monitoring, what does that mean for doses to the public, and its estimation of that?

MR. TREMBLAY: Pierre Tremblay, for the record.

I'll ask Lauri Swami to talk about our monitoring program.

MS. SWAMI: Lauri Swami, for the record.

We have the radiological environmental monitoring program where we monitor a number of radioactive components in the environment. Where it's not possible to monitor those components, we use our dose emission levels and calculate what the dose impact would be.

That program is fully available in our web site; our radiological environmental monitoring program is fully documented with all of the results that we have, and how we go about calculating a public dose impact, so it would be available to the intervenor.

MS. ELWELL: Health Canada used to monitor;

they had 25 locations across Canada; however, that practice was discontinued in 1997.

So the public doesn’t have the type of transparent and publicly verifiable evidence, to rely on the proponent to monitor is almost like asking the fox to look after the chickens.

MEMBER VELSHI: Staff, do you want to comment on that?

DR. THOMPSON: Patsy Thompson, if I could?

Just two areas, on page 8, the section you were pointing to speaks to new monitoring in the regional study area; so, if you recall, the EA is -- has the sites, local and regional, and so the monitoring is in the site and local area. And the regional monitoring was not built into the monitoring program conducted for the CNSC, essentially because at that distance the levels are not detectable.

In terms of the Health Canada program, when the -- in the mid-1990s, the program was reviewed and some of the stations that used to be monitored by Health Canada were discontinued, essentially because they were monitoring non-detectable levels, and they concentrated their monitoring effect closer to facilities where things could be detected.

MS. ELWELL: With respect, the regional

study area is very limited. In terms of air, it’s one kilometre, and in terms of water, it’s five, and the radiation environmental monitoring program is only for the local vicinity.

The proponent cannot say with any confidence that regional monitoring is taking place, when the scope of that regional assessment is so narrow.

MR. JAMMAL: Mr. President, Ramzi Jammal, for the record.

We have -- Health Canada is with us here. Monsieur Auclair, if you can answer the question?

THE CHAIRMAN: By all means.

MR. AUCLAIR: Jean-Patrice Auclair with Health Canada’s Radiation Protection Bureau, for the record.

So the issue in regards to a tritium program it was -– it was in fact –--

MEMBER VELSHI: Sorry; the question around tritium monitoring it really is around gamma radiation.

MR. AUCLAIR: Okay. So, effectively, there are a number of stations that are run around the reactor sites that measure gamma radiation, both by the utilities and by ourselves usually in the communities downwind around the plants. And those results are published on our website on a monthly basis, and published quarterly at the

moment. We are working towards publishing more frequently and making them available to the public more frequently at the moment.

MEMBER VELSHI: What we heard form the intervenor is that Health Canada ceased doing that monitoring in 1997, so does a programme still continue, and is there independent validation of the estimates, I guess, that will be g-makes based on their emissions.

MR. AUCLAIR: So the program that was significantly downsized in 1997 was our tritium monitoring program, not our fixed-point surveillance networks. Our fixed points in our surveillance networks actually have been strengthened since the mid-nineties with more modern equipments and replaced with gamma detectors. And, moreover, we have made agreements with utilities to share both their date and our data with each other. So in effect our -– and we maintain all of the stations as part of those MOUs. So all the data is pooled and essentially is made available to ourselves, the utility, and the regulator as required. So, no, the fixed-point gamma detective network is fully operational.

MEMBER VELSHI: Staff, any comments, please?

DR. THOMPSON: Patsy Thompson for the record.

I'd like to explain how the monitoring programme that the CNSC requires OPG to have in place are designed and reviewed. The focus of the regulatory programme is to make sure that we have a good understanding of the behaviour of radiation and radionuclides in the environment around facilities. And we look at all the sources of emissions to air and water from the facility. We use dispersion modelling to look at where the radionuclides will go, which critical groups, which critical locations will be impacted, and at what distance. And it's that information that is used to design a monitoring programs, OPG submits a proposed program, we reviewed it technically. Once it's approved it's put in place. The CNSC staff inspects the implementation of the program and we also review the results on an ongoing basis. There are annual reports, we look at trend analysis, and if there was anything out of the ordinary we would take action. But the monitoring program around the facility is entirely appropriate to monitor the very low levels of radioactivity that are being emitted by the plant.

MEMBER VELSHI: I think we've -– I think we've got two conflicting responses here. So is there gamma monitoring in the regional study area? Because I think what we've heard from Health Canada is that there

is.

DR. THOMPSON: Just to be clear -- Patsy Thompson.

There are no gamma monitoring equipment in the regional study area because they are not needed. If the gamma monitoring equipment is required on site to be able to pick up anything that’s unusual, far -- if the monitoring were offsite, very far from the site it would be, essentially, a bit too late to pick it up. So the focus is on making a -– having a good understanding of what’s onsite.

MEMBER VELSHI: And was there monitoring pre-1997 in the regional study area?

DR. THOMPSON: Patsy Thompson, for the record.

My understanding is pre-1997 it was air and precipitation samples mainly for tritium and some particulates.

MEMBER VELSHI: And not for gamma radiation for the substances identified by the intervenor?

DR. THOMPSON: Patsy Thompson, for the record.

That’s my understanding. We will confirm with Health Canada and get back to you either today or tomorrow.

THE CHAIRMAN: Dr. McDill?

MEMBER McDILL: Thank you.

This is a question for staff and it's to respond to something, it was in the intervenor submission on page 6. I know I've asked this question in other hearings, I'll repose it here because the intervenor is here. The top of the page it says, "It has also been established that there are higher rates of childhood leukaemia," et cetera, et cetera, "that Canada, Germany, and United States." So I'll repeat a question to staff that I've asked before. Can you summarize for me whether or not it has in fact been established? Because I think it's a matter of some concern for the intervenor and others.

DR. THOMPSON: Patsy Thompson, for the record.

If I can, Dr. McDill, I will respond in terms of studies that are quoted as being outside of Canada and I will let the medical officer of health for the Region speak to the Durham Study that was done regionally.

Essentially the intervenors -– this intervenor, as well as others, have raised the –- the KiKK Study as well as one of the next intervenors talks about the recent French geo cap study that was done recently.

The German study was done using not radiation dose information to the Kinuda Study (phonetic) but essentially they looked at distances from the facility using essentially circular zones going -– moving away from the site. Of all the German power plants that were considered during the study, when the Krümmel Plant is removed from the other studies the relationship between distance and childhood leukaemia disappears. So the findings of the German study seem to be only focused on a leukaemia -- childhood leukaemia cluster around Krümmel.

When those studies came out, all the regulators were concerned and we all paid attention to those studies. We looked at all the work that was done subsequently because of that concern and the re-assessments that were done of the German studies indicated that there was a stronger relationship between the -– whether the population was rural or urban and was not related to radiation dose.

There are other studies that have been done in Finland and Switzerland where, contrary to the German study, there was a tracking of individuals that were part of the study to know when -– how long they had been in the region, when they had immigrated in and out of the region. And neither the Finnish study nor the Swiss study found any relationship between distance to a nuclear power plant

and childhood leukaemia.

Lastly, the last geo cap study that was published in early 2012, what the French did is they did the study similarly to what is done in Germany looking at circular zones equidistant from the 19 nuclear power plants that were studied. And they also did what's called dose base geo-zoning. So they looked at zones defined by radiation doses around the facilities and classified the cases of cancer according to both distance circularly and also according to the dose regions around the facilities. What they found when they looked at distance circularly there was a -– for one time period only, not the whole period, there was a relationship between close childhood leukaemia and distance. When they looked at the geo-zoning based on dose, that relationship disappeared. And so the French have concluded that the relationship they found for one time period was not related to dose because when you look at dose that relationship essentially disappeared.

And so in summary, for the international studies there is no evidence that what has been found is nothing but a childhood leukaemia cluster, and there's absolutely no evidence that there's an increased incidence in childhood leukaemia related to radiation doses from nuclear power plants.

MS. ELWELL: My friend cites the German study where the conclusions were different. She admits that in the French study there was one cluster where there was a relationship. I'd like to point out the Commission staff response to us here and I'm referring to SCC 41 provocatively said:

> "Based on objective evidence" -- "scientific evidence the precautionary principle does not apply with respect to tritium."

That is an affront to environmental principles that precautionary principle does not apply. You're quite right to direct questions in that regard and given the conflicting conclusions in studies to say that, you know, the precautionary principle doesn't apply is just quite an offensive position to take especially with children and leukaemia.

THE CHAIRMAN: Staff, do you want to reply to this? It sounds like a strange statement.

MS. ELWELL: Page 38.

DR. THOMPSON: Patsy Thompson, for the record.

Essentially when we state that it's based on objective science what we mean is that the CNSC staff, international organizations of experts, look at all of the

scientific studies for evidence of radiation risk, all of them. And the conclusions we make are based on the weight of the evidence of all of these studies.

What we've seen in terms of the reference to the KiKK study is that people consistently use the statement that the German study has shown that radiation doses causes childhood leukaemia when the authors of that study make no such statement and they were careful not to make that statement. That study was re-assessed, re-evaluated by a number of independent experts from different countries and at no time was a relationship between childhood leukaemia and doses of radiation ever found.

The intervenors have always ignored similar studies done in Finland, done in Switzerland, done in France that have never shown a relationship between distance to nuclear power plants when they were done carefully.

THE CHAIRMAN: Nevertheless, I don't, if I understand what the intervenor is arguing that even if it doesn't, it doesn't mean that you throw away the precautionary principle. I think that's what she's actually arguing and I assume that all they allow a concept in all of this to apply.

DR. THOMPSON: Patsy Thompson, for the

record.

Yes, the precautionary principle is used. The CNSC has a policy on environmental protection, it's on our website as one of the --- in a regulatory framework and we've made a commitment to the precautionary principle as enacted in Canadian federal law. The ALARA principle is essentially an application of precaution and very, very low levels of radioactive emissions are a testimony to the use of ALARA and the precautionary principle.

THE CHAIRMAN: Dr. McDill?

MEMBER McDILL: Thank you. I think there was a reference in the intervenor of the United States and in the Durham medical service come forward or are we going to wait another day for that? First the United States, perhaps.

THE CHAIRMAN: Maybe it's a good time now to introduce Dr. Kyle if he's available.

MEMBER McDILL: But what about the United States, is he to do the United States as well or, Dr. Thompson said she would do international.

THE CHAIRMAN: No, I think this is about the level.

DR. THOMPSON: So international there's the Comaro 14 (phonetic) report in the U.K. which did a reassessment of all the studies, showed no link between

radiation doses from MPPs and childhood leukaemia. The Finnish study, the Swiss study, all the French studies and the reassessment of the KiKK study in Germany.

MR. KYLE: So Mr. President, Commission Members, for the record, I'm Robert Kyle. I'm the Commissioner and medical officer of health for the Durham region. I've been in this position for 22 years and since 1996, I've chaired the Durham Nuclear Health Commission -- Committee and we have a separate written submission.

With me is Mary-Anne Pietrusiak. She has been a public health epidemiologist for the health department for 20 years and she is the author of "Radiation and Health in Durham Region 2007" which I think we've been asked to speak about.

So I was planning to just give a little bit of context and then turn it over to Mary-Anne to discuss her findings.

So prior to my coming to Durham Region, the Ministry of Health of the day agreed to look at, both prior to and after the start-up of Darlington. to look at a number of health outcomes particularly cancer mortality and some reproductive health outcomes.

So it produced, I think, a series of three sets of statistical tables up to and including, I think, the end of the '80s.

In the middle of 1996, we changed the format, looked at, I believe, cancer incidents and published “Radiation and Health in Durham Region” in 1996. Between then and 2007, we published a snapshot on cancer in Durham Region and then in 2007 we published “Radiation and Health in Durham Region”. So the context was we were honouring a commitment made by the Ministry, by the industry and by previous councils with respect to look into this matter.

So in 2007, we developed a framework which tweaked and improved upon the framework for 1996. We looked at cancer. We looked at congenital anomalies. We looked at stillbirths and we looked at certain time periods around start-up of Pickering A and B and start-up of Darlington.

You need to understand and the report goes into great lengths about it being an ecological study. So it’s a weak study design. Our view is you have to look at the data that’s available. You have to look at your community. You have to look at the industry and do your best job at coming up with a snapshot or a picture with respect to possible human health effects. And that was done in 2007. There were a lot of data limitations which were described in the report but a number of strengths as well. And finally, we had the framework reviewed by an

external panel and it’s listed in the report.

So I think I’ll turn it over to the author to basically summarize the results of radiation and health in Durham Region. Mary-Anne.

MS. PIETRUSIAK: Thank you. Mary-Anne Pietrusiak, for the record.

So what our study did was compare municipalities within Durham Region grouped into Ajax, Pickering, Oshawa, Whitby, Clarington and North Durham and we looked at 18 different cancer groupings, five types of congenital anomalies, as well as stillbirths and we looked to see whether those areas were significantly higher than Ontario. We used Halton Region and Simcoe County as comparison communities. They were outside of Durham Region obviously but they provide some idea of how these different types of health indicators vary.

The study did not look at health indicators according to distance from a station so we heard about this -- the KiKK study that looked at within the five kilometre zones. We did not do that. We’re looking at it by municipality, however most of Ajax, Pickering’s population is within 10 kilometres of Pickering nuclear and about 74 per cent of Clarington’s in 2003 was within 10 kilometres of Darlington.

As Dr. Kyle mentioned, this is an

ecological study so we examined how Durham Region and its municipalities compared to Ontario. We described variations in health but we can't necessarily identify why these variations exist.

And there is also a lot of changes that occurred in the population over time in terms of a lot of population growth. Clarington grew by 146 percent from '81 to 2004 and in some cases, the numbers of these -- some of these very rare health effects are too small to report in the earlier time period, but then with the population increase, we are able to report numbers in 1983 or 2004.

So basically the study conducted comparisons with Ontario for 18 cancer groupings and 9 perinatal outcomes resulting in approximately 966 comparisons. Within Ajax-Pickering -- actually, I'll just stick with Clarington. For Clarington, six of the rates ratios were significantly high, 17 were significantly low, and 16 were non-reportable and then a number of them were exactly the same as Ontario.

We did not find any significantly elevated rates of childhood cancers or childhood leukaemia. I did take a look at the specific age group of under five. I just did that last week in response to the KiKK study and there aren't -- there is no significantly elevated rates

for leukaemia in those very young children in Durham region or Ajax-Pickering or Clarington and, in fact, we did have a significantly low rate of childhood leukaemia zero to four in Ajax-Pickering in 1993 to 2004. So this idea that we did have elevated rates is not true for Durham region.

MR. KYLE: So in conclusion, I would say the report, including its executive summary and the full report, is at our website.

We have taken -- we did suggest a number of steps be taken to move forward in light of the report and we've acted on most of them, and they include continuing on with the Durham Nuclear Health Committee, establishing a congenital anomaly surveillance system in Ontario, setting up a forum to discuss the more readily available release of cancer data from Cancer Care Ontario. We have a number of information products that we have produced: Cancer at a Glance, Reproductive Health at a Glance and the last two information products are on our website and updated on a regular basis and they're found at the Health Statistics in Durham Region tab.

Thank you.

THE CHAIRMAN: Thank you.

MEMBER McDILL: Could I ask the intervenor to clarify where their data came from with respect to near

nuclear plants in Canada?

MS. ELWELL: The publication on our website called “Tritium on Tap” and fully referenced.

And with respect to Durham, the Club defers to Durham Nuclear Awareness. They’ll be more able to respond to the numbers that were presented this morning.

THE CHAIRMAN: Okay, this is going to be a topic of discussion the next few days.

Dr. McDill?

MEMBER McDILL: I was just going to ask, since I don’t have “Tritium on Tap” up at the front here if maybe staff could see if they have that or maybe find the reference just specifically for that particular thing.

MS. ELWELL: Madam Commissioner, could you give me the reference exactly so that I can respond?

MEMBER McDILL: Near. Near.

MS. ELWELL: Which page?

MEMBER McDILL: Page 6, the same page I’ve been on.

MS. ELWELL: Page 6.

MEMBER McDILL: Yeah.

MS. ELWELL: Thank you.

MEMBER McDILL: Top of the page, third line, near nuclear plants.

MS. ELWELL: Thank you.

MEMBER McDILL: I think it's important for the community to know what that source is. Thank you.

MS. ELWELL: Thank you.

THE CHAIRMAN: I just have a personal curiosity about those ecological studies. You always, sort of, prefer -- preface this with something like -- maybe I don't want to put words in your mouth, but like it's not a strong analysis, a cause-effect relationship.

We always look at the elevated. What about the one's that below, like, you've got 16 that were under the Ontario norm; does that mean -- can one reach the conclusion that it's better to live in this community? You know, we always look at the high, it's worse to live in this community, but what about the lows?

MR. KYLE: So I think your question, Mr. President, is rhetorical. Robert Kyle, for the record.

But I do think you make a valid point which is because of the weakness of the study design, you have to look for patterns, and just by chance, given the number of analyses that occurred, you would expect some just by randomness to be higher than Ontario and some lower than Ontario.

So I think you have to very careful about, if you will, cherry picking either the highest of the lows and look at the bigger picture. And that's what we've

tried to do in this study.

Mary Anne, I don’t know if you have any additional comments.

MS. PIETRUSIAK: Mary-Anne Pietrusiak, for the record.

I thought you summed it up quite well, but I think that it’s important to understand that there’s a lot of factors within the population that affects the health. A big factor is socioeconomic status and that is a universal kind of indicator that is associated with health.

Depending upon what kind of health indicators you’re looking at, there may be a lot of different factors that influence those and you cannot just pick one factor and say that’s the reason.

THE CHAIRMAN: Thank you. Thank you very much.

Dr. McDill?

MEMBER McDILL: Yeah, I have other questions, but other intervenors have raised them so I’ll ---

THE CHAIRMAN: Okay, Mr. Tolgyesi.

MEMBER TOLGYESI: Merci, Monsieur le président.

On the same page 6, on the Sierra Club

submission, the Sierra Club is comparing why there's guidelines regarding tritium which is 7,000 becquerels in Canada, 100 becquerels in European Union, which kind of confusing. It's down as low as 14.8 in California. Could the staff explain what's the difference when you compare these guidelines?

DR. THOMPSON: Patsy Thompson, for the record.

Essentially the CNSC, when we did the tritium studies for -- at the request of the Commission, we have an information document that summarizes the scientific basis for all the standards for tritium; and there are many, I agree. And so just to focus on the ones you've mentioned and they were mentioned in the intervenor's submission, the Health Canada Guideline and the Ontario standard of 7,000 becquerels per litre is based on World Health Organization's recommendation that they've rounded off to 10,000 becquerels per litre and it's based on World Health Organization recommendation.

In the European Union, the 100 becquerels per litre is not a health standard. It's a guideline that is in place to require triggering of additional monitoring and they've chosen tritium to trigger initial monitoring at that level because it is easy to monitor and it could be indicative of other -- the presence of other

radionuclides. So it’s not a health-based number.

The California number is a health protection goal, and as such it’s not a health -- it’s not a legal drinking water standard, but it’s a health protection goal that people are supposed to try to achieve.

All of that being said, the drinking water quality around the Darlington plant and the -- on Slide 26, we presented a number for year 2009 because intervenors have spoken about the spill in 2009 that compromised the monitoring; which, in fact, it didn’t compromise the monitoring. There was a lot of monitoring done because of the spill. And so the drinking water supply plants in 2009 the levels of tritium in drinking water were between 5 and 6.2 becquerels per litre, so well below even the California health protection goal.

MEMBER TOLGYESI: Does it mean that in your opinion they have just a guideline; they don’t have something which is on a health-based considerations?

DR. THOMPSON: Patsy Thompson, for the record.

If you give me a few minutes, I’ll go and get a document. There are a number of guidelines in place. The Fins have a guideline. A lot of them are higher than the WHO recommendation, but I don’t have them

here at my fingertip, but it’s on my floor.

MEMBER TOLGYESI: While you are looking for that, it's just the page 11, I'm -- it's a question for OPG. According to Sierra Club, also you -- “OPG refuses to consider nuclear accidents involving out of core criticality, which may result in an acute release of radioactivity into environment.” Could you comment on this statement, please?

MR. TREMBLAY: Pierre Tremblay, for the record.

I'm going to ask Mark Elliott, Chief Engineer, to answer that question.

MR. ELLIOTT: Mark Elliott, for the record.

With natural uranium fuel our design is such that when they're -- when the fuel comes out of core it goes into a light water or a regular water spent fuel pool or irradiated fuel bay and that fuel, natural uranium fuel, with light water, regular water, cannot become a critical reactor, and that's why we don't spend the effort on that. In other designs, that's not the case and attempts or work has to be done to keep that spent fuel pool from becoming critical.

MEMBER McDILL: There was a reference in one intervenor's comment about natural uranium going critical; I think someone said one billion years ago, if I

read the document correctly. Can you comment on that? Since you just made this statement now it's a good time to put to two together.

MR. TREMBLAY: We'll just have to find the reference. So give us a moment, please, it's a long time.

MEMBER McDILL: Maybe the tritium regulations have surfaced.

MR. JAMMAL: Ramzi Jammal, for the record.

It's a natural occurring phenomena certain individuals would like to refer to as a spontaneous occurrence. It is in Africa and the Congo as a state. I don't have the exact name of the location, but again, that's -- it’s a criticality. It's -- will have to be proven but there are natural occurring substances that occurred billions of years ago, and it is in an African country.

MR. ELLIOTT: I've got the details, Dr. McDill. This was 1.7 billion years ago and the -- we -- you know, what we understand is there was a deposit of 3 percent U-235 where our natural uranium that we use in our reactors is 0.7 percent. So that's why we say that it was -- ours is insufficient at light water to become critical.

MEMBER McDILL: I'm amazed that someone can pinpoint it to 1.7 billion years, but I'll accept that.

MEMBER TOLGYESI: So Mrs. Thompson ---

MR. JAMMAL: Sorry, I'd like to correct myself for the record here, is I gave the wrong country. It's Gabon. So the key factor, as mentioned, it's the Uranium-235, it occurred over 1.7 billion years ago, and the natural uranium has decayed to 3.1 percent to the current level of .71 percent. However, I beg to understand the relationship and relevance to this power reactor refurbishment licence.

MEMBER McDILL: Simply because there was a comment by an intervenor that spontaneous criticality had occurred in natural uranium, and I wanted to be -- wanted to put the two thoughts together at the same time. Thank you.

DR. THOMPSON: Patsy Thompson, for the record.

And so the -- I'll quote the Information. It's the -- it's Info 0766. It was published and it's on our web site in January 2008. It has all the technical -- it has technical appendices that detail the basis for all the drinking water standards that we could find in the world.

And essentially, in Europe there's the European Union guideline of 100 bequerels per litre as a trigger for additional monitoring. Finland is

30,000 bequerels per litre, Russia is 7,700, and Switzerland is 10,000 bequerels per litre.

MEMBER TOLGYESI: So they are not stand as their guidelines?

DR. THOMPSON: The European Union, you mean? The European Union is a guideline to trigger additional monitoring if 100 bequerels per litre is reached.

MEMBER TOLGYESI: Do you have some data? In France, for instance, several nuclear power stations, what's the tritium level in the water there? Because one is to trigger a study and when the observation measured that, what's that?

DR. THOMPSON: Mr. Tolgyesi, just to make sure I answer -- your question is what are the levels of tritium around French nuclear power plants?

MEMBER TOLGYESI: Yes.

DR. THOMPSON: I don't have that information. I'll try to get it for you for this week. What I could say though is that the 100 bequerels per litre of tritium was chosen because if there's a malfunction at a nuclear station there are a number of radionuclides that could be released to the environment along with tritium, and tritium is easy -- and it's essentially to -- as a monitoring tool to detect something

that may go unnoticed.

And because tritium is easily monitored, if identified tritium as the one they would be monitoring and if 100 bequerels per litre is reached they would look more in detail and look for other radionuclides as well. But it's not a health-based number by any means. But we will try to get information about tritium around nuclear facilities in France.

THE CHAIRMAN: Okay, so let me try to summarize what I understand between all those numbers, the 7,000, 100, 14, et cetera. So the health number is by the World Health Organization and Health Canada, et cetera, is 7,000, which is the health limit. However, because of the precautionary principle and they allow -- and the ability to keep a regulatory limit a lot lower than that, that's why we apply the lower regulatory limits 100 bequerel or something like this. Is that really what the differences are between the health limit and the regulatory limit?

DR. THOMPSON: Patsy Thompson, for the record.

What I could say is that the World Health Organization and Health Canada number are based on 0.1 millisievert per year, so a tenth of the public dose limit, which represents a level that would not represent a health risk.

The 100 bequerels per litre, the OPG's voluntary target, was agreed by OPG in the late 1990s if my memory serves me well, when the then-Ontario Advisory Council for Drinking Water had made similar recommendations, and it's been in place since then.

But the CNSC's regulation of Darlington has resulted in levels of tritium in drinking water in the range of 5 to 6, essentially below 10, and with the ALARA Programme, with the Environmental Monitoring Programme, with the safety systems in place at the power plant, we would expect those levels to continue to be that low.

THE CHAIRMAN: Thank you. Anybody else has additional questions. The Sierra Club?

MS. ELWELL: Just a quick response for one other number. The Ontario Drinking Water Advisory Council recommends a health base standard of 20 Bql, not 100 that OPG says it voluntarily complies with.

THE CHAIRMAN: Wait a second, that's not my understanding of what I heard. That's drinking water limit.

MS. ELWELL: Drinking.

THE CHAIRMAN: Right.

MS. ELWELL: Right, drinking water.

THE CHAIRMAN: Right.

MS. ELWELL: So the levels of tritium in

drinking water should not be more than 20.

THE CHAIRMAN: And I think everybody adheres to that in terms of ---

DR. THOMPSON: Patsy Thompson, for the record.

Just to clarify, about two years ago the -- or two or three years ago the new Ontario Advisory Council made a recommendation of 20 bequerel per litre. That recommendation has not been moved forward by the Minister of Environment of Ontario.

A hundred (100) bequerels per litre is OPG's voluntary target, arrangements with the water supply plants around the facility, but the levels are currently well below 20, they are 5 to 6 bequerels per litre and there is no indication that the plant would operate to yield higher levels of tritium in drinking water unless there's a malfunction of some kind.

MS. ELWELL: Or a spill, for example.

DR. THOMPSON: Even ---

MS. ELWELL: Which will ---

DR. THOMPSON: --- even the 2009 spill, we have the numbers here, the levels stayed below 10 becquerels per litre, well below 20 becquerels per litre.

THE CHAIRMAN: Okay. I’ve just got two quick questions for you.

In your presentation, you say there is on -- and this is on page 10, “There’s no specific regulatory limits for radio nuclear concentration in soil.” I thought there was a cleanup limit, which I thought was -- in fact, there’s a big, huge Port Hope cleanup now, that’s actually to a limit that has been established by the Ministry of Environment.

Is that not a regulatory limit?

DR. THOMPSON: Patsy Thompson, for the record.

Mr. Binder, you’re talking about the uranium soil?

THE CHAIRMAN: Yes.

DR. THOMPSON: And that’s for uranium? I think what the intervenor is mentioning is that when there are releases from nuclear facilities, you get concentrations of radionuclides in your ---

THE CHAIRMAN: But there’s a whole list. It’s not only uranium, there’s a whole list of other ---

DR. THOMPSON: No, but the others are metals and organic contaminants, so there are no other radionuclides on the list. But we do regulate levels in soils by regulating the public dose limit, because we do assume that soil is a pathway towards humans.

THE CHAIRMAN: Also on page 23, they say

also there’s no specific regulatory limits for radionuclides in milk. Is that correct? I thought that Health Canada had some limit on concentrations in milk.

DR. THOMPSON: Patsy Thompson, for the record.

There are numbers in -- for Health Canada. The FAO, Food and Agricultural Organization, also has levels of radionuclides in different foodstuffs. They’re not legal limits; essentially, they’re guidelines and countries and regulators adopt them for different purposes.

But, for our purpose, the levels in milk and vegetation, vegetables, meat, are monitored and are being considered in terms of public doses. And the public dose at the -- around the Darlington plant, is 0.006 millisieverts per year. The public dose limit is 1. So the levels in milk and other food products are very low, and are lower than the FAO, Food and Agricultural Organization, levels.

THE CHAIRMAN: Okay, thank you. You have the last word.

MS. ELLWELL: Thank you.

MR. CHAIRMAN: Thank you.

I think it’s time for us to break for lunch. And I’m told -- I wanted to cut lunch into a

smaller chunk, but I hear that some people have to go and find a restaurant around here, so we will reconvene at 2:00. Thank you.

--- Upon recessing at 1:06 p.m.

L'audience est suspendue à 1h06

--- Upon resuming at 2:01 p.m.

L'audience est reprise à 2h01

MR. LEBLANC: We are ready to resume, thank you.

I just want to deal with a little item of procedure. This morning, during the intervention by the Sierra Club, they asked that an undertaking be considered. That undertaking was -- would be for Environment Canada to provide the rationale for the US-Canada Agreement, that's Section 5 analysis.

So the Commission is asking Environment Canada to provide such a document. We will send a formal letter, but within the next week or so -- the next month, two weeks and those intervenors that are interested in responding, including Sierra Club, will be provided an opportunity to do so. Thank you very much.

THE CHAIRMAN: Thank you, Marc.

So let's move to the next submission which

is in another presentation from Mr. Seitz?

MR. SEITZ: Yes, thank you.

THE CHAIRMAN: As outlined in CMD 12-H13.3. Mr. Seitz, the floor is yours.

12H-13.3

Oral president by

Tim Seitz

MR. SEITZ: Thank you very much, and thank you for having me here at this public hearing.

It isn't often that you get a chance to stand up and say what you think about nuclear power where you might even have a chance of being listened to. Many people find it a big turn-off.

You have my written submission in front of you there, of the oral? So I'm going to start on the second page.

I've been at this anti-nuke activity for a long time. I guess you'd call me a life-long activist. I don't know if any of you read this book, or heard of it, written back in the early '70s.

My father used to work for Detroit Edison when they were building Fermi 1. And I'd been a Physics and math major in university, and I was fearful of it. It

sounded crazy. It sounded like hubris. They thought that they could tame plutonium. No one has succeeded, and they didn't either. And as far as I know, it's still festering under thousands of tons of concrete at Laguna Beach, and let's hope it's the kind of concrete that doesn't atrophy under nuclear force.

Firstly, I'd like to talk about language. I want to absolutely clear with you. Everything is political in this world; this is political. I expect it anywhere -- in government, in business, and even in the clergy. My other background is in religious education, and I must say one thing, to their credit, they can identify their own dogma.

But when I put this question to physicists, they get all beet red and say, "We have no dogma." Well, sorry fellas, you do. But we won't sidetrack you with that.

I've created a petition, and at the top of it, it says, "Stop Making More Nuclear Waste." That's who I am, and what I am about. Then I ask to abolish all nuclear fissioning applications, and then I suffix it with "A-S-A-P," "As Soon As Possible."

Now, the practitioners in the art of the possible are politicians, so this is an appeal to them. I'm not a politician. Maybe I am, but I'm not running for

anything. So under that, I just try to state the facts as best I know them.

Nuclear fissioning happens in nuclear reactors or in nuclear warheads. Nuclear waste is the only product of nuclear fissioning. Nuclear waste is destructive of all living things. Nuclear waste lasts forever, and must be managed forever. You're not going to bury it, and put it somewhere else. Sorry folks -- that's a delusion that needs to be washed away.

In Ontario at present, in all of our CANDU sites, we are storing 46,000 tons of high-level nuclear waste. Now, how is it that Ontario can end up with 46,000 tons of high-level nuclear waste, and the United States, with 104 light water reactors, only claims to have 88,000 tons of high-level nuclear waste?

So let's focus on how it is that we fission with natural uranium. There was a bit of a discussion on that this morning. In order to do that, you have to build a huge calandria. I got the figure this morning, thank you to you, for telling me how many litres it takes to fill that with heavy water; 250,0000 litres. Another figure that was given was water -- heavy water, whatever it is, coming out of the reactor and it was found to be at 44 million becquerel per litre. Now, that's a lot higher than your figure of 7,000 becquerel per litre which it

would release from any plant. So how is it that we end up with 44 million becquerel per litre?

Well, I can tell you what I know from my physics background, and it’s this; heavy water acts in two ways inside the calandria. Firstly, it is a moderator, and the other one is that it is a sustainer, but what happens inside that calandria when the fissioning starts, is that the heavy water undergoes a personality change. The heavy water is made up of naturally occurring deuterium. In the fissioning process, neutrons are released and when one of those molecules of heavy water absorbs a neutron, our deuterium is changed to tritium. That is the unstable sibling of hydrogen.

So now, inside of our calandria, we are accumulating tritium. Tritium has a half-life of 12.3 years. So while the fissioning is going on, it’s accumulating more, and more, and more tritium, but tritium is unstable. It doesn’t like remaining as hydrogen. It’s going to do another personality change. It’s going to become an isotope of helium.

Now, what does that do? Well, first of all, helium likes to form in bubbles and go to the top of the calandria. That isn’t so good for the rate of nuclear fissioning, to have lots of helium accumulating in the calandria. The other thing that happens is you have a

free OH ion floating around, looking for a hydrogen partner. That's like a base in chemistry.

So it might work on the shielding, something there, but it will bring about fatigue inside of that calandria. These calandria do not last forever, and they themselves become a lower level of nuclear waste.

Thirdly, it also releases an electron, so that's floating around, plus I guess, a very slight gamma particle. So you have all of that going on in your calandria. Pretty soon the fissioning isn't doing its wonderful 30 percent of heat production, it drops. So what have our engineers decided to do? It's time to flush the calandria. Get all of this tritium and all of this helium out and put in more heavy water to bring it back up to its original state of fissioning.

So where does this tritium go? It's dumped, it's flushed from the calandria and wow, look at this figure here, 44 million becquerel per litre.

Now, how are you going to reduce it below 7,000? Well, I can tell you. They're going to get fresh water out of the lake and they're going to mix it so it's down to an acceptable level and release it, or they're going to capture it and try to separate the tritiated water from ordinary water. And I can tell you, that's chemically impossible.

Tritated water is radioactive water, so the question now becomes how do you separate radioactive water from water? We're deep in our doo doo, aren't we? The way to treat tritium, in my estimate -- I've read through and I get literature from the Nuclear Waste Management Organization, and nowhere do they list tritium among the radioactive products that they intend to store permanently.

So where is it? Some of it goes to a place that separates it and would you believe, they turn it into a commodity. You've heard the saga of Shield Source up in Peterborough? I'm sure they bought the tritium from here and further to that, they cannot separate all of the tritium they create, only some of it because that was originally built in the 80s and we build these CANDU reactors in the 90s, and they have multiplied the amount of tritium we create. So it's going somewhere.

Friends at Bruce had one report showing that when they did a study of the groundwater there in the early 90s, the groundwater was 2 million becquerel of tritium. So it was getting dumped. My, my, my.

Another place you can get rid of it is to put it in a stack. Water can be made into steam, boil it away and along with cigarette smoke, people are going to breathe it. We have increasing rates of lung cancer and I

wonder if tritium isn't also one of the culprits. It's just a thought.

THE CHAIRMAN: Okay. Can you please ---

MR. SEITZ: Wrap it up?

THE CHAIRMAN: --- wrap it up, please?

MR. SEITZ: Sure. I have some questions for you about this other document you created here. It's called "Commission Hearings CNSC Staff Presentation". It's on page number 3, you're talking about Fukushima and that statement reads as follows: *"Implementing lessons learned from Fukushima and improving defence and doubt."*

Lessons learned sound like the past tense. Let me tell you this about Fukushima; it's an ongoing event and I hope you keep your personnel there forever because nobody knows how to put that one out. It is though someone lit a match but before they lit it the person said, "If you light this match no one can ever put it out." Nuclear waste.

Questions?

THE CHAIRMAN: Thank you. Questions? Monsieur Harvey?

MEMBER HARVEY: I would ask OPG to comment and to explain the -- what they do with the tritium.

MR. TREMBLAY: So Pierre Tremblay for the record.

That’s a fairly broad question but fundamentally, you know, the releases of tritium from the site are very low. They’re monitored. We contain the heavy water. It’s a precious material for us and so we have an extensive set of systems to dry purify the atmosphere inside the reactor building.

We also, I think, you know, broadly to the point, we have de-tritiating facilities that we operate at the Darlington site to reduce that source term. The tritium levels inside the moderator systems for example, and we turn the -- we capture the tritium as an oxide form and it’s stored, essentially, onsite.

So I would say that, you know, every pathway outside of the plant is monitored. We’ve talked a little bit about that and we’ve talked about the overall impact on the public, which is very, very low and so on. So you know, I guess it -- that would be my broad answer to that question.

MEMBER TOLGYESI: You mention you store it but a part of it is -- well, have you stored all the tritium that has been catched from the beginning of the plant or you do something else with it?

MR. TREMBLAY: Yeah, the practical answer is yes, there is some minor sales of tritium that have taken place from time to time, but you know, basically

yes.

MEMBER TOLGYESI: It’s minor compared to the total amount?

MR. TREMBLAY: To the inventory, yes, that’s right.

MEMBER TOLGYESI: Okay.

THE CHAIRMAN: Can you be a little bit more precise and say you have the calandria running after many years becomes more enriched in tritium. When is the time that you need to take out the tritium out? Where is this tritium gone -- the intervenor’s claim is getting flushed and diluted? Can you give a little bit more precision to the heavy water cycle?

MR. TREMBLAY: Pierre Tremblay, for the record.

You know, certainly. The moderator system over time will increase in terms of its tritium inventory and, you know, the tritium itself, when it -- in its form is an ingestion hazard, it’s an internal hazard to staff, and so we maintain the levels of tritium in the atmosphere very low.

One of the things that we do and have done for some time is reduce the source term, if you will, in the moderator system and we do that through detritiation which is a process of removing some of the inventory and

essentially processing it through the tritium removal facility. And that essentially reduces the tritium significantly.

As I say, the by-product of that is a solid form that is not an ingestion hazard, if you will, and that is essentially how we maintain the levels clearly.

This is an area of ongoing issue for us in terms of managing the tritium levels and the uptake. So, in the CANDU system, we have both external hazards and internal hazards, and this is one of them.

So, as I say, the levels are low, certainly from a standpoint of emissions. We've heard the story today, a couple of times now, in terms of the very small impact that this has in terms of public dose.

So, we do a good job containing it and reducing it on an ongoing basis.

MEMBER VELCHI: This issue of storage of tritium comes up by other intervenors as well and the question is that if the plant's life has been extended by another 30 years, is there adequate storage facility on site in your vaults for this additional tritium?

And the second part is what the intervenor here has raised that the current deep geological repository does not have plans for taking the tritium in storage. So what's the long-term plan for the tritium?

MR. TREMBLAY: Pierre Tremblay, for the record.

So there's adequate space, certainly in the short and medium term for the tritium. There are obviously some commercial applications for it potentially down the road. But, I believe that the space is more than adequate. The volume is not great and so should we require additional space that would need to be done and that could be done.

MEMBER VELCHI: And as far as the long-term disposal of it?

MR. TREMBLAY: Well -- Pierre Tremblay, for the record.

There is some commercial application for this as well. It's been very limited but certainly that's a potential down the road and we're looking at that as one aspect.

MEMBER VELCHI: This is just to confirm the deep geological repository scope does not include looking after the tritium?

MR. TREMBLAY: Pierre Tremblay, for the record.

I do not believe that it does.

MEMBER McDILL: But, the half-life? What's the half-life, 12 years?

MR. TREMBLAY: Twelve (12) years, yes.

MEMBER McDILL: So, what's the decay time, total?

MR. TREMBLAY: Pierre Tremblay, for the record.

In terms of ---

MEMBER McDILL: Something like 125 years?

MR. TREMBLAY: Pierre Tremblay, for the record.

I guess the point that you're making, Dr. McDill, is that it's not an issue in the longer term. Yeah, fair enough.

But I think the question was in fact is the deep geological repository established to handle tritium waste and my understanding is that it is not for that purpose.

MEMBER TOLGYESI: Yes. To OPG, Mr. Seitz is saying that Kingston is downstream from Darlington and there is a -- and the drinking water contains far more tritium.

Do you have or are you monitoring tritium levels on downstream, do you have any plume data, and is there a kind of cumulative impact, if its ---

MR. TREMBLAY: Pierre Tremblay, for the record.

The answer is yes, we do monitor that.

I'll ask Lauri Swami to talk about our sampling program and regime.

MS. SWAMI: Lauri Swami, for the record.

We monitor the water supply plants close to our area but we also look about 40 kilometres downstream. We have sampling locations in Burlington, Cobourg, and Kingston, and we measure -- at least in the latest report in 2011, our measured value at Kingston was 5.2 Becquerels per litre.

And as we've discussed earlier today, that's very consistent with what we see in the water supply plants around our facilities.

MEMBER TOLGYESI: And is there a cumulative impact or cumulative effect?

MS. SWAMI: Lauri Swami, for the record.

The actual amount of tritium that we measure is based on what we would normally see in the emissions from the nuclear facilities in Ontario.

And as I said, it's still 5.2 Becquerels per litre, which is well below the 100 Becquerels per litre that we've committed to and certainly well below the 7,000 Becquerels that is the current standard in Ontario.

THE CHAIRMAN: Anybody else?

Dr. McDill?

MEMBER McDILL: Thank you.

The intervenor raised an interesting question with respect to the amount of total waste, Canada versus United States; can we get a comment on that?

MR. TREMBLAY: Pierre Tremblay, for the record.

Clearly there’s a volumetric issue as a result of the natural uranium so it does have an impact. I don’t have the numbers at my fingertips, but clearly, there would be an increased volume.

MEMBER McDILL: The DSCs are partly responsible for this?

MR. TREMBLAY: Pierre Tremblay, for the record.

The dry storage containers are just the mechanism, the vehicle by which we transfer the spent field from the wet water bay to dry storage. And so those facilities are sized to accommodate the fuel and, as was mentioned in the submission, there are plans to build an additional facility recognizing the increased duration of operation of the Darlington facility as part of the refurbishment.

MEMBER McDILL: One more; the intervenor also requests the facility to test fish and plants in Lake Ontario for organically-bound tritium. The current

testing that was done covers what aspects of tritium?

DR. THOMPSON: Patsy Thompson, for the record.

OBT measurements are a part of OPG's radiological environmental monitoring program. So, I would suggest that OPG could provide the information.

MS. SWAMI: Lauri Swami, for the record.

We do do sampling for organically-bound tritium today. However, the methodology is not fully defined, so as part of our radiological environmental monitoring program and in calculating our public dose, we factor in organically-bound tritium to ensure that it is a component of the public dose.

And as we've talked about earlier, the public dose at Darlington is a very, very small fraction of the legal limit.

MEMBER McDILL: Are there tables and documents that would be available to the intervenor, if he wanted to see the organically-bound tritium content of whatever fish have been sampled?

MS. SWAMI: I don't know the specifics of what's in our report, but our radiological environmental monitoring report, with all the data that we have, is provided on our website. It's also submitted to the CNSC for their review.

So it may not be specifically available but that's certainly what we do as part of our program.

MEMBER McDILL: Maybe I could ask that you and the intervenor share information on that so that the intervenor has access to it.

Would that be helpful, sir?

MR. SEITZ: No, because I've been to their website and they have nothing on organically-bound tritium.

And I was advised to go to the MNR, Ministry of Natural Resources, and when I consulted with them, their answer was "no", they do not test for organically-bound tritium.

Now, that's tritium that's got inside of the skin. And the thing you have to remember about fish, I might drink six glasses of water a day, but fish drink water all day long and all night too.

MEMBER McDILL: Staff has a comment.

DR. THOMPSON: I think our wires just crossed.

Patsy Thompson, for the record.

Just to confirm that OPG does measure organically-bound tritium. It is in their annual report and the annual report is on their website.

But just for the purpose of today, what I

could say is that organically-bound tritium was measured in fish for human consumption and for doses to non-human biota and the values range from 19 Becquerels per litre to 37 Becquerels per litre of organically-bound tritium in fish tissue.

THE CHAIRMAN: When can -- where can one find this study and how does the intervenor can get a hold of this?

DR. THOMPSON: Patsy Thompson, for the record.

There is data in the environmental impact statement. There's also information on OPG's annual environmental -- radiological environmental monitoring report.

THE CHAIRMAN: So I'm just trying to make it easy. Sometimes it's tough to find it once you send it to the intervenor or at least direct him to a way he could find it in the mountain of data, okay?

MS. SWAMI: Lauri Swami, for the record.

OPG will provide the link to the website for both the environmental impact statement and the radiological environmental monitoring program.

THE CHAIRMAN: Thank you.

Anybody else -- have they got a question?

You have the last word.

MR. SEITZ: Thank you.

There is some commercial fisheries in Lake Ontario and I think out of fairness to them because they market fish from Lake Ontario, have you approached them to take larger samples of those fish and test them for organically-bound tritium?

MS. SWAMI: Lauri Swami, for the record.

Our radiological environmental monitoring program, as Dr. Thompson mentioned this morning, is based on an ecological risk assessment, and the sampling program is based on what we would see as potential impacts.

We sample various media, including fish. That information is published, but overall what we would say is we don’t see a significant change in the radiological components when we do sample fish. And we look to what that would contribute to public dose.

And as we’ve discussed, it’s a very low number, marginal at best, so it doesn’t have an impact on the commercial fisheries.

THE CHAIRMAN: Okay. Thank you.

Very last ---

MR. SEITZ: In 1943, before all this visioning started, do you know what the Becquerel per litre in water was naturally occurring? It was 0.1. It was less than 0.1 Becquerel per litre; one scintillation

every 10 seconds. So if you say you're using five you've just increased it by 5,000 percent over what nature would have done.

Thank you.

(APPLAUSE/APPLAUDISSEMENTS)

THE CHAIRMAN: Thank you.

Okay, we'll move to the next submission by Williams Treaties First Nation, as outlined in CMD 12H-13.190. And I understand that Miss Sandy McKenzie will make the presentation.

The floor is yours.

12-H13.190

Oral presentation by

Williams treaties First Nations

MS. McKENZIE: Thank you. I'm Karry Sandy McKenzie; I'm Williams Treaty First Nation Process Coordinator. I'll be representing the Williams Treaties today.

The Williams Treaties are comprised of seven First Nations in Southern Ontario and they include the Chippewa's of Beausoleil, Georgina and Rama First Nation and the Mississauga's of Alderville, Curve Lake, Hiawatha and Scugog.

These First Nations have a significant historical relationship with one another that endures to this day, rooted since time immemorial in protecting and preserving their Aboriginal and treaty rights and interests in the contemporary context.

We've participated in this process with CNSC and OPG consulting with the First Nations on the extension of the DNGS licence. Our intention to participate in that process was from a traditional knowledge context and what could we offer to this process.

We relied on many of our -- I guess -- colleagues, scientific expertise in reviewing the reports that they had submitted, as well as the reports and minute from CNSC and OPG. We've had many meetings with OPG and CNSC staff who have addressed a lot of concerns and provided us with some capacity of knowledge in terms of the technical data that was being presented to the First Nations.

Our priority remains the ongoing protection and preservation of our lands and waters and wildlife and fisheries in our traditional territories. The nuclear station is right in the middle of the Williams Treaty traditional territories. And we recently also undertook a process with Ontario to recognize those pre-Confederation treaty areas. So there are valid treaty interests as well

as Aboriginal interests in protecting this area.

One of the consistent comments from I think OPG and CNSC is that there have been no -- there are no significant or -- impacts on the First Nations traditional rights or interests in this area because of course the nuclear station itself is off-limits. Public can't access it. So gathering of medicines, hunting and fishing obviously cannot occur there because of the restrictions and access to that site.

However, we maintain that notwithstanding that limit of access we look at this process as a holistic approach and it's not a static vision. It's not an isolated vision of limiting how that affects our people as well as all of the other citizens in this province and arguably in Canada should there be an issue with that extension.

So in that respect it is important to note that we rely on our teachings and stories which are embedded in our oral history.

As you are aware Section 35(1) of the *Constitution Act* also recognize and affirms our Aboriginal and treaty rights in that regard. And we've asked for meaningful consultation with CNSC and OPG and they have accorded that to us and it has been a positive experience thus far.

We do have some remaining concerns, notwithstanding that consultation, and hopefully they will be remedied in ongoing consultation as we complete this process.

In particular, we note that at Section 410 of the EA there is a section there that purports to address Aboriginal interest.

We didn’t think that it adequately described our relationship with those traditional lands and waters surrounding that site. It is our fundamental belief that we, as all First Nations, have a unique cultural, traditional and social connection to that land and a special interest in preserving, protecting the balance of the environment.

But we also recognize that it also needs to provide a sustainable future for generations to come. But that means not only economically but also healthy in a good way. And we are partnered with other intervenors concerns on at what expense will we achieve that.

So OPG noted on its final draft that it remained committed to continuing to work with our First Nations to ensure it has a deeper perspective of this knowledge and discuss how this knowledge may better inform its programs and processes.

So in this way we hope that we can move

forward in the importance of protecting the environment and the perspective of stewardship with that.

We understand the effects on land will have a reverberating impact in other areas as well, such as human health, fish, wildlife, air quality, water quality and socio-economic wellbeing.

As such, we make this submission with that holistic perspective in mind but we also balance the reality that the Darlington nuclear station is an existing site that is already had an enormous footprint on our environment.

It is hoped that further degradation of this environment is not a foregone conclusion and the consideration of the refurbishment and continued operation.

On the matters that we are of the opinion remain outstanding as it concerns the First Nation; on the matter of fish impingement and entrainment OPG has stated in the EA that it will mitigate the current impingement and entrainment losses by offsetting.

It continues that the OPG shall research and incorporate additional mitigation matters to an extent reasonably and economically feasible, and if required, shall offset.

From our perspective we remain concerned

that compensatory measures, such as the creation of a new habitat may not succeed.

There have been no long-term concrete examples of past successes in this area to appropriately evaluate. We also believe that contingency plans should be developed as an alternative should compensation plans be unsuccessful.

On the issue of groundwater we've also noted that at December 21st, '09, that spill of tritium contaminated water occurred.

It is noted that CNSC has stated that they do not consider this event to be a significant risk to the environment or the public health. However, we continue to be of the opinion that the above-noted spill is yet another example of the risk associated with the handling of nuclear materials.

As it relates to Aboriginal interests, this is cross-related to the matter of malfunctions and accidents. The Williams Treaties First Nations remain concerned about the effect of the St. Marys' Quarry blasting activities. And we haven't really received a clear indication of the relationship between the Darlington site and St. Marys and how that they're interrelated. We understand that there are -- there is a site at the Darlington site that measures the seismic

levels at St. Marys. But we also have been advised that there’s an application to increase that activity.

We would like more information on the potential impact and the relationship between the two parties, and what work has been done to ensure that that seismic activity at St. Marys doesn’t negatively affect the Darlington project.

In addition Aboriginal interest also refers to the offsite and storage of nuclear waste management facilities. CNSC has indicated to us that such shipments typically are less than 10 per month on an annual basis. The report concludes that as such, that transportation of these materials will comply with existing approved systems and does not warrant further consideration in terms of potential effects on Aboriginal interests.

We of course, as First Nations, have communicated our concerns over the storage and transport of this nuclear waste through our First Nations and other First Nation traditional territories, and we disagree that this matter can be easily dismissed. The experience regarding the proposed shipment of waste from the Bruce nuclear facilities guides us in this conclusion.

In this respect we rely on our Grand Chief, Patrick Madahbee, speaking on behalf of the Anishinabek Nation. He stated that the Supreme Court has stipulated

the requirement for consultation and accommodation with First Nations. First Nations have to be accommodated on activities that could have an impact on our traditional territories.

As well, the United Nations' Declaration on the Rights of Indigenous Peoples says handling of hazardous materials in our territories requires our free prior and informed consent.

So we maintain that the storage and the transport of those materials, we cannot condone.

Finally, the requirement of an EA follow-up programme has been identified for the project. In this respect, the William Treaties are concerned that the priority again appears to be focused more particularly on the convenience and cost associated for protecting and preserving -- I'm sorry, the priority appears to be more focused particularly on the convenience of costs to the project rather than the means of how can we preserve the environment and protect it.

In closing, the FN has stated that one of the most fundamental teachings of First Nations is the obligation to care for this earth. It is a firmly held belief by the First Nations that they are entitled to be sustained and to prosper from the lands and resources given to them by the creator, but that they also hold

sacred responsibilities to care for the earth in a responsive manner.

We have continually expressed our concern about the impact of the nuclear industry on the land and all people. And our greatest concern is to ensure the long-term sustainability of the land, as it is our deep and abiding connection to the land that holds our future.

It is hoped that the Panel will ensure the outstanding matters concerning emergency preparedness and the transfer of hazardous materials, and the enforcement of follow-up programmes will be addressed. It is hoped that the continued operation of the refurbishment of the Darlington Nuclear Generating Station is not completed at the cost of health of Lake Ontario.

Thank you; Migwetch.

THE CHAIRMAN: Thank you. Anybody who wants to start? Ms. Velshi.

MEMBER VELSHI: She raised a number of issues. I'll start off with the St. Marys' Quarry and the two issues around that, both what is a relationship and what impact is it likely to have on the refurbishment plans and any future plans for St. Marys' Cement because you said there's some indication that they may be increasing their scope of work.

So maybe we can get OPG to comment on all

those three aspects of St. Marys' Cement, please.

MR. TREMBLAY: Pierre Tremblay, for the record.

I'm going to ask John Peters to deal with that aspect of the EA.

MR. PETERS: John Peters, for the record. St. Marys' Quarry and OPG have had a longstanding neighbour relationship in that they are our neighbour to the east on -- to our property boundary. And we have a formal agreement that was struck through the Ministry of Natural Resources who issues permits for St. Marys' Quarry to exist and to operate under certain conditions. And any expansion or change to that quarry would further require a revision, and a review potentially, of those permitted undertakings.

So OPG has a formal commitment to a certain performance-related -- it's called seismic but the blast values are known. They are monitored and they are annually reviewed by the parties to make sure that they never achieve a level that becomes a threat to the operation of the Darlington site.

Now, that -- I can say that about this particular project, so for the life of the facility that would continue to be the case. And St. Marys would need to work through that process as part of their permit

expansion, should they choose to do that.

Is that sufficient?

MEMBER VELSHI: Yes. I guess the question is; is that agreement available? Is that publicly available if the intervenor wanted to review it?

MR. PETERS: John Peters, for the record.

I believe that the agreement was struck as part of the licence conditions for the quarry to operate. So I believe that that would be available. It's a -- there's nothing magical about it all. And the values that are recorded are in the public domain as well and available on the website.

THE CHAIRMAN: Just to piggyback, over the historical life of the quarry, what was the biggest blast and did you ever measure the possible impact? Is there any possible impact? Can it generate a release -- seismic forces that would cause any damage?

MR. PETERS: So yes, the little bit of information we can offer is that the agreement is to -- three millimetres per second as the movement that is the agreement. OPG has got ranges that are a tenth or lower than that on a regular basis. So they never approach that three millimetres per second. And it would have to be 10 times or more higher before we would feel any effect on our operation.

THE CHAIRMAN: Thank you.

Ms. Velshi?

MEMBER VELSHI: My second question, if you turn to page 9 of the intervention, again this is a question for OPG and it's on thermal effects from the diffuser.

And the intervenor says that the EA -- the draft EA was based on this Griffith's 1980 study, a 30 year old study, and are there plans on updating it and, you know, what kind of impact would that have on the analysis?

MR. PETERS: John Peters, for the record.

The Griffiths study is a piece of work that started in 1980 and was completed in the late eighties, '89 or so. And we have undertaken to start and redo that work. It was the first year of the Reid analysis of -- using the same methodology, the same approach, was last winter. And we are going to do a second round this winter to make sure that using modern laboratory techniques -- modern codes and standards, that we can demonstrate exactly what -- that the results will be similar or better or whatever they are, and those will be published and form the basis, as we've said, in our follow-up program to determine thresholds for potential effect going forward.

So, yes, we have assessed that. We are in

the middle of that evaluation and updating. And we will confirm that as a basis for the ongoing monitoring program to determine when there may be an effect of the diffuser in the future.

Right now we see no effects from its operation based on the known performance and the known thresholds we have assessed to date.

THE CHAIRMAN: I seem to piggyback on your question all the time. It’s also in the same paragraph, on page 9, it mentions the Gagnon model developed by Environment Canada to assess thermal impacts. So my question really is, will all the results of those studies be available for 2014?

MR. PETERS: John Peters, for the record.

Yes, that is true; they will all be available by 2014.

THE CHAIRMAN: Okay. Thank you.

Mr. Tolgyesi.

MEMBER TOLGYESI: Merci.

This is a question to OPG on page 14, the intervenor is stating that mitigation measures for the adverse thermal effects of these charge were not identified. And therefore OPG will simply be required to review the results of that adaptive management programme. Could you comment on that, the thermal effects of the

discharge were not identified? Page 14, first paragraph, it starts at third line.

MR. PETERS: John Peters, for the record.

This ongoing monitoring issue that is being raised here is an attempt for both of us to understand exactly what the requirements are. We have created an adaptive management strategy, which we’ve placed on our website for discussion and review by interested parties, to make sure that people recognize what we know and what we do not know, and the areas of research that we are actively engaged in.

This conclusion is pointing out that currently we do not see effects. We are actively involved in research to further broaden the scope of the analysis to ensure that, very conservatively, that we don’t have a problem here, and that’s what’s being described. When we say technically and economically feasible, we’re pointing out that there are things that could be done in the future should there be an issue, and we’ve identified those in our website and in this report for review and comment.

MEMBER TOLGYESI: Well, I think that the intervenor is saying that you didn’t identify thermal -- adverse thermal effects, and what you eventually will try to do is, probably, by adaptive management programs that find economically achievable, with mitigation options, if

it cannot be identified, and will consider offset measures which will be, to some extent, I think, much easier solutions, or eventually will not answer to the problem.

MR. PETERS: Just -- the statement on your part -- John Peters, for the record.

Just to comment, we used this -- we demonstrated that we have no effects today. We acknowledged in our work that the potential effects of climate change over the continued life of the facility has some potential to increase water temperature, and that we would examine means why which we would continue to operate regardless, in a way that did not affect the fish community, and we described several mechanisms by which we could do that, which were to change our operation.

If all that failed, then we would be faced with, potentially, creating a compensation program in consultation with regulators who would administer that, require it to be completed, monitor, and verify that it was adequately done and met the objectives. That’s all as set out in the *Fisheries Act* authorization process, as I understand it, and OPG intends to work with DFO as we go forward to explore this, once the EA has been approved.

DR. THOMPSON: Mr. Binder, before -- my apologies, Patsy Thompson, for the record.

Before moving on, I just wanted to clarify.

The impression that is being left is that the assessment did not consider thermal effects.

We described this morning, in the summary on Slide 20, that thermal effects were assessed. They were assessed for round whitefish eggs, and that the conclusion was that there was a 1.4 hectare area in -- on the margin of the ideal reproductive zone which would be impacted which would result in no significant adverse effect.

The moving forward, there’s a requirement for a follow-up program. There’s a requirement for adaptive management. Those programs have not been fleshed out yet. The next steps are, if the Commission approves the EA, would be to work with OPG, DFO, Environment Canada and other stakeholders, to define the programmes and the triggers moving forward.

And, of course, moving to 2014, it would also be presented to you are part of the licence.

MR. CHAIRMAN: Okay. I just have one question.

On an ongoing relationship, you mention that you have set up an ongoing consultation process? Is this new or is it sort of something that’s been around -- they’ve been around for a while, the OPG and the Darlington. Is that a new relationship, and how do you

see it moving forward to help during the mitigation implementation process?

MS. McKENZIE: It, I think, could be interpreted as a relatively new process. It has really commenced with this project, in a meaningful way, I would argue.

We have representatives from all of the First Nations that are involved, and come to meet with representatives of OPG, or CNSC in this example.

In terms of moving forward in the mitigation, and to follow-up -- I'm sorry, I don't know your name; I forgot already. I think the concern for us was more not the studies have not been completed. We've only had one winter of looking at the data and what the results of that may be, and we respect that there is going to be a follow-up programme, and that there is going to be a compensation plan, if required.

But, again, we maintain is that the price -- at everything it seems that the environment has to pay the price for the compensation. And you can't always just compensate when you've changed something in the environment, and that's what our ongoing concern is.

So we hope in terms of ongoing participation with CNSC or OPG, that we would be actively involved in obtaining those studies and in a meaningful

way having a dialogue about how that follow-up programme is implemented and how it is enforced.

One of our questions remained was, yes, we understand that it has to be enforced, but what happens if they don't meet those standards? Do you shut the whole plant down? Obviously not. We couldn't get a clear answer as to what would happen if they didn't meet those standards. How long does it take to implement an alternative compensation plan?

Issues like that remain outstanding, so we look forward to see the final data, and I think it's premature to reach conclusions that nothing is significant right now because we don't know yet until those studies are complete.

Thank you.

THE CHAIRMAN: But I assume that if the EA is approved, you'll be actively involved in the eventual licence application for the refurbishment, for the -- in 2014.

MS. McKENZIE: Yes, we would hope to be. Thank you.

THE CHAIRMAN: Okay. Thank you very much.

I'd like to move on to the next submission by the Municipality of Clarington as outlined in CMD H-13.3, and 13 -- sorry, 13.30, and 13.30A. And I

understand that Mayor Foster will make this presentation.

12-H13.30 / 12-H13.30A

Oral presentation by the

Municipality of Clarington

MAYOR FOSTER: Mr. Chair, Members, my notes say, “Good morning.” For the record, Adrian Foster, Mayor of Clarington.

You have a written submission to respect some time limitations that are appearing, and you’ll note that I’m skipping through a couple of the sheets that are here.

As Mayor of Clarington, I’m very pleased to be here to address you regarding the three issues relating to the Darlington Nuclear Generating Station being considered by the CNSC at this hearing.

I have with me, Franklin Wu, our Chief Administrative Officer; and Gordon Weir, the Fire Chief; Faye Landmaid, who is the Manager of Special Projects; Ron Albright, who is our Manager of Infrastructure and Capital Works. We also have Janice Schwartz, who is a Principal Planner, and Wilma Cray, both of those folks were involved in the peer review of the EIS for the Darlington refurb project.

As the host community for the Darlington Nuclear Generating Station, the Darlington Waste Management Facility, the proposed Darlington New Nuclear Build Project and the Port Granby Project, the Municipality of Clarington has a vital interest in ensuring the safe operation of these facilities within our community.

We've appeared before the CNSC on a matter of -- on a number of occasions to make you aware of the municipality's position on the various matters being considered by the Commission. Most recently, we addressed you in March of 2011 at the hearing for the Darlington New Nuclear Build Project and, again, in September 2011 at the licensing hearing for the Port Granby project.

On both occasions, the central focus of our submission has been ensuring the safety and well being of our community. Today's submission will continue that theme.

My comments to you will briefly address the topics outlined on the slides. I'm going to spend more time addressing some issues as they are important to the municipality and we believe also to you.

As a host, who are we? Clarington came into being in 1974. It is an amalgamation of the former townships of Clarke and Darlington and is one of eight

lower-tier municipalities in the Regional Municipality of Durham. Clarington covers 612 square kilometres. In 2011, we had a population of approximately 84,500 and 30,230 households.

Clarington is a blend of vibrant and growing urban areas, scenic rural landscapes and over 30 kilometres of shoreline along Lake Ontario. Our residents live primarily in four urban areas; Newcastle to the east, Orono to the north, Bowmanville and Curtis on either side of the Darlington Nuclear Generating Station. We also have a significant number of residents who live in our 14 hamlets and other rural areas.

With our large rural land base, it is not surprising that agriculture is our largest industry; OPG and St. Mary’s Cement are our major employers along with Lakeridge Health at the Bowmanville Hospital Campus.

We are also close to Durham College and the University of Ontario Institute of Technology in Oshawa and Trent University in Peterborough all of which provide skilled and educated young people eager to work within the energy industry.

The Municipality of Clarington is proud to be the host for the Darlington Nuclear Generating Station including the Darlington Waste Management Facility. Darlington has been a significant and positive presence in

our community since construction on the station began in the early eighties. We anticipate and look forward to this continuing for many more years.

OPG has the community's confidence. This has been built through continuous community liaison and outreach by OPG and the superb safety performance of the Darlington station. This confidence is well-founded as evidenced by the recent announcement of the Award of Excellence for the Darlington Nuclear Station by the Institute of Nuclear Power Operators.

The Municipality of Clarington is pleased to provide -- be provided with this opportunity to express our support for OPG's applications to extend the operating licences for the Darlington Generating Station and the Darlington Waste Management Facility and the environmental assessment of the proposed refurbishment and continued operations project. I will speak to our involvement in the peer review of the draft environmental impact statement for the refurbishment project later in my presentation.

I'll move ahead a little quicker. Land use in Clarington is required to be in conformity with provincial regulations such as the Places to Grow in the Greenbelt Plan as well as the regional official plan for Durham region.

The Municipality of Clarington is responsible for the development and implementation of emergency planning management programs under the *Emergency Planning Plans Act,* a *Fire Prevention and Protection Act* and the Ontario Fire Code. Our emergency management plans are integrated with those of DEMO, the Durham Emergency Measures Office. We work closely with DEMO in developing and undertaking training exercises and drills and reviewing emergency plans.

Clarington's emergency plan prescribes the emergency organization and emergency response management to be implemented within Clarington and provides a framework for responding to any type of emergency including any that may occur at the Darlington Generating Station. The plan outlines the municipality's emergency management policies, response strategies and operations and roles and responsibilities in the event of an emergency. It is reviewed every year and updated as necessary. Training exercises are also carried out annually.

In partnership with OPG, the Clarington Fire and Emergency Service Department has a cross-training program for both Clarington staff and OPG staff. Every year, department staff participate in regular training exercises at the Darlington site and train at OPG's

Wesleyville Training Facility. As well, a variety of training objectives are practiced annually including co-training with OPG staff.

Emergency and Fire Services conducts regular tours of the facilities at the Darlington Station and works closely with management staff at OPG. OPG has assisted both Durham region and the area municipalities including Clarington with evacuation planning for both the Darlington and Pickering Station sites. Drills are conducted each year for activities such as setting up offsite evacuation centres and worker centres.

The evacuation plans and modelling that have been developed for the Darlington Station have included input and review by Clarington Transportation Planning, Operations and Emergency Services staff.

While Clarington has large areas of green space and agricultural lands, these areas are not available for future residential or industrial growth. The Oak Ridges Moraine stretches across the northern portion of Clarington and is subject to the Oak Ridges Moraine Conservation Plan. The Greenbelt encompasses the Oak Ridges Moraine and lands to the south except for the urban areas and whitebelt lands. Greenbelt policies apply to 82 percent of Clarington.

The whitebelt lands separate our urban

areas, include some of the best agriculture lands within Southern Ontario and will be continued -- will continue to be protected through our official plan policies. We have to strike the right balance between urban and rural and while there is pressure to allow expansion into the whitebelt lands, there is no justification to do so at this time and for at least 20 years.

In future, should expansion into the whitebelt occur, it would in the first instance be to the east of Bowmanville where the servicing infrastructure is easily expanded. Bowmanville's west side is constrained by infrastructure capacity and the physical constraints of a rather large drumlin. The eastward expansion of Curtis is constrained by the 407 East Link. As such, the Darlington Station is ideally located away from any potential residential expansion.

As the host at Darlington Nuclear Generating Station, the Darlington Waste Management Facility and the Port Granby project, Clarington is a knowledgeable nuclear host community and we understand how nuclear power affects our community. OPG provides annual presentations and reports to council and we participate on the Darlington Community Advisory Committee and the Durham Nuclear Health Committee. We have participated in several CNSC hearings, are involved with the nuclear waste

management organization and our CEO is the Secretary of the Canadian Association of Nuclear Host Communities.

At the community level, the children of Clarington grow up visiting the Darlington site, playing soccer on the fields adjacent to the station and riding their bikes on the waterfront trail where it crosses OPG's property.

The Darlington Nuclear Generating Station has been part of our community for 30 years and has provided many benefits with minimal adverse effects on the natural, social and cultural environments. We've experienced the effects associated with constructing and operating the station which we have found to be manageable and which we have been diligently preparing for the refurbishment and continued operation of the station.

With funding provided by OPG, the municipality retained a team of qualified consultants to undertake a peer review of the draft environmental impact statement for the refurbishment and continued operations project.

Our peer review focused on the municipality's core responsibilities and interests, planned use, the socio-economic environment including municipal finance, traffic and transportation impacts and the atmospheric environment. For each of these

components, the peer reviewers looked at how the draft EIS evaluated the potential effects of the project including cumulative effects, the measures proposed to mitigate these effects and the requirements including -- included in the EA follow-up program.

The peer review resulted in numerous comments on the draft EIS, all of which were dispositioned by OPG to the satisfaction of the municipality and its peer review team. This process allowed the draft EIS and supporting technical documents to be revised to reflect the municipality’s comments and concerns prior to its submission to the CNSC for review.

Clarington council approved the peer review comments on the draft EIS on October 24, 2011.

The peer review found that OPG had comprehensively addressed all aspects of the proposed refurbishment and continued operations project for the Darlington Nuclear Generating Station.

We've also reviewed the proposed EA screening report and found that the document reflects the results of the municipality's peer review.

There are a few key issues of importance to the municipality that we'd like to specifically draw to your attention.

The Darlington Generating Station is

ideally sited between Curtis and Bowmanville south of the 401 on the shore of Lake Ontario. The land uses that surround the site are, for the most part, industrial, commercial and green space.

Of particular note is the Clarington Energy Business Park to the west of the station. This park is envisioned as a cluster development for energy-related businesses.

All existing and planned urban residential uses are located entirely within the Curtis and Bowmanville urban areas and lie outside the three-kilometre contiguous zone for the station.

There are no sensitive land uses, existing or planned, within the three-kilometre contiguous zone for the Darlington Station site. The municipality agrees that there is a need to ensure that incompatible land uses are not located in the vicinity of the station, but we note that our land use policy must conform with provincial legislation and the Durham Region official plan.

We would welcome the opportunity to work with upper levels of government and OPG to develop a comprehensive policy for sensitive land uses in the vicinity of nuclear generating stations.

A second issue for the municipality relates to the potential traffic and transportation impacts of the

Darlington refurbishment project and the cumulative traffic impacts related to planned municipal growth and other projects in the area such as the new nuclear build project and the East Durham Link.

This was an important element of our peer reviews, of the draft environmental impact statements for both the refurbishment project and the new build project.

The EA screening report reflects comments made through the peer review that, despite road improvements planned by the responsible road authorities in the vicinity of the Darlington site, a decreased level of service is expected at some locations within the local road network as a result of the refurbishment project.

A number of measures are proposed to ensure the transportation system continues to perform satisfactorily. These include having OPG engage interested agencies to develop a coordinated system of road and transit improvements to maintain safe and efficient transportation operations in the area during refurbishment and in the longer term.

Since 2007, OPG and the Municipality of Clarington have been meeting with other transportation authorities, including the Region of Durham and the Ontario Ministry of Transportation, to discuss planned and required improvements to the road network serving the

Darlington site. More recently, the Darlington refurbishment traffic management working group was created in 2012 with representatives from OPG, Clarington, Durham Region and MTO, with other agencies being invited to participate as needed.

OPG coordinates the work of this group in accordance with the mitigation measures set out in the EAs for both the Darlington refurbishment and new build projects.

The purpose of the working group is to plan a coordinated program of road improvements to maintain safe and efficient transportation operations in the vicinity of the Darlington site. The terms of reference for the working group specifically include the development of a traffic management plan as a deliverable.

OPG has committed to participate financially as appropriate in transportation works improvements if they are attributed to the refurbishment project. OPG has also advised that it is willing to enter into front ending agreement with the Municipality of Clarington for works required of OPG by the traffic management plan.

As Council and as the elected representatives of the people of Clarington, we have listened to our constituents and can, with confidence,

tell you that our community has been actively engaged and that they are aware and comfortable with nuclear issues.

The Darlington Nuclear Generation Station, including the Darlington Waste Management Facility, has been a significant and positive presence in our community for many years. We look forward to the benefits these facilities bring to Clarington for many more years.

Based on our experience with both OPG and the Darlington Station, the Municipality of Clarington is pleased to advise the CNSC that we support the applications by OPG to renew the operating licences for the Darlington Nuclear Generation Station and the Darlington Waste Management Facility.

We also support the conclusions and the proposed mitigation measures provided in the EIS and the EA for the Darlington refurbishment and continued operations project.

In summary, the refurbishment and continued operations of the Darlington Generation Station is a significant part of our economic development strategy, as are energy-related businesses. A major focus of our efforts is the Clarington Energy Business Park to the west of the Darlington site, which OPG is an integral part of.

Joint planning undertaken by our emergency services department in cooperation with DMO and OPG

ensures that we are prepared for unplanned incidents. This working relationship has continually developed over the years and has become a much envied collaboration between large industry and a municipality, and it continues to improve.

The municipality, region and OPG have been working together to ensure that the community infrastructure will be ready to welcome the professionals, construction workers, crews and activity that will be part of this major project.

Clarington is proud to be a nuclear host community and to be the host of the Darlington Nuclear Generating Station and the Darlington Waste Management Facility. Thank you.

THE CHAIRMAN: Thank you.

Questions? Mr. Harvey?

MEMBER HARVEY: Merci, monsieur le président.

Page 44 of your written submission, you mention that Clarington's emergency plan prescribed the emergency organization and the response management to be implemented within Clarington and provides a framework for responding to any type of emergency.

Are you far from the moment wherein the plan will be completely implemented? I mean, because in

your oral presentation you mention that there should be some modification to the transportation network and things like that, and you are in discussion with OPG and you have been in discussion for many years.

So I understand you've got to plan, but are you far from the moment that the plan would response like you mention here to any type of emergency? And I would like to know what you mean by "any type of emergency".

MR. FOSTER: Adrian Foster.

If I'm understanding the question, there are two parts to that. You're looking at the transportation, the issues around transportation, as well as the ---

MEMBER HARVEY: Yes.

MR. FOSTER: --- the -- I'll pass this over to the chief in a moment, but, you know, clearly emergency planning is an ongoing effort that we do, so you try to anticipate what comes. You try to imagine what comes forward and you make the plans based on that.

Chief? Chief, do you have anything to add to that?

MR. WEIR: Gord Weir, for the record.

If I understand the question, I guess our emergency plan is originally we had two plans, one for regular emergencies throughout the municipality and we had

a nuclear plan. We've combined them.

But in that plan, I guess I would suggest it's -- we're laid out that should an emergency occur at Darlington, OPG through the proper channels, we would be notified, whether it's a standard emergency such as, you know, a small fire or medical type emergency we're dispatched, a larger type emergency where the province might be notified and then we're notified and we would respond.

With regards to transportation, we work with both engineering and planning and EMO.

I think -- is your question more about how we would evacuate people? And yeah, it's an all enhanced approach that people would be notified and then evacuated from the three or the 10, whichever is required.

I'm not sure if that gives you totally what you need.

MEMBER HARVEY: No. I mean, we can have a plan, but if an emergency would happen tomorrow, for example, will the plan -- would the actual plan what you have in hand now and will that -- will you be able to guarantee the security of the people with the -- what you have now with the current transportation network?

Is there places where you would not be able to meet your objective.

MR. WEIR: Gord Weir for the record. Well the plan, I believe, would work. We train annually a multitude of times with OPG, different types of emergencies, so I am quite confident that that training we do and the ongoing training is sufficient.

Regarding to get people out safely, yes, I believe with coordination through EMO and Durham regional police, and the other entities, yes, we could safely get everybody moved to either evacuation sites or outside the zone, yes.

MEMBER HARVEY: To what extent the population is aware of the plan and would respond to any advice from the -- from OPG or from the Darlington.

MR. WEIR: Gord Weir for the record. Well the plan is -- it’s published, it’s on our website. We do a lot of ongoing public education events promoting it, along with OPG. As the Mayor had alluded to -- reports, OPG comes to counsel and speaks. I’m out frequently, you know, notifying different facets of the public in our community as to how things would be managed down there. Yeah, so I am quite confident that it’s well -- most people would have a good understanding of how things work.

THE CHAIRMAN: I -- can I jump in this? So post Fukushima people are preoccupied with doomsday

scenario. Forget about this little fire and traffic accident, we are talking about a doomsday scenario and the question is, is there a plan for a doomsday scenario?

And I got to tell you, my concern is when you deal with institutional arrangements, there's too many cooks. So you got the OPG and I don't know if Bomanville has its own plan which dovestail into Clarington, which goes into the Durham which goes into EMO.

And somewhere along the lines, CNSC gets involved and Ministry of Health of the Federal Government, et cetera, et cetera. Is there a site specific plan that puts all those coordination for a doomsday scenario?

MAYOR FOSTER: Thank you Mr. Chair. And again, I'm going to pass this over to the Chief but I can tell you that a very important part of what we're doing on the emergency planning is, in fact, working together with our emergency services being coordinated and training with Darlington's emergency services.

And then the overview with EMO, including the annual exercises that are not always nuclear exercises -- nuclear emergencies but how we would deal with a Durham wide emergency. So I understand the many cooks but in this case, you know, I think the cooks are working well together.

THE CHAIRMAN: It's going to happen in your

community.

MAYOR FOSTER: Well together ---

THE CHAIRMAN: So you have sort of a -- kind of an interest, a selfish interest in making sure everybody knows what needs to be done right?

MAYOR FOSTER: We are deeply interested and deeply concerned and as you point out, especially post Fukushima. So the community is-- they're aware and yet, I would suggest that largely they're -- given the number of calls that I did not receive after the event they're comfortable but if I -- if you allow the Chief to respond to the joint training exercises and the depth of which the various organizations interact.

MR. WEIR: Gord Weir for the record. Just to clarify to your comment about that. The plan -- our plan is not Bomanville based, it's Clarington based. So there's one plan for the municipality of Clarington.

Three tiers of government; the lower being the municipality but also with the regional -- the region has plans that would interface along with the province so those three entities work close together depending on, you know, if it's the doomsday or the larger type of emergency.

Regular training, as Mayor Foster alluded to, occurs and you talked about Fukushima. Just -- most

recently last week I was able to -- I attended the site. OPG has been doing a lot of work on studying the effects of Fukushima and how they can prepare for, let's say, their own Fukushima, I guess. They've implemented a number of things, some of which they've just been in receipt of a quite a bit of mitigation equipment. Last week, I believe it was on Thursday, that they did a dry run with some of that equipment deploying it. They didn't actually run a lie with it but deployed it. I went down Friday and actually observed and saw some of that equipment. So they're well in hand in preparing that.

The next steps in that evolution will be cross training with our staff and their staff the SERMs and the ERMs so that should we be called down there to assist, we will be able to assist in a proficient manner.

THE CHAIRMAN: Okay, Dr. Barriault?

MEMBER BARRIAULT: Just a brief question. We've covered some of this ground in previous meetings and I guess what I'm wondering is, what kind of a notification system do you have for the community? Do you have alarms? Do you have a phone system? What kind of a system do you have?

MR. WEIR: Gord Weir through Chair. Well yeah, well we've got a public alerting system that's -- it's in place right now as well as it's in Pickering as

well it’s -- they’re sirens.

The next evolution is looking at some either type of -- within the three kilometre zone either some type of a radio transmission type alerting or possibly -- they’ve been testing an auto phone dialling for the residents that would live within that three kilometre zone, but that’s in place now.

MEMBER BARRIAULT: How -- what’s in place now, is it fully functional now?

MR. WEIR: Fully functional and it’s tested regularly. Yes.

MEMBER BARRIAULT: Okay, thank you. Thank you, Chair.

MEMBER VELSHI: A couple of questions for you Mayor Foster. You said in your statement that you would welcome working with your partners in developing a land use policy for around the site. I guess both to make sure that you limit sensitive facilities being built and making sure the evacuation plans are not undermined at all. Is there a firm commitment to develop such a policy and if there isn’t, what is it going to take to develop one?

MAYOR FOSTER: Adrienne Foster, I think there are two parts there. So the land use policy is -- Clarington is the lowest level of government. We must

conform with what the region of Durham tells us to conform with as well as the province of Ontario. At the end of the day it's going to be the province that has to put those planning tools, if you will, at our use. We can't, being the lowest level, do that on our own. We will be delighted to engage in those discussions but again, it's got to come from the province, come from Durham region so we're the last folks there.

That's probably separate and apart from -- not necessarily tied in with the, you know, with the evacuation plans but probably just makes good planning sense to keep that zone free. So as it is now with our zoning, it is. If the province or the region told us, and they won't, but if they told us that something else had to go in that we disagreed with, we'd be in a fight. We'd rather get those policies in place now today.

MEMBER VELSHI: So you're not aware of any initiative by the province to put in place such policies?

MAYOR FOSTER: Nope, not at this point in time.

MEMBER VELSHI: Okay, my second question was a slide that you skipped. It is on population growth and so it's slide number 12. There have been a number of interventions that have commented that the screening report does not look at population projections to 2055 or

whatever the plan date is for the continued operations. Can you comment no what you envisage the population growth to be like from 2031, because as I look at just a simplistic line here, you know every 30 years it seems like doubling, and anyway, comment on population growth to 2055 please?

MAYOR FOSTER: So we are a high growth area. I'm not sure, Ms. Langmaid, if we've got some actual numbers percentage wise moving forward. And as we talked about, the growth would be centred, in all likelihood in Bomanville, not entirely.

Curtis is going to be the second largest and then again, that growth -- I think you're going to see it mostly north in Bomanville. Curtis, we've got the 407 expansion coming down, so there is a natural barrier in Curtis.

And as I've mentioned on one of the slides, the extended growth that you would see moving out into the future in Bomanville, happens most easily on the eastern side of Bomanville, not the western side because we've got challenges with infrastructure and some natural features.

MEMBER VELSHI: Okay, so that didn't quite answer my question. Maybe I'll turn over to staff. Is the expectation that there is a good handle of what the population projections to 2055 are in order to be able to

be more confident on the environmental assessment?

DR. THOMPSON: Patsy Thompson for the record. I'll provide a first level of answer in relation to this environmental assessment, and then I think Mr. Newland -- Dr. Newland will add some information.

In terms of this current EA, the environmental assessment is a planning tool. It was done on the basis of the information available to allow us to verify the impacts on the environment of a postulated accident if the Commission approves the EA and the project most forward under the licensing framework of the CNSC, emergency measures are a part of the licence requirements and would be verified on an ongoing basis to make sure that the mitigation measures that we rely on are still valid and both function.

And I think Dr. Newland can provide additional information.

DR. NEWLAND: Dave Newland, for the record.

As part of the Joint Review Panel hearings for new build, the Joint Review Panel made specific recommendations that were accepted by the Government of Canada that CNSC staff should engage with the Municipality of Clarington and the Province to address the issue of sensitive land use within the municipality.

MEMBER VELSHI: Yes. That answered my

first question around land use. The second one was around population growth and -- but I think Dr. Thompson answered that, so that's fine. Thank you.

THE CHAIRMAN: Dr. McDill?

MEMBER McDILL: Thank you.

Your document is largely positive in nature, perhaps with the exception of issues with roads and protection services. Did your peer review team not come up with any negatives, or did you just not present them?

MAYOR FOSTER: Adrian Foster.

Yes. No, the -- certainly that document is available if you want to see it. There were -- the peer review team came up with any number of comments which were disposed of, so we got answers back the concerns again.

And the concern on the road network is sort of a rolling concern as things move ahead, right? There isn't, you know, any end point in time but, at the end of it, and I should imagine you have that document -- it can certainly be given to you -- that the comments were addressed.

MEMBER McDILL: What I was looking for was, in your opinion, everything that was of that nature was disposed of or dealt with or handled or accommodated, or -- you're confident?

MAYOR FOSTER: Yes.

MEMBER McDILL: Okay.

MAYOR FOSTER: Yes. Yes, we are.

THE CHAIRMAN: I'll just piggy back, so the document, when you did the peer review, did you share it? I'm trying to assess the community acceptance. You mentioned a couple of times the community really accepts the finding and the Council actually approved. So did you -- was that done sort of in a public -- did you table this peer review document and did you invite the public at large to take a look? And how do you gauge the acceptability of all of this by your community?

MAYOR FOSTER: Thank you, Mr. Chairman.

There are two answers, I think, to the question. So this is the actual report that dealt with the peer review. It's a report that was presented and received at Council, which is a very public process, so available for people to see, available for people to comment on.

We debate and discuss at a meeting called "General Purpose and Admin"; again, that is all published with all of the information available and then, the following week, whatever we have discussed at the General Purpose and Admin comes back for ratification at Council. So it's all a very clear and transparent, open process.

THE CHAIRMAN: So you don’t do a polling or survey. It’s just that kind of -- there is already a vehicle for you to know who opposed. There’s always an opposition somewhere; right?

MAYOR FOSTER: Typically, you know, I’m usually aware of who would be in opposition of a certain project or not. But in terms of community support, just to broaden, we’ve talked about Fukushima and I don’t know if you’ve heard in the presentations yet, my office received two phone calls and an email. We had the children’s programme -- that was right around March break time -- I’m going to suggest thousands of children were dropped off by their parents. The community, just by virtue of the numerous times that we’ve been in front of the CNSC, is well aware of things done, the refurb, new build Port Granby projects.

Going further back, we had Eider; the community was hugely excited about that which didn’t come. So nuclear issues and licensing, you know, are a regular part of our (inaudible).

THE CHAIRMAN: Thank you.

Anybody else has questions?

Thank you. Thank you very much.

Okay. We will move to the next submission by the Lake Ontario Waterkeeper, as outlined in CMD 12-

H13.67.

I understand that Ms. Bull and Mr. Rotenberg will make the presentation.

The floor is yours.

12-H13.67

Oral presentation by

Lake Ontario Waterkeeper

MS. BULL: Thank you.

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

I'm Joanna Bull, counsel for Lake Ontario Waterkeeper. I'm here today because OPG wants to refurbish and operate Darlington for another 40-plus years.

Instead of upgrading to modern cooling technology, OPG wants to keep using its outdated once-through cooling system. There is a long list of problems with OPG's proposal but we only have 10 minutes here today, so I'm going to get right to the point.

Darlington kills fish, lots of them, and it doesn't have to. If it continues to kill fish for the next 40 years, it will only be because you chose to let it.

When Darlington was built in the 1980s, once-through cooling technology was already out of date. The last time it could have been described as cutting-edge was in the 1940s, when it was first built to cool a Canadian reactor in Chalk River.

When it came to building Darlington, OPG only made minor changes to the design, keeping to once-through cooling and the status quo. Now it’s 2012 and they tell us they want to do the same thing again.

By the time a refurbished Darlington is decommissioned in 2055, once-through cooling technology will be more than 100 years old and wildly out of step with modern standards.

Darlington is one of the largest nuclear power plants in North America. The plant has an outdated, open-cycle, or once-through, cooling water system. It’s the most destructive cooling technology option available. It kills fish and it wastes water.

The system at Darlington pumps so much water that it could drain an Olympic swimming pool in 15 seconds. Continuously pulling that much water out of Lake Ontario kills tens of millions of fish, larvae, and eggs every year. The number of fish impinged and entrained by Darlington is going up rapidly and dramatically. This includes swarms of small fish that are the foundation of

the lake’s food chain, like alewives and round gobies, endangered species like the American eel, and commercially important and ecologically vulnerable species like the round whitefish.

After all that water is used only once, instead of cooling it and reusing it, it’s wasted. It’s spit back out into the Lake. What’s more, it goes out at a higher temperature, harming more fish and destroying more habitat in the process.

There is no need for all of this waste. We provided extensive, independent evidence that shows that OPG can install modern cooling water technology at Darlington. They would save up to 95 percent of the fish and use a fraction of the water from Lake Ontario.

You have reports in front of you from Dr. Peter Henderson, Bill Powers, and Sharon Khan that show that once-through cooling is out of step with modern industrial cooling standards, that the massive fish kills at Darlington are unnecessary, and that the choice to stop killing fish is yours.

This has been a well-established concept in the United States for decades. Super Law Group in New York was integral to that country’s transition to modern standards. Edan Rotenberg from Super Law is here with me to speak to what’s accepted practice on the other side of

our lake and throughout the rest of North America.

MR. ROTENBERG: Good afternoon, Members of the Commission, Mr. Chair.

So the good news is that it is very easy not to kill fish and the current standard in the power industry today is to use closed-cycle cooling.

As Joanna pointed out, by the 1980s, even before Darlington was built, building closed-cycle cooling systems into new power plants was already a standard practice. Voluntarily, the power industry almost completely stopped building these once-through systems in the United States.

In 2001, the U.S. EPA made it official, by law, closed -cycle cooling is now deemed to be the best technology available for virtually all new power plants in the United States.

So where does that leave older, existing power plants, like Darlington? And the question of whether Darlington, after refurbishment, is indeed an older plant is one which I would be happy to return to during questions.

Since 2014, however, the power industry trend towards closed-cycle cooling has been accelerating. When old power plants across the United States reach decision points where their owners need to make massive

capital investments, like the $10 billion investment being made at Darlington, U.S. regulators have been requiring a conversion to closed-cycle cooling.

In most recent such decisions, include the Brayton Point and Marin Canal plants in Massachusetts; the Merrimack plant, those were all regulated by the Federal government, U.S. EPA Region 1; the E.F. Barrett and Indian Point plants in New York; the NRG Indian River Unit 3, which is in Delaware; and the Oyster Creek Nuclear Power Plant in Jew Jersey.

Now, in addition to those plants, the State of California has adopted a statewide policy of phasing out once-through cooling systems at the state’s 19 coastal power plants, which includes two nuclear plants that are comparable to Darlington in size, and across the lake from us, New York state has adopted a similar policy in 2011.

So it’s environmentally beneficial, it’s also cost-effective, to protect fish. The benefits of using a closed-cycle system are clear: It’s better for the environment and it is better for the reliability of Ontario’s electric generating system. We have long known that cooling towers save a lot of fish.

Closed-cycle cooling reduces water use by around 97.5 percent in fresh waters. It reduces fish kills concurrently by 97.5 percent. Nothing else is this

effective; nothing else even comes close.

Admittedly, while deep offshore intakes, like those at Darlington, provide some reduction in fish kills compared to an onshore intake such as at Pickering, the U.S. EPA has found cooling towers are three times more effective than these offshore intakes at reducing fish kills.

Currently, Darlington kills over 18 million fish, of all life stages, every year. And some of the species that would benefit from decreased fish kills are extremely vulnerable at the moment, a point that Environment Canada, DFO, and the CNSC do not contest. These species include the sculpin, the round whitefish, and the threatened American eel.

Not only does closed-cycle cooling save fish and water, however. As I mentioned before, it increases the reliability of our electricity system.

Power plants with once-through cooling are vulnerable in extremely hot weather, and not just in southern, drought-stricken areas. This August, the Millstone Nuclear Plant in Connecticut, which is on Long Island Sound, a very large body of water, had to shut down a reactor because the once-through cooling system couldn’t handle the summer heat.

Because of climate change, that kind of

extreme heat and seasonal warming is expected to become increasingly common over the planned lifetime of the Darlington reactors. It's a consideration. Further, Darlington's a very strong candidate for a closed-cycle cooling retrofit.

The report before you from Powers Engineering shows that a close-cycle cooling system would be effective at Darlington; it would be technically feasible and it would be affordable. Darlington has ample space to build cooling towers, even if the new build goes ahead, and the refurbishment is going to require multi-year outages at each reactor, so a closed-cycle retrofit would have no impact on power output. Conversely, trying to do one later, once the plant is in operation, I would suggest is severely problematic.

There is no need for Darlington to kill fish. You can replace the existing once-through cooling system with a closed-cycle system that saves millions of fish, including endangered and vulnerable species. It's affordable; it's entirely feasible.

Thank you.

MS. BULL: Thank you, Edan.

OPG and CNSC staff agree that readily available technology would save fish on Lake Ontario, yet when Waterkeeper asked for a more thorough review of the

proposal, when we asked OPG and CNSC staff to seriously consider closed-cycle cooling, our request was denied.

The CNSC said no to a full hearing, based on science, with testimony from experts under oath, and public participation and cross-examination. Instead, we got this hearing today and these 10 minutes.

We asked you to look seriously into closed-cycle cooling at Darlington, and you chose not to. We stepped in and did that review for you. We brought you facts based in science and expert evidence. CNSC staff said they're rather wait and see. How bad does it have to get before you decide to act?

OPG and CNSC staff cannot bury their heads in the sand and pretend that they don't understand the choice and what's at stake here. The choice is simple: Kill fish and waste water at Darlington, or don't.

If a major refurbishment happens, it's easy to bring Darlington into the modern age by installing close-cycle cooling. Now is the time to do it, but it's a small window of opportunity. If you fail to act now, when it's easy, what are the chances you'll shut the whole plant down to fix this problem later?

The truth is, if you approve a plan to refurbish Darlington without updating the cooling water system, we will be stuck with outdated technology that

kills fish on Lake Ontario for decades. This isn't the 1940s; no one will say that you didn't know any better. No one will say you didn't have the means to save water and fish, only that you didn't have the will.

Thank you.

THE CHAIRMAN: Thank you.

Dr. Barriault?

MEMBER BARRIAULT: My question is for OPG.

Have you explored the closed-cycle cooling system in this new refurbishment?

MR. TREMBLAY: Pierre Tremblay, for the record.

Yes, is the answer to that. To begin with, I'd say OPG's got a longstanding practice of implementing operational and design changes to address situations where there's an impact to the environment from our operations.

In the case of Darlington, we don't see the need to install cooling towers. In fact, the original design at Darlington was centred around minimizing the impact on fish. After the original installation, our studies indicated that there was no impact from operating our plant.

And we've talked, to some extent, about this already today in the presentations. All of our Darlington aquatic studies over many years have shown that

there’s minimal fish loss associated with the plant operation, either through infringement, entrainment, or temperature effects. Again, we’ve talked to some of that today.

OPG has been monitoring various developments in other jurisdictions. For example, regulatory requirement 316 Bravo, for new intake structures, has been issued in the U.S. When compared to Darlington intake design features, we have demonstrated that Darlington meets the proposed performance expectations with our existing systems.

We’ve committed to periodically study this area; again, we’ve discussed that, and should we find an impact, we would take appropriate steps to mitigate it.

MEMBER BARRIAULT: Just a quick question. You have a zebra mussel problem at the plant, do you? Or don’t you?

MR. TREMBLAY: Zebra mussels are a part of -- Pierre Tremblay, for the record.

Zebra mussels are part of our oversight and management, and we apply chlorination and dechlorination as an aspect of maintaining a cooling flow and managing the issue itself.

MEMBER BARRIAULT: The amount of chlorination required on the flow-through system, is it a

large amount or just a small amount?

MR. TREMBLAY: Pierre Tremblay, for the record.

We work with the Ministry of the Environment to ensure that we meet all the requirements and regulations. I don't have the specific amount of chlorination. If you'd give us a bit of time ---

MEMBER BARRIAULT: Yes.

MR. TREMBLAY: --- we could probably talk specifics about that.

MEMBER BARRIAULT: Do you use other chemicals besides chlorination to get rid of the mussels?

MR. TREMBLAY: Pierre Tremblay, for the record. Not at this time.

MEMBER BARRIAULT: Thank you. And the volume of mussels coming through, is it a big amount that's coming through the screens?

MR. TREMBLAY: Pierre Tremblay, for the record.

As you can imagine, we have periodic inspection programmes; we look for them. There's a protocol around the beginning of the chlorination period that essentially depends on lake temperature, and, again, we look at the low velocity systems in the plant that are on surface water, and examine and monitor for zebra

mussels, and we manage it in that manner.

MEMBER BARRIAULT: Thank you.

Thanks, Chairman.

THE CHAIRMAN: You want to say something about it?

MR. ROTENBERG: If I might. Edan Rotenberg, for the record.

A question for Mr. Tremblay: Could you possibly refer me to the point in the record at which OPG has examined the use, and considered the use, of closed-cycle cooling?

I have read your technical supporting documents. I haven’t seen any mention of it anywhere.

THE CHAIRMAN: Thank you.

MS. SWAMI: Lauri Swami, for the record.

For clarity, we considered that as part of our business planning process going forward. We looked at the results of the environmental impact and did not see any significant environmental impact as a result of the fish impingement entrainment in thermal effects and therefore we did not consider that going forward.

We’ve also completed a lot of work on this matter as part of the new nuclear environmental assessment. We did many, many studies on that particular project and as you know, there was a recommendation from

the Joint Review Panel to also do a further best available technology economically achievable study.

That work has been completed and is submitted to the CNSC as part of this process. That included public consultation phase as well as looking at the technical aspects of it.

That report still concludes that our once-through cooling water design is effective for fish mitigation.

THE CHAIRMAN: Sorry let me -- just so I am clear, that -- I remember that recommendation from the JRP on the new build and I wasn't aware that the study has been completed. Has it been completed and posted, and it's talking at the pro and con of cooling; this is the Can system?

MS. SWAMI: Lauri Swami, for the record.

The work has been completed by OPG. It's available on our website and it has been submitted and is under review by the CNSC and other regulators.

I would say that was one study that was study that was completed but there were many studies completed as part of the Joint Review Panel process. And so there are many things that could be referred to as part of this process of looking at whether once your cooling water versus cooling towers are more appropriate.

THE CHAIRMAN: And these are available to all intervenors?

DR. THOMPSON: Patsy Thompson, for the record.

Perhaps Dr. Newland will be able to add some information. But the technical support documents and the EIS for the new build, all the work that was done around cooling towers and the assessments are publically available. They are part of the public record for the Joint Review Panel.

In terms of the latest study that OPG has just talked about, it's under review by CNSC staff and other regulators like DFO.

THE CHAIRMAN: But not available yet?

DR. THOMPSON: It is available on OPG's website.

THE CHAIRMAN: Okay.

Dr. Newland?

DR. NEWLAND: Dave Newland, for the record.

I don't think I can really add much to say other than it's under review by CNSC staff and we'll come to a conclusion by probably January or February of next year.

THE CHAIRMAN: Okay.

Dr. McDill, you wanted to jump in?

MEMBER McDILL: Thank you.

I don’t believe you were here this morning so I’m going to ask a question I asked this morning so that it’s on the record twice.

Staff, could you remind me of how many -- I think it was mass this morning but it could be numbers -- thousands of fish were impinged entrained, including larvae and small fry last year, I guess was the number that you gave this morning.

DR. THOMPSON: Patsy Thompson, for the record.

This morning it was in relation to Slide 19. The number we provided and it’s in the screening report; there’s approximately 275,000 fish from 13 species in 2010-2011.

If you need more information in terms of those details we can ask some of our specialists.

MEMBER McDILL: No, that’s fine, that was-- and -- oh sorry the intervenor was here all morning, I didn’t see you again. I apologize. I have just been a passed a note you were here -- I guess over there.

But where is your number of 18 million coming from? That’s what you said a few minutes ago.

MR. ROTENBERG: Yes, thank you Commissioner.

Well, the numbers haven't changed since this morning. And what was said this morning was 275,000 fish indeed were impinged. And several million, I believe, is what Dr. Thompson said this morning, larvae and small fry are entrained. We believe the number is upwards of approximately 18 million.

MEMBER McDILL: Let's go back to staff.

DR. THOMPSON: Patsy Thompson, for the record.

I'll say the number I said this morning and then I'll ask Don Wismer to explain how we arrived at that calculation.

So this morning I said the entrainment amounts to less than 2 percent of the impingement losses and that -- so entrainment, less than 2 percent of impingement losses.

And I'll ask Mr. Don Wismer to explain the details.

MR. WISMER: Don Wismer; Environmental Risk Assessment Specialist.

The number you're hearing, 18 million, that would be eggs and larvae that would be entrained. And the other number you're hearing, the 275,000, that's larger fish that can't pass through the debris screen and they get impinged. That's the difference.

And the other point that was mentioned in our presentation is the natural survival rate of these millions of eggs and larvae is really quite low. So it's the impingement, which is larger fish that have survived their first year, they have a lot higher biological value because they'd be expected to survive.

MS. BULL: Sorry Mr. President, if I can address that.

Our expert, Dr. Peter Henderson, reviewed the calculation that OPG used to assess equivalent age value which is I think where some of these numbers and some of the devaluation of eggs and larvae is coming from and he had -- he found significant issues with it.

At which point we have expert reports in conflict; he found that the numbers would actually be quite a lot higher than what we're hearing.

And I would suggest that if we want to get into this further we should actually have a review panel in which this testimony can be examined under oath. We can have other independent scientists review it. Going back and forth on the numbers isn't going to get us too far.

The other point I want to make though, is that -- and when we're talking about natural death rates for eggs and larvae, that's discounting the fact that

those eggs and those larvae actually play a part in the food web. Whether or not they grow to become full-size fish or adult fish they're playing a part in that food web which they can't play if they are taken into the plant and crushed.

I'd also like to make just a quick point on the earlier discussion. We've heard that closed cycle cooling was considered as part of the business planning that OPG did and that it was considered as part of the new build hearing. That is not the process that we are in today and that evidence should be before you on the record for this process.

Again, that could be addressed by referring this to a review panel.

THE CHAIRMAN: Dr. McDill, you still…

DR. McDILL: Thank you. One more question ---

THE CHAIRMAN: But before we finish with the fish, I'm still stuck with some of those numbers.

So if there was 18 million a year, what happened the last 20 years? How come there's still commercial business in the Great Lakes and in fact everybody keeps talking about the return of all of this, so something doesn't compute. Either you destroyed over the last 20 years all the fishery or you have a minimal

impact. Help me here.

MS. BULL: No there's been a major impact. The commercial fisheries have declined. I think there's one left on Lake Ontario.

The numbers that we're seeing rebound are from invasive species, as OPG has pointed out, round gobies.

The unfortunate fact is, you know, they were invasive species now they can't be discounted. They are part of our food web. So higher levels in the trophic levels are actually relying on those invasive species at this time.

But the plant has had a major impact on our fisheries. And again, I'd love more science and more studies. We weren't able to do that in this process because ---

MR. CHAIRMAN: I thought it was mainly -- again I'm reading -- mainly because of pollution that was the issue here about the original fisheries. So I -- something still doesn't compute.

MS. BULL: No, I would argue that killing millions of fish every year has had a major impact beyond pollution.

The content of those fish and food consumption advisories for those fish definitely has been

related to pollution. Pollution is something we can address, killing them in such large number we can't.

MR. CHAIRMAN: Dr. McDill?

MEMBER McDILL: Thank you.

One more question. It's your opinion the water is wasted even if it's -- aside from the thermal issue, it's your opinion that the water is wasted even if it's returned? In what way do you make that waste?

MS. BULL: It's wasted in that the most damage to fish happens at the point of intake. So you're taking in all of that water into the plant; you might as well make the most use of it possible once you've done that damage at the intake point.

As soon as you only use it once and spit it out back into the lake, you're wasting the potential usage of that water. You need to intake more water to replace it every second in such vast quantities that you're wasting the potential usage of that water. You need to intake more water to replace it every second in such vast quantities that you're killing more and more fish. If you reuse it within the plant, that's how you save 95, 97, 98 percent of the fish.

MEMBER McDILL: Thank you, I understand now what you mean by that. Would you like to comment, and staff?

MR. TREMBLAY: Not particularly. I mean I would say that, you know, we've looked at this area. We've done what 60 -- over 60 studies in terms of what impact there could possibly be. We haven't found any. We've talked at great length about the facts that are there. So I would say that the technology that we used is appropriate and we've looked at this pretty carefully and would say that there's a further commitment on our part to continue to look at this and if there are changes that are required, we will undertake those changes.

DR. THOMPSON: Patsy Thompson, for the record.

There were comments a few minutes ago to the effect that the Commission does not have evidence in front of you to weigh and balance that information. The submission that the Lake Ontario Waterkeepers made to the Commission has, as an attachment, the technical review done by the expert hired by Lake Ontario Water Keeper. If you would allow us, I would ask Don Wismer from the CNSC and Mr. Tom Hoggarth from the Department of Fisheries and Oceans to put information in perspective so that you can balance what is being said and what's attached to the Lake Ontario Waterkeepers' submission with other technical evidence.

THE CHAIRMAN: Go ahead please.

MR. HOGGARTH: It’s Tom Hoggarth, for the record, from Fisheries and Oceans Canada.

This issue around killings of millions of fish and how can you not consider that significant is something that we need to look at and so what I did, I’ve done recently a lot of literature reviews to look at this specific issue, and some of the most recent stuff.

If we want to look at alewife as an example. There has been some recent work done in Lake Michigan that demonstrated that once these fish hatch, every single day 25 percent of the population that hatch dies. So over a 40-day period, that’s 99.98 percent of all fish have already died and then there’s a massive mortality rate that goes on over the winter. Very few of these fish actually survive the first winter as well.

So when we look at trying to decide what an impact is with a number so large, if you do the calculations, it shows that if you started with, you know, 17 million larvae, and I’m speaking to alewife at the moment. After they first, right from when they hatch until the fall before the first winter, you’ll only have about 2600 of them still surviving. That’s how hard or how high the natural rate of mortality is and then once you go through the first winter, the chances are you’re probably end up anywhere around 870 to 900 fish left from

the 17 million that hatched.

These fish, this is a natural process for them. A fish like alewife, although they've integrated into the ecosystem within the Great Lakes, are also an invader. They came from the salt water. They're actually not all that adapted all that well to live in fresh water and massive die-offs occur on this fish species at a regular basis just because of high winds that shift the bottom cold water up towards the shore.

So this fish to survive all this has produced a way of survival by producing massive and massive and massive amounts of eggs.

Another way of looking at these numbers, if you, you know the average alewife female can produce up to 50,000 eggs. So again, if you look at the number of eggs that we're looking at here, there's only 320 female alewife are required to produce the amount of eggs that are being entrained through the system. And then when you look at the estimates and the number of fish within the Great Lakes, the Minister of Natural Resources does surveys every year to estimate different populations in the lake. They estimate that the biomass of alewife in Lake Ontario is over 3000 metric tonnes. So we're talking millions and millions of fish.

So again, although when you look at the

number offhand, it seems like an extremely large amount but that is very typical of fish that are broadcast spawners. They just lay their eggs, let their eggs go and so you will have a large mortality rate.

The other fish, when we did the assessment, the other fish that has some of the biggest impact on are the round goby. Round goby is an invasive species to which we would all prefer were not within the system and so at this stage of the game, when we're doing our assessment, we're discounting or don't worry about the mortality that's occurring with the round goby. We've worked very hard and very long within our department to actually eradicate round goby and to try and get rid of it from systems. So at this stage it's just not something that we look at.

MEMBER McDILL: What about whitefish?

MR. HOGGARTH: Again, Tom Hoggarth, for the record.

That's one fish that we have expressed concern on and because of the concern that we've expressed, we are continuing with OPG, with CNSC on looking at the impacts around whitefish. At the moment, and I can be corrected on, I don't have the specific numbers in front of me but the amount of impingement or entrainment around whitefish is extremely low at the site.

Sorry, the other fish that was mentioned was the endangered American eel. It's listed provincially as endangered. It is not listed federally as being endangered but the records show that there was one American eel and again, so that's a concern even though it's just one but we will look at that and through monitoring and follow-up, assess whether anything needs to be done.

THE CHAIRMAN: But I'm trying to understand the process that DFO does their analysis. So I think our intervenor is saying that's a better technology because it doesn't kill fish, right. So how does DFO says, yes it kills fish but the old technology is good enough. I mean, I'm trying to understand the process. Is that the process that you actually take a look at the various technologies?

MR. HOGGARTH: For Fisheries and Oceans, the process that we do is we will look at the environmental assessment, as in this process, to look at what the impact is and for us, we need -- once we decide whether -- we need to first decide whether that impact is acceptable or not. So if it's not acceptable, we would just deny the project as it is. But then, if we look at it, we decide whether the project is acceptable or not for us and when we look at this project, the amount of impingement and entrainment is low enough that we do not

consider it as significant environmental impact. However, it is still a residual impact and therefore for us, under the *Fisheries Act* and under our current policies, we do have the ability to offset for that and that's where we've been in discussions with OPG over offsetting that loss with the creation of habitat.

THE CHAIRMAN: Okay, Dr. McDill? Anybody else?

MEMBER McDILL: Maybe after, the intervenor wanted to say something.

MR. ROTENBERG: Yes, thank you. Edan Rotenberg, for the record.

Dr. Hoggarth's answer I submit to you respectfully is in many ways correct and yet it exemplifies exactly what's wrong with the record before you.

For a simple example, yes the populations of fish die, absolutely; a very well understood fact, a very, very small survival rate. The point is that they die and serve a useful ecological function and by removing that useful ecological function, by taking these eggs and larvae out of the system and removing them as feed as part of the prolific network and putting them back into the water as detritus, chlorinated detritus that is accessible most only to some microbial species, the food webs

undermine.

But more importantly I think there is a large area of agreement actually between us as intervenors and between the government and, to some extent, between OPG. It is certainly agreed by all parties that the killing of fish is a residual adverse environmental effect.

Further, as far as I understand the situation, and I would be pleased to be corrected if I'm wrong, but I believe all parties agree that mitigation measures should be applied. If they are the best available technology that's economically achievable, if they are reasonably practicable, if they're technologically and economically feasible and that if closed-cycle cooling is feasible, then it would do a significantly better job than the system that's in place. And as Dr. Hoggarth just said, there is no question that there is a residual adverse effect here and the question is simply is it subject to mitigation in the most effective way possible.

And on that point, I haven't heard anything from OPG yet today that corrects the record. As far as I know, they did not consider closed-cycle cooling on the record in this proceeding. If the new nuclear plant is before us, then it would be very interesting to get into a

discussion of the cost problems and the cost projections in their best available technology assessment for that plant. I don't know if that's something you'd like to do today, but there's certainly a reliance there on industry figures from the Edison Power Research Institute in the United States which are in conflict with figures generated by the U.S. EPA and the figures that are used in doing its own cost assessment when it did its first version of the existing 316 B or 316 Bravo Rule in the United States in 2003/2004.

But leaving that aside, there's also agreement that -- and I'm quoting here from the response to comments:

> "That many populations of fish species such as alewife, lake trout, salmon, lake sturgeon, white sucker and emerald shiner are unstable or in decline because of the combined impacts of invasive species over fishing, pollution, and habitat destruction."

So there is some degree of severe ecological flux going through Lake Ontario. There is a lot of disruption from invasive species which, over time, are coming in and becoming established in the lake. The

alewife, when Darlington was built, was an invasive species; now, it's a cornerstone of the lake's ecosystem.

And that uncertainty increases the rationale for having a closed-cycle cooling system that all parties agree is the most effective option for controlling this adverse impact. The dispute is simply about whether it's worth doing that or not. There's no question that this works. There's no question that it works much better than what's in place. And the question is simply, is it worth doing or not? Is it worth saving the fish?

I don't see anything in the record before this Commission apart from what Lake Ontario Waterkeeper has submitted that gets at the cost, that gets at whether it's technically feasible. I'm very glad that OPG has considered it in their business planning and if they'd like to put that information on the record, I think we would benefit from seeing it.

Thank you.

THE CHAIRMAN: Anybody want to talk to that point?

MR. TREMBLAY: Pierre Tremblay, for the record.

I'd like to have John Peters just settle the context and provide some input.

MR. PETERS: Thank you. John Peters, for the record.

I just -- I think -- let's just say generally that in the U.S. and in Canada, there is a well-established way of calculating what eggs, fish, and larvae entrained and impinged may be and what the net effect of that is on either the productivity of the ecosystem on commercial harvest, on recreational harvest and the net biological effect can be determined based on a number of changes that would be resulting from the decline in the number of fish as a result of any particular cooling system that may affect them.

We did a study which we filed again as part of our work called the "Biological Liability Losses Report" in 2009 and we'd summarized all this data that we'd been talking about and it looks at all of the different parameters to try and get a sense of the range of effects. And it boils it down at the end of the day, as the intervenor says, "It's about cost; isn't it? It's about the number of fish lost and the cost to do some alternative against the effect of that in the ecosystem".

And using methodologies that are used in the United States routinely, we did that work and we filed it and the kinds of losses we're talking about here range in a severe year of what we call our conservative bounding

assessment, the maximum amount of fish that we've ever seen taken, we saw a potential biological liability of $20,000 to compensate and address the effects that were caused by that loss of productivity and fish in the ecosystem.

The reality is that these are very small numbers of fish. They are commonly available fish that are easily -- as Mr. Hoggarth's pointing out, they can be reproduced and we can compensate for those losses effectively and that biological loss value calculates some of that information and what it would take to do that.

And we just -- we're in a very difficult position to point out that, you know, yes, there are a few fish taken. I accept that. We're not challenging that and that's the minor adverse effect that we've characterized and we will proceed to seek acceptance of that through the authorization process should the EA be approved.

But in reality, the kinds of systems that they're proposing are extremely expensive, as they will acknowledge, they have significant parasitic load; in other words, the reduction in power output from the nuclear plant today will be substantive and very expensive and there will be massive changes in the layouts of the plant to accommodate the proposals that they're making.

The drawings they show us have restructuring of everything from the protected area fence through to the major infrastructure that supports the existing plant for all four units. It is not, as I would characterize it, a trivial exercise and that's just based on a quick review of the intervenor's submission in Appendix B.

Thank you.

MS. BULL: As you can tell by the answers that OPG's offered and CNSC staff has offered, these issues are complex. I would submit the evidence you have before you, from our experts, shows that the cost of installing closed-cycle cooling is very low relative to the price of this project; 1 percent, in fact, was the -- 1 percent per reactor was the estimate that we had.

The impact on power output is relatively low and could be, you know, increased with -- or made up for with renewables, but again, I -- you've pointed out you don't want to get into the power supply plan; that's fine, but it's relatively low and the design is completely feasible according to the engineering reports that we've submitted which come from the source that's been working on these projects for decades.

Clearly, if we want to get into these issues and have them addressed in a way that is based on

evidence and not just hearsay, we need more review. I would suggest that if you want that kind of review, we're going to have to refer this to a review panel.

THE CHAIRMAN: Thank you.

Ms. Velshi?

MEMBER VELSHI: So before we leave this whole issue of how many fish are killed and so on, I mean, one of the areas we see this real disconnect between not just Lake Ontario Waterkeepers, but a number of intervenors on the impact of fish impingement and entrapment -- entrainment, is -- if you look at CMD 12-H15.1, this is on licensing renewal on environmental protection, on pages 32 to 34, OPG doesn't even mention killing the fish as an environmental impact and some -- I'm kind of curious and surprised by that because for this particular project, the only residual adverse impact that has been identified is the impact on fish and yet, the environmental protection section of Darlington's report -- operations report doesn't even talk about that as an impact and I'm just wondering why there is such a disconnect. And I think we're seeing some semblance of it here, especially when you quantify it as only a $20,000 or so loss, but is that the only residual adverse impact that's valued at like $20,000? Like, maybe you can comment on why it's not in your report as an environmental

impact in the environmental protection side.

MR. TREMBLAY: Pierre Tremblay, for the record.

You know, clearly, this is an area that's consumed a lot of attention and time for us. I've talked about the dozens of studies and surveys that have been done, but in the end, we have concluded that there is minimal impact on fish and I'm not presuming pride of authorship on the report. You make a good point. We can certainly go back and discuss it, but I would suggest that it isn't something we're ignoring; it's something we're paying very close attention to as you can probably tell from the responses.

MEMBER VELSHI: Okay, well, I think that we've probably talked about that enough, but I do want to talk about something else that you mentioned which is on what's happening south of the border around regulatory standards and benchmarking and perhaps I can ask the CNSC staff to comment on that. Is that a trend going forward because maybe they haven't done the risk-benefit analysis, but have just accepted that as a policy decision going forward?

DR. THOMPSON: Patsy Thompson, for the record.

There's been a lot of analysis done in

terms of the environmental benefits and the cost benefit analysis have been done by the U.S. EPA and we have been following what the U.S. EPA is doing in terms of regulations and requirements for fish entrainment impingement and thermal for a long time.

I'll ask Mr. Don Wismer to provide some of that analysis that has been done in the States and how the CNSC has used it in supporting the environmental assessment.

We've also used that analysis, for example, when we required that OPG put in place additional mitigation measures for Pickering, it was based on the work done in the States.

Before giving Mr. Wismer the time to speak, one of the things that I think we need to clarify, there's been a lot of discussions about air cooling towers, achievable, practicable, and one of the things that I think we tried to clarify is that we're not debating the cost of towers. What we're looking at is the risk that towers or other mitigation technologies, would compensate.

And our assessment to date -- the numbers have been shown in the technical support documents and EA screening report and we've presented today -- our assessment is that the level of risk do not warrant the expenditure at this time to put in place cooling towers.

We have put caveats in place, both in the screening report and in our presentation to the Commission today requiring a follow-up program to be in place with an adaptive management framework because we know the ecosystems change, climate change will come in, there's been the discussion of invasive species and others.

So we want to make sure that, as a planning tool, the EA has looked at the information that is available to date, the best signs we have, and it will be reassessed on an ongoing basis to make sure that, moving forward, the environment continues to be protected.

I'll let Mr. Wismer talk to what has been done in the U.S.

MR. WISMER: Don Wismer.

The basis for decision making in CNSC on risk controls -- there's four factors. There's international regulatory best practice, industry operating experience -- what works, what doesn't -- proportionality to risk, and cost.

And so we take those factors into account when we look at a situation. For the first one, international US316B -- you heard it mentioned before, that's their *Clean Water Act* -- is solely concerned with intake fish loss. It doesn't take into account other factors as we have to under our Act and especially under

an EA.

But their rule is for new plants performance equivalent to towers. For existing plants, their rule will not be final until next summer, but right now it’s proposed to be an 88 percent reduction in impingement relative to a baseline, that’s a type of plant that Pickering is. And Darlington meets that and exceeds it.

And then for entrainment, because it’s a lot harder to solve entrainment with retrofit technology, they leave it up to a site-specific determination and options analysis. And there are many other options besides towers to retrofit to a facility that are available at a lot less cost.

So if the situation changes, where the types and numbers of fish being affected from ongoing monitoring appear to be going in a way we don’t like -- they’re sensitive species or threatened -- then there are technology options that can be done, including changes to operations, retrofit technology and you’ve already heard about offsets.

The last point is not everything that passes through the plant gets killed -- the eggs and larvae invertebrates -- some fraction survive. It’s quite variable, depends on the type and the life stage.

MEMBER VELSHI: So if the Darlington plant was located in the States, with its current once through cooling system, would it be allowed to be refurbished as is?

DR. THOMPSON: Patsy Thompson, for the record.

The answer is yes. What we -- Mr. Wismer has just explained and what we put on the record this morning during our presentation is that the current Darlington plant meets the proposed new rule for existing plants that is being proposed in the States.

THE CHAIRMAN: And have they licensed -- not only nuclear -- any power plant under the new scheme for existing refurbishment in the States, have they been doing it recently?

MR. WISMER: Don Wismer.

The Indian Point plant that was mentioned earlier is undergoing hearings right now and so a decision hasn’t been made.

But the one -- the industry submission pointed out all these other alternatives to towers and how it would take at least a decade or more to retrofit towers. Meanwhile, fish would be being killed through that whole period. So the other options would be installed sooner and reduce the fish kill.

We'll remain -- remains to be seen how it will –- what the NRC will decide because it's ongoing right now.

THE CHAIRMAN: Thank you.

Ms. Velshi?

MEMBER VELSHI: Did -- did you have anything to say?

MS. BULL: Yes, thank you.

Dr. Thompson says that this is not about costs that this is about risk. I would suggest that the CNSC's valuation of that risk is -- has not been done with Canadian's valuation of those fish in mind.

The evidence before you shows that in the United States, the conservative number for how Americans value fish impinged and entrained by power plants is at $10 billion. The number that OPG cites of $20,000 is abysmally low and I'm not sure where that comes from, but it certainly is not in line with that kind of valuation.

So I'm going to pass it as well to my colleague to discuss the American standards, but I did want to call that to your attention in terms of valuation.

And I again want to say, this comes down to a choice to kill fish or not, and that really goes to the heart of it.

MR. ROTENBERG: With respect to valuation,

it is indeed, Commissioner, a very difficult question.

And very often in these kinds of proceedings around the United States and in other places, industry power plants -- what will often, whether -- and I should say this is not just the nuclear industry, all power plants that use thermal electric power use cooling systems; all large industrial facilities, like refineries for example, use cooling systems. So power plants and industry will routinely do their best to estimate the cost, the value of what they are destroying.

Often those estimates are based on the value of commercially valuable fish destroyed. Or perhaps, at best, a habitat replacement cost which would really be quite progressive and is not typically done by most industry groups, in which they look at what's destroyed and they look at what it would take to build the habitat to compensate for that, which is a very -- to put it bluntly -- a very uncertain calculus.

We don't quite know how well that habitat replacement is going to work and that was the point of the Williams Treaties and the First Nations that were here before.

The best data on this, to the moment, was produced by the Environmental Protection Agency last year, as part of their look at what they're going to do with

existing plants in the United States.

As staff have said, that rule is not yet final and in support of that rule, they're doing what is basically the world's best -- at the moment -- cost benefit analysis for closed cycle cooling. And it examines through hedonic pricing methods what value Americans put on saving fish.

And the answer -- and I would submit that they are a relatively comparable population to us, that is they are reasonably close in wealth, in terms of disposable income and they may not quite value their environment as much as Canadians do, but they're close.

So I think the survey results are going to be fairly comparable across the border. And those results suggest that the net social benefits of saving fish are in excess of several billion dollars a year. The survey is not final yet.

In order to get those kinds of figures, the firm I represent and the groups we work for -- I'm in a lucky position to be a Canadian expat in the States and I'm representing most of the American Environmental Movement in the 316V proceedings as they go forward in the United States -- my firm is.

We had to end up going to the Stockholm Environmental Institute and asking one of their economists

to finish the analysis because he paid -- put out the raw data and hadn't put out a finished analysis.

And the numbers that we have suggest that the net benefits are in the billions of dollars per year. That is, society places a much higher value on protecting the fish than the actual cost to power plants of protecting the fish.

With respect to where the rule is in the United States, I am generally of the opinion that it's a good idea for us as Canadians to sit back and wait for the Americans to make the mistakes first and learn from their experience.

And if we want to delay a decision about whether there should be a refurbishment for many years to see what they do, that's fine.

Unfortunately, in this situation, OPG wants to go ahead and refurbish the plants and we're going to have to move before they're finalized. So where it stands now, the Indian Point plant, the draft permit -- the industry submission says what it says. The draft permit calls for closed cycle cooling. That's the considered opinion of the regulator, the New York State Department of Environmental Conservation. The draft rule that goes in, it's not at all clear to me where this power plant would come out under that rule.

With respect, I think Ms. Thompson's representation of the rule is largely correct, but not complete. One of the outstanding issues in that rule -- and it's an issue that the Environmental Protection Agency has raised -- is whether, when you have a massive investment like this, the plant still counts as an existing plant.

When you're making an investment of multiple billions of dollars that is going to extend the life of the plant for decades, it's within the control of the operator of the plant. Environmental Protection Agency staff suggested that should be considered a new plant.

That's not being pushed on them, on the plant, by the EPA. That's a choice that's in the power plant owners' responsibility. They can decide when to make those kinds of decisions. They can take the outage when they want to take it. That should be analyzed as if it were a new plant.

That provision of the draft has so far -- is subject to some debate. It is sitting with the Office of Management and Budget in the White House and I'm not sure what's going to happen to that. So ---

THE CHAIRMAN: So when is the study going to be complete, the EPA study?

MR. ROTENBERG: I don’t ---

THE CHAIRMAN: Does anybody have a clue?

MR. ROTENBERG: We have a consent order with them and they were required under that consent order to release it last year, and every six months they call us and ask for an extension. So I ---

THE CHAIRMAN: But it’s imminent. You’re talking about -- it’s going to be available -- probably done before 2014?

MR. ROTENBERG: Theoretically, yes. Our current ---

THE CHAIRMAN: Not theoretically, really.

MR. ROTENBERG: Well, so the current consent degree says, yes. They’re rule should be final, submitted to the public by 2014.

However, the last three deadlines they’ve blown through and it looks like they have other priorities in the White House. So it’s not clear to me that this will be ready by 2014.

But the record that they have developed suggests that the costs greatly exceed the benefits. That this plant may not be considered an existing plant at all in the United States and that for existing plants the considerations that generally -- you have to remember, they’re dealing with 600 and something existing power

plants. And so when they looked at those they said, there are four things that make us think that maybe a closed-cycle cooling system is not appropriate at every plant.

There may not be space. There may be an electric reliability issue. There may be an air pollution concern at that plant and adding additional air is an issue. And there’s the remaining useful life of the plant. None of those factors are really binding at Darlington, which is what makes this plant such a strong fit for a closed-cycle cooling retrofit.

The analytical framework that is set out in the draft rule right now, would call for some form of cost benefit analysis, some form of weighing of the risks and the benefits of this system. It’s not clear where this plant would come under that if it were an existing plant. But clearly the cost benefit analysis in the record to date here is not adequate for the Board to reach any conclusion on that, I don’t think.

THE CHAIRMAN: Okay. Anybody else? Any other kind of a question?

Well, I’d like to thank you for this intervention.

And we will take a 15-minute break which will make it -- we’ll reconvene at 4:45.

Thank you.

--- Upon recessing at 4:31 p.m./

L'audience est suspendue à 16h31

--- Upon resuming at 4:47 p.m./

L'audience est reprise à 16h47

MR. LEBLANC: Okay, we are ready to proceed.

I'd like to mention, in terms of timing, that we're a bit -- well, a lot off time. So in that context, we plan to continue as late as we can to accommodate everybody that had been scheduled today. But if it goes beyond a certain hour, which was yet to be defined, depending how things goes, we may have to ask one or two intervenors to come back tomorrow or some other time that is appropriate for them.

So hopefully we don't need to do this, but I'd rather give advance notice because we still want to go through the interventions and provide the time necessary so that we can ask all the questions.

Thank you.

THE CHAIRMAN: Thank you, Marc.

We'll move now to the next submission by the Canadian Environmental Law Association, as outlined CMD 12-H13.4. And I understand that Ms. McClenaghan will

make the presentation.

Please proceed.

12-H13.4

Oral presentation by the

Canadian Environmental

Law Association

MS. McCLENAGHAN: Yes, thank you, Mr. Chairman.

And do we do something to put the slides up? There we go. Looks like that's the end. There we go.

So in view of the time, I won't belabour the background on our organization; we have appeared before you before.

In terms of the context of course, that's been well outlined by you, Mr. President and by staff, in terms of the fact that we're proceeding with this matter as a screening EA.

And we did take a close look. We had made comments on the scoping report and then when the draft screening report was issued in the summer we took a close look at that. We focussed our attention on the topic of emergency planning and so that's the only topic that I'm

addressing today.

At the time that we made our submission we also provided comments on the draft report on behalf of Durham Nuclear Awareness. But at this point I am providing these comments on behalf of CELA and they are appearing themselves, in their own right.

So the methodology was to prepare an outline, which you'll see in the longer submission, the July 18th report, outlining basically all of the questions that you would typically have if you wondered about the adequacy of emergency planning for the referb project, and we then examined the draft screening report to determine whether each of those issues was addressed.

We looked, as well, at other available information beyond the draft screening report to see what was available and we did reference that in that report. We went back and re-examined those issues on the release of the final screening report.

So our conclusions were that there was very little treatment, surprisingly little treatment, on the topic of emergency planning in the draft screening report despite the fact that the scoping document required that topic to be addressed in the EA.

So in our July 18th comments on the draft we called on the CNSC to explicitly review a very

extensive list of issues relating to emergency planning for a refurbished Darlington plant in respect of both the EA and the licensing decisions.

And of course, as you well know this EA is for the entire operating lifespan, if the project proceeds to refurbishment. So right through to 2055, so it's a very significant stage to be doing this review at this point.

When we looked at the final screening report we did see a modest increase in the report's treatment of emergency planning issues. For example, there was some additional information in respect of a variety of issues relating to the representative accident, the one that's been chosen as the sample accident in relation to emergency responders, communications, oversight of accident management, evacuation and sheltering.

However, in our view of the treatment of emergency planning still suffers from the fundamental concerns outlined in our report on the draft screening report. The most important of which is that it was repeatedly confirmed in the response that a large scale accident with a large release, or early release, or on the scale of the Fukushima accident, were excluded from this EA.

So turning for a moment to what the statute requires, Section 16 does require -- and of course it applies by way of the designation order that was referenced earlier today.

It does require, pursuant to Section 16(1), that there be a consideration of the environmental effects of malfunctions or accidents that may occur in connection with the project.

It requires looking at the significance of those effects, comments from the public, and measures that would be technically and economically feasible to mitigate any significant adverse environmental effects.

And I would submit that emergency planning is one of the most pertinent matters to be considered by you in terms of the measures that would mitigate any significant adverse environmental effects of malfunctions or accidents from the plant. And as I said, the EA has to apply to the entire refurbished operating period of the plant and consider it over the decades of its operation. And this would be one of the issues, I would submit, that would be of utmost importance to the surrounding community.

There were many reviews of Fukushima. I did review and reference in the longer document, those from the diet of Japan, the independent commission in

Japan as well as the Green Peace report pictured here. And they reached many common conclusions. One of which was that the consequences, the actual felt consequences of the accident at Fukushima was exacerbated by the prior circumstance of not taking catastrophic accidents seriously enough and explicitly including the lack of sufficient emergency preparedness for such a large scale accident.

As you know, in that accident, some areas as far away as 50 kilometres had to be evacuated, and importantly, the areas with the highest levels of radiation were not necessarily where they were expected.

In addition to that, there were massive "voluntary evacuations", that is, people, especially women and children, leaving beyond those who had been required by the authorities to leave.

And there were a number of other findings in those reports. One of the ones that concerns me the most is around the area of communication.

When you look at Ontario, this is just a screen capture from your website pointing out a review, you were -- at one of your earlier meetings earlier this year, about the fact that even some of the current requirements are not yet in place, this was for Pickering and Durham Region. And so it's even more a concern that

even for the 3 kilometre and 10 kilometre alerting requirements, there's a lot of work still to be done here.

So what are the major concerns with emergency planning for the Darlington Refurbishment? The first and foremost is that the screening has considered emergency planning only in relation to a relatively less severe accident. So the screening has not evaluated emergency planning for a large scale breach of containment with release of radioactive materials far beyond the plant boundaries. The accident you heard described today assumed that basically, any breach would reach as far as 3 kilometres or plant boundary.

This screening has assumed that safety systems will mitigate the accident it examined, and thus avoided considering emergency preparedness on a larger scale. And as I mentioned, it failed to examine early release -- large-scale early release.

It also failed, the screening that is, to evaluate the existing and future adequacy of public notification and communication in the event of a large-scale accident and failed to evaluate the state of emergency preparedness in case there was a necessity to evacuate beyond the 10 kilometre zone around the plant. It also failed to recommend controls on land use and population growth beyond the 10 kilometre zone around the

plant.

So our major concerns are summarized on this slide. We think that detailed emergency plans for large scale accidents need to be developed, together with consultation, and we think you should have that information available before you approve this decade's long refurbishment.

We also think the province needs to develop detailed evacuation plans for at least 20 to 30 kilometres, not just 10, right out until 2055. And again, you should have that information before you approve this operation, which will be in that timeframe.

In addition, the suitability of the site itself needs to be re-evaluated in terms of such a large-scale refurbishment and decades of additional operation in light of the growing population pressures. And the unfortunate regular occurrence of nuclear accidents internationally, much as we will hope that such a thing will never happen here, the planning needs to take account of that eventuality.

In addition, vulnerable communities need extensive advance communication and planning; seniors, institutionalized populations, schools, health facilities, and I already mentioned the point about land use planning.

So in terms of a time check, I'm going to

move ahead in my slides. I have some detailed points that are there but I want to move ahead to the implications for this decision.

And we think until these issues are addressed, the Commission should not conclude that the environmental effects of the refurbished project and its operations from malfunctions or accidents are not significant. That's a double double negative, but looking at the test in the statute, we think you have to conclude that if there was a severe accident, the effects would be significant.

Until those accidents are addressed, the Commission shouldn't conclude that appropriate mitigation measures are in place to address the effects from such a severe accident at a refurbished plant. So we think you should not, as a responsible authority, exercise your authority to go further and grant licenses.

We think that you should conclude that taking account of the mitigation measures currently in place, i.e., the current approach to emergency planning or at least as reviewed in this EA screening, it is likely to cause significant effects in the case of certain significant accidents. And you should publish a notice of that course of action in the CEAA Registry.

In the alternative, if you concluded that

it's uncertain, according to the statute this is the next test, if you think it's uncertain whether the project is likely to cause significant adverse effects and whether emergency planning would mitigate those effects, you should refer the project to the minister for a reference to a mediator or a review panel.

And in the further alternative, we think that the public concern on this topic, in addition to many others, warrants a reference to a mediator or a review panel in any event, and we request that you make such a reference to the minister, preferably with a recommendation for a review panel.

So that's a quick overview and leaves time for discussion.

THE CHAIRMAN: Thank you. I think maybe it would be useful now to maybe re-invite EMO and maybe the Durham emergency planning people to come here and maybe share with us their reaction to what is being presented by the proponent -- by the intervenor I meant to say.

--- (A short pause/Courte pause)

THE CHAIRMAN: Who wants to go first?

MR. CIUCIURA: My name is Ivan Ciuciura. I'm the Director of Emergency Management for Durham Region and perhaps I can start. And please interrupt if you would like to go in a certain direction because I don't

know where you would like to start.

THE CHAIRMAN: I'd like to basically to react to -- I think what I'm getting -- the bottom line, I don't want to put words in your mouth, but you say you don't have any plan for a doomsday scenario, those are my words.

MS. McCLENAGHAN: Mr. Chairman, perhaps before they start. There's a bit of a plan for a doomsday scenario, it -- beyond the screening report. The -- it says we can adapt, we can deal with the circumstances as they arise. My point is that there's very little of that in the doomsday scenario anywhere, but especially the point is, it's not in this screening review. That's the fundamental point.

MR. CIUCIURA: So again, Ivan Ciuciura. We do have planned, as the Commission members know, to undertake protective measures in Durham Region out to 10 kilometres. So to address the immediate concerns, it does not address the 20 to 30 kilometres, the scenario outside of a 10 kilometre zone.

We take our direction from the provincial plan, so any changes would have to come from the province in that planning basis, whether we should extend it to 20 or 30, or beyond.

I should say, though, that -- and try to

build on some of the Clarington comment, there is a structure in place to respond to emergencies. And that structure is emergency operation centres at the -- in Clarington, at Durham Region, at the province to respond to any type of event, nuclear or non-nuclear. So that structure is there, notification system, getting staff in to deal with the issues.

Reference –- if there was an evacuation, we know there is going to be voluntary evacuations beyond 10 kilometres. If there was an evacuation at said 10 kilometres, we know that people outside that area will evacuate, and transportation plans in some of the studies have taken that into account. And future studies will also.

If we had to evacuate beyond 10 kilometres, the structure is in place. Those centres, there’s a joint traffic control centre in Downsview with all the police services that are involved in evacuation. There’s a regional traffic control centre in the region. Durham Regional Police Service has an evacuation traffic monitoring and control plan. Those types of things can be expanded.

And as a direct answer to your question, they’re not there now, but I'm confident that key players are together, and if you had to do an expansion or take

out more people, they would be advised to leave, they would be advised how to leave, what time to leave, and that the traffic monitoring and control plan could be expanded to look after that.

MS. STUART: Thank you. Allison Stuart, for the record.

Throwing it open like this is hard for me without a deck because I am a bureaucrat and I'm used to working from a deck. So forgive me if I'm rambling a bit and pull me back in when you need to. We would certainly agree that the world took a real shift with the events of Fukushima. And we've acknowledged that in the work that we're doing. And we continue to accept that there will be change and there will be evolution as more information and more findings from those events comes forward.

One of the things that we have underway is a review of the planning principles that were first developed in the 1980s for us, and then were reviewed again in 1996. We think that with the benefit of having had the experience in Japan, we want to review those again to make sure that those are -- the principles still fit, or if they don't fit that we can identify what needs to be changed and then move on that. I think at this stage, it's not clear whether there needs to be change. And there's lots of opinion, but we'd really like to do that

thoughtful review to drive our planning.

We do have work underway to examine what further steps we need to take as we move out from the contiguous to the primary zone and so on. We're wanting to do that work in a thoughtful, methodical way and that's underway currently. With our work around the situation, should we need to evacuate an area, which based on the information we have is unlikely, but if it happens we need to be ready for it, and we totally agree that we ought to be ready for that.

There's significant work underway to develop the kind of models that will assist with that that are beyond simply looking at arithmetic, but also looking at the human condition and factoring in how do people behave in an emergency. So that work is underway. And I believe there are representatives of the Ministry of Transport who are leading this for us here today who can talk further about it. But that work is anticipated to be done by December 2013.

In all of the work that we do, we work from the point of, the event has happened, now what? So we're all about contingency planning and responding to the consequences of any event. So that allows us to be more flexible in the planning that we do and in our actual responses because we can make the response bigger or

smaller depending on the events because of the approach that we've used in our original planning.

We will be supplemented in the work that we've done and others have done as the Ministry of Health plans to have their emergency plan for a nuclear event completed by the end of this fiscal year. So that would be, for us, the end of March 2013.

So with those pieces in place, we believe that we're moving forward in a way that is recognizing that we are in a new world and we have a new lens that we're all applying to emergencies. But also allowing us to move forward in a thoughtful way so that we're building rather than changing one thing and then going off and changing something different, rather than having –- so it's not an integrated approach. So at this point, that would be my opening comments. Thank you.

THE CHAIRMAN: Thank you. I just want to complete the question was to staff whether the EA, as constituted, dealt with some of those issues; the intervenor claimed not.

DR. THOMPSON: Patsy Thompson, for the record. I'll start by providing the CEAA umbrella, and then Mr. Jammal will link it with the ongoing process moving forward if the EA is approved.

So under the *Canadian Environmental*

Assessment Act, the purpose of the Environmental Assessment is to assess the impacts or the consequences of the project on the environment under normal and potential accidents and malfunctions.

And in that situation, for accidents and malfunctions, the emergency response is looked at as a mitigation measure if the plant systems fail and there is a release of radioactive materials. For this Environmental Assessment the choice of one in a million accident probability corresponds to a design –- beyond design basis accident, and is, as we said earlier, consistent with international practices.

When we did the assessment for this beyond design basis accident, the consequences were 5.7 millisievert at a three-kilometre zone. And under the Emergency Response Plan, this could invoke the need for sheltering. And so the assessment was done to meet the needs of the *Canadian Environmental Assessment Act*. And if the Commission approves the Canadian environmental -- or, Environmental Assessment and the project moves forward, then the licensing would take over to look at the other aspects.

MR. JAMMAL: Ramzi Jammal, for the record. As Dr. Thompson mentioned, the selection of one in a million is consistent with international safety goals.

However, as we are undergoing the review of the integrated safety review, the integrated safety review considers lower frequency events with large releases. Hence the -- putting in place the integrated improvement plan that OPG must put in place, the enhancement for safety through licensed activity.

So it’s –- the lower frequency has been considered as an integral part of the enhancement for safety, hence the mitigation measure for large release frequency. And the IIP, as we come before you in 2014, will address, as Dr. Thompson mentioned, the mitigation measures, both in the physical design and in the emergency management programs.

THE CHAIRMAN: Okay. I’m sure there will be lots of other questions. M. Harvey, do you want to start?

MEMBER HARVEY: The first question is addressed to the staff. When you say it is consistent with international practises, talking of releases in large accident, is it the 10 minus 6 or the selected type of accident? What is the international practice?

DR. THOMPSON: Patsy Thompson, for the record.

The international practice is in terms of choosing an accident that is a beyond design basis

accident, in the range of one in a million. And I think Mr. Phil Webster could provide more details to that answer.

MR. WEBSTER: Thank you, Dr. Thompson.

Good afternoon, Members of the Commission. I'm Philip Webster; I'm the Director of the Darlington Regulatory Program.

If I can take the Commission back to when staff first made a proposal for the accidents that may occur as defined in the *Canadian Environmental Assessment Act*, this was in 1999 for the Pickering refurbishment, and we began -- as you've heard several times here -- with what are called "design basis accidents".

These are accidents created by the designers on consideration of what they had designed and it considered various failures that would then need to be mitigated, and special assistance were provided to handle those failures.

So, as a very minimum, design basis accidents are ones that may occur. However, in nuclear safety, it's never enough to do the minimum, so we went beyond what was then regarded as the standard and we chose a figure of one in a million years.

That figure has been used in subsequent environmental assessments and it was still proposed for

the Darlington one, even in light of Fukushima. And this was done because even with the evolution of safety standards since 1999, design basis accidents still go down to only 10 to the minus 5.

So, by going to 10 to the minus 6, we are in order of magnitude beyond the accidents that the station is designed to happen, which by definition, in our view, are accidents that may occur.

So we have gone, as Dr. Thompson just said, into the category of beyond design basis accidents but we've not gone so far as severe accidents. They are being handled but they're being handled elsewhere and the elsewhere is, as you've heard today, the Fukushima Action Plan and the action items placed on licensees under that.

So there are three prongs to this. The environmental assessment considers down to 10 to the minus 6, the integrated safety review which would lead, along with the environmental assessment, to the integrated implementation plan, as our Slide 6 this morning showed.

And thirdly, the Fukushima action items; we covered the totality of the accidents that the Darlington station may encounter, but in different places.

Thank you.

MEMBER HARVEY: That choice that you or OPG made about the nature of the accident is such that there

will never be large-scale releases?

I mean, it’s the impression that we have and that the public also.

DR. THOMPSON: Patsy Thompson, for the record.

We didn’t go about choosing the accident to exclude accidents that would have releases. We went about choosing the level of probability based on plant design and, as Mr. Webster has just explained, what would be considered beyond plant design and we’d consider an accident that, within the requirements of the *Canadian Environmental Assessment Act*, is an accident that may happen for EA purposes and for planning purposes.

But in the case of the accident that corresponds to the one times 10 to the minus 6, one in a million, there are consequences off site, and as we’ve mentioned, the 3 kilometre zone around the plant, for someone in that area, the dose would be 5.7 Millisievert and could invoke the need for sheltering under the emergency response plan.

MEMBER HARVEY: I think we’re going to have with the -- maybe in a year and half, some indication of the crash of a commercial accident on the plant. I mean we have -- there has been studies on a small craft crash but, is that -- is my thinking good, that we’re going to

have some indication of a larger plane crash and could that be over the accident that has been chosen for the 10 minus 6?

DR. THOMPSON: Patsy Thompson.

I'll correct the statement I've just made and then I'll ask Mr. Gerry Frappier to address the plane crash question.

The 5.7 Millisievert dose is at 1 kilometre, but within the 3-kilometre zone the zoning for potential sheltering could be triggered. But the dose is at 1 Millisievert -- at 1 kilometre, sorry.

MR. FRAPPIER: Gerry Frappier; Director General of Assessment and Analysis.

You were asking a bit about the airplane situation. So, with respect to airplane crashes, that's viewed as threat; it's a malevolent act, if you like, or possibly an accident due to a random act.

So those have been analyzed. The report on that will be brought to the Commission as part of the refurbishment licensing project. In that area, they had design-based threats and beyond design-based threats similar to what we're talking about here with respect to accidents and with all the design-based threats, the systems would not produce radioactive release that's beyond what we're talking about here in the environmental

assessment.

MEMBER HARVEY: Merci.

THE CHAIRMAN: Dr. Barriault?

MEMBER BARRIAULT: Thank you, Mr. Chairman.

I'm trying to get my hands around this. The Fukushima incidence of an accident was what, 10 to the minus 6 or was it one in a million or what was it, do we know?

(Short pause/Courte pause)

THE CHAIRMAN: Why don't you take your time to consult with some of the people who know and when you got the answer come back to us on this.

MR. JAMMAL: Ramzi Jammal, for the record.

Let me try to be politically correct here. It's the -- what happened in Fukushima in regards of the frequency, the design basis of this facility required to have mitigation measures in place to be placed in order to even cover and provide protection for a design basis events.

So they did not put the physical barriers in place to address the physical design. So, hence the event progressed -- toward the progress.

And this is a completely different scenario of what Dr. Thompson and CNSC staff has done from the EA assessment. And that's the fundamental issue here.

So, you’ve got -- I mean, I’m trying to be politically correct without critiquing any other --

MEMBER BARRIAULT: No, no.

MR. JAMMAL: -- facility as such, but the design basis called for these measures to be in place, they were not installed.

And that’s where the big difference is between the Canadian environment and the CNSC regulations with respect to continuous improvement versus even -- we had the discussion before about the U.S. system. While the U.S. system has a certification process and you have to go through a major retrofit design perspective, whereas in Canada, we’d review the safety cases every three years. We have an enhancement of safety on an ongoing basis to include the adaptive management and any requirements to ensure safety at all times.

And that’s the major difference between the events of Japan and what it is we’re talking here with the refurbishment perspective.

MEMBER BARRIAULT: So what I’m hearing is that your defense in depth is much deeper than what they had in Japan?

MR. JAMMAL: Agreed. And this is what Dr. Thompson is trying to say.

So the EA is measuring the impact, okay;

the sheltering that she spoke about is a mitigation measure, but she has -- they have evaluated the impact and then what would be the mitigation measures in place to protect the health and safety of the public and the environment.

MEMBER BARRIAULT: Thank you.

Thank you, Mr. Chairman.

MEMBER VELCHI: I have a couple of questions.

The first one is just the one in a million probability. We have multiple units on site; do you then divide it by the number of units? So, for four units, it's really .25 times 10 to the minus 6?

MR. WEBSTER: For external events, it's the frequency for the site.

MEMBER VELCHI: Sorry, so if there was a -- the failure that's been identified here is the base case that could happen in any unit with the probability of one in a million in any given year. So for the site, it releases four times 10 the minus 6 then?

MR. WEBSTER: It's the same for all of them. If it happens to the site, it happens to each unit at a frequency of one in a million years.

MEMBER VELSHI: Maybe I'm just not understanding this. So if it happened in one unit, it's

an event that could happen one in a million in any given unit in any year, is it?

Or what you're saying is it's one in a million for the site. Am I explaining my question?

MR. WEBSTER: Let me try again. I was answering what I thought was the key part of it. There's the difference between internal events and external events.

The internal events, which are -- we delete the limiting ones for the environmental assessment, are per unit. The external events, of course, affect the whole site.

MEMBER VELSHI: Right. So the base one is per unit and so would that be for .25 times 10 to the minus 6 or is it 1 times -- because it could be times four units, right?

DR. THOMPSON: Patsy Thompson, for the record. I'll give you a response and I'll trust that my PSA colleagues will hit me on the back if I'm wrong.

And so the accident scenario under malfunctions and accident, under the *Canadian Environmental Assessment Act*, is an accident that may happen. We consider it an accident with a probability of one in a million. And my understanding is that is taking into consideration the safety systems and the designs of

the reactor. So it would be one reactor. And so I would conclude it's for one reactor.

MEMBER HARVEY: Would it be different for Point Lepreau or Gentilly-2?

DR. THOMPSON: Patsy Thompson, for the record. We -- for the Gentilly-2 environmental assessment, we use one in a million as well.

MEMBER HARVEY: For external effects?

DR. THOMPSON: That's correct. For the potential accident -- nuclear accident that we consider under the ---

MEMBER HARVEY: So the fact that it's multi-units, it does nothing. I mean, there's no difference with four units and one unit.

DR. THOMPSON: Patsy Thompson, for the record. It has not changed the frequency of accidents that was considered for EA purposes.

MEMBER VELSHI: I'll just have to refresh my probability. These are independent events and you would just add them up for the four units, right?

So isn't it 4 times 10 to the minus 6 then becomes the probability of this particular event happening?

DR. THOMPSON: My understanding is that for the probabilities to be additive, it would consider that

all four units would undergo -- would fail at the same time, which is not likely.

MEMBER VELSHI: Or four separate times in a year. Okay. But you got my question.

The second one, really, is more fundamental on what really is the value of the EA as a planning tool when there could be something fairly substantive that would come out from the Integrated Improvement Plan once the ISR and all the other stuff is done.

So where you look at a local probability incident and, you know, now there’s a whole lot scope of work that needs to be done with fairly significant environmental impacts as a result of that.

So we’ve heard repeatedly that when the licensing process evolves, if this project goes ahead, that’s when they’ll get the full picture on exactly what the implications are. And I’m just wondering would it not be more prudent to have a look at that as part of the EA process to make sure that there is a good handle on the full likely impact, as opposed to waiting for another piece to come down the road?

DR. THOMPSON: Patsy Thompson, for the record. Essentially what we did under the EA for the accidents and malfunctions is we considered the work being done under the Integrated Safety Review and we considered

some of the work being done under the Fukushima Task Force -- or, lessons learned.

And so the accidents and malfunctions considered a post-refurbishment plant with the upgrades to safety systems having been put in place. And some of the upgrades from the Fukushima lessons learned having been put in place as well. And so the EA, as a planning tool, considered that what is being planned under the Integrated Safety Review and Fukushima lessons learned is being implemented.

And one of the jobs of the Commission and Commission staff moving forward, if the EA is approved and refurbishment happens, would be to verify that all the mitigation measures that were considered in the EA are actually being put in place.

And one of the considerations under the Regulatory Document RD/GD-360 is the way the system was designed was the Integrated Safety Review and the environmental assessments are two sources of information to identify any required plant upgrades or improvements to safety systems.

MEMBER VELSHI: So what I've heard you say is that the Integrated Safety Review had progressed far enough, when you were reviewing the EA, that you feel confident enough that it reflected what would likely be

the outcome from that?

DR. THOMPSON: Patsy Thompson. For the EA at this stage, for planning purposes, yes. A lot of the safety improvements had been identified. And as any other EA over time, the licensing under the *Nuclear Safety and Control Act*, where we have an obligation to look at protection of health and the environment, there's a requirement for ongoing monitoring of the situation and identifying other mitigation measures if needed.

MS. McCLENAGHAN: Mr. Commissioner, I wonder if I might, before the questions continue, I have comments on some of the other things. But on that one it would -- I wish that if that were being taken into account, it had been put forward as part of this EA screening report and was transparent and something that we could comment on.

In other words, what I'm hearing Ms. Thompson say is that more severe accidents were taken into account and affected the judgement of the CNSC in its recommendation to you about whether the impacts would be significant or not from an accident. And yet their response on the record was that such severe accidents were out of scope for this EA.

DR. THOMPSON: Could I potentially repeat what I've said.

What I said was the EA took into consideration upgrades to safety systems coming out of the Integrated Safety Review and the Fukushima lessons learned. And with those safety systems in place, the frequency of certain accidents decreased. And the one -- the accident that was chosen -- the representative accident chosen representing one in a million probability is the consideration of the plant configuration after the safety upgrades.

I did not say that we went to severe accidents. I said with the safety upgrades, the probability of certain accidents decreased and the one in a million is the one we chose.

THE CHAIRMAN: Anybody else?

So let me try to figure out what I just heard here. And correct me if I'm wrong here. So for the EA, staff did what they thought was required for the EA. And it's -- you may consider it to be minimal kind of a work, but that's what they determined to be to satisfy the EA requirement.

Coming to the licensing in 2014, we'll need to forget about this one in a million. What we need is in case of a doomsday scenario, I'm using the doomsday scenario because it's devoid of any 10 to the minus 6 and the minus them -- and it's just, everybody knows what a

doomsday scenario -- we need to make sure that there is a plan for a doomsday scenario.

And that’s why I assume that staff and OPG will present a kind of what do you do in a doomsday scenario? What do you do about evacuation? What do you do about transportation? Et cetera, et cetera.

There’s got to be a plan with everybody, as unlikely as it might be, there is a plan to do all the things that need to be done. Did I –--

MS. McCLENAGHAN: So Mr. Chairman, that’s correct for licensing, but that doesn’t take away the question about what your job as a panel is now under the EA and what you have to do under section 16 of the EA.

So you have to look at accidents and malfunctions. And in respect of those, you have to make a decision about whether there would be adverse effects. And then you’d have to look at whether there would still be adverse effects after mitigation, which includes emergency planning.

And my contention is that it’s not realistic for you to do an EA based on only -- as panel, not as staff, as a panel -- based on only the one in a million accident that’s not going to cause a problem beyond three kilometres from the plant boundary, that it’s incumbent on you, in the public interest and in the

purposes of the *Act* to protect the public and the environment, to look at a severe accident beyond one in 10 in a million, and to make a determination about whether emergency planning, which is all I'm focusing on, is sufficient to mitigate such an accident or whether there would be remaining adverse effects.

I would contend that if there were such an accident, the doomsday accident, we know from other accident experience there would be remaining adverse effects.

That's going to then take you to the next part in the statute which is whether they can be justified in the circumstances or not, the go or no-go decision you have to make. Or you may say, "I have uncertainty about that," and send it to a panel review.

So I appreciate what staff is saying. They chose a certain size of accident.

My contention to you as a panel is that's not good enough. It's nor good enough for you and it's not good enough for the public.

THE CHAIRMAN: But let me -- so help me try to understand what you're saying. All of this applies to the current operation. Why aren't you now suggesting that we -- that OPG should shut down all operations right now? Because the same risks are associated right now with the

current operation.

UNIDENTIFIED SPEAKER: Works for us.

THE CHAIRMAN: Thank you.

MS. McCLENAGHAN: As we ---

MR. CHAIRMAN: All the arguments you're making about the need for a plan ---

MS. McCLENAGHAN: Yes, it's true. It's true, it does, but your EA responsibilities arise now, because there's an application for refurbishment, to take this plant forward for many decades more operating life, and at this point you have to apply the statute. You have to apply it reasonably and you have to look at what would be the consequences of an accident. It's required explicitly by the statute.

MR. CHAIRMAN: Okay. Thank you. Thank you very much. OPG, you wanted to make a ---

MR. TREMBLAY: Thank you.

MR. CHAIRMAN: You've been very quiet on this one.

MR. TREMBLAY: Oh, I have. Pierre Tremblay, for the record.

I guess the context I wanted to set is that -- you know, and as we've been talking as an industry, and as a current operator, one of the significant lessons from Fukushima was that while there is a design basis, other

things can happen, other things like severe accidents.

And so we need to be prepared and to react to those realities.

And so I would suggest and say that we have done that. We have been briefing this Commission on the progress that we're making. You heard a little bit from the community around their assurance to you, around their contribution to the emergency plan, and there's a lot of work underway.

Clearly, this is an area that is evolving. As things are learned, we adjust and we change, but it is an issue for the current facilities and the current licences, and I can tell you that we have learned significant lessons from Fukushima, and those include looking to avoid severe accidents by looking for other ways of repowering and rewatering the core.

And the video, I thought, showed very well some of the work that's been going on and, you know, I appreciate this isn't an EA, but I felt it necessary to at least get that on the table to reflect the work that is ongoing, as part of the ongoing operation.

And the refurbishment of Darlington will not stop that from progressing forward, as well it should not.

Thank you.

MR. CHAIRMAN: Okay, thank you. Last words, any of you? No?

MS. STUART: I think, not at this point, in terms of the bigger issue, but I failed to say -- sorry, it's Allison Stuart, for the record -- when prompted earlier, that our current nuclear emergency response plan doesn't contemplate stopping at the most narrow of definitions.

We do have plans in there for sheltering in place. We do have plans in there for evacuation. So, you know, KI distribution, those sorts of things are part of our existing plans and will be further strengthened as time goes on.

I didn't want to leave the group feeling that we hadn't contemplated that.

Thank you.

MR. CHAIRMAN: Okay, thank you. Thank you very much.

I'd like to move on to the next submission by the Canadian Association of Nuclear Host Communities, as outlined in CMD 12-H13.5.

12-H13.5

Oral presentation by the

Canadian Association of

Nuclear Host Communities

THE CHAIRMAN: You're obviously not Mayor Ryan ---

MS. THOMPSON: For the record ---

MR. CHAIRMAN: --- so welcome.

MS. THOMPSON: --- President Binder, I am not Mayor Ryan, Chair of the Canadian Association of Nuclear Host Communities. I am Linda Thompson, the Mayor of the Municipality of Port Hope and a member of CANHC.

Mayor Ryan does send his regrets.

Our association is comprised of heads of councils of nuclear host communities from New Brunswick in the east to Manitoba in the west.

The Association provides a forum for our members to share knowledge and best practices in our respective experiences in working with nuclear industries.

Most importantly, CANHC provides support to our members through public hearings, support to our participation and liaison with various government agencies to further our mission and objectives.

CANHC is pleased to appear before the Commission in support of the environmental assessment for the refurbishment project. Our association has been monitoring the EA process undertaken by Ontario power

Generation and is impressed with its comprehensive, as well as extraordinary emphasis in place on an open and inclusive public consultation process.

We are satisfied with the conclusions of the EA, that the refurbishment and continued operations of the Darlington station would have negligible impact on the environment and local communities. Our conclusions are consistent with the position of our member host community, the Municipality of Clarington.

CANHC values the economic benefits associated with the nuclear facilities in our communities. The refurbishment project will continue to bolster the economic well-being of Clarington. It will provide employment opportunities, boost housing, commercial and industrial development, and add tax revenue to the local governments.

That said, CANHC also believes that any nuclear undertaking should not be endorsed at the expense of compromising public safety. In this regard, CANHC is pleased with OPG’s exceptional track record for the safe operation of the Darlington station and has every reason to believe that OPG will continue to uphold its excellent safety record.

For these reasons, CANHC supports OPG’s application to renew the operation licence at the

Darlington facility.

Last but not least, CANHC would like to support OPG's request for a 10-year licence renewal on the on-site Darlington waste management facility for the spent fuel bundles.

We understand this is a temporary facility until a permanent location is secured for the long-term storage of the spent fuel bundles.

CANHC has been monitoring the works of the Nuclear Waste Management Organization and is pleased with the progress of the NWMO in its findings to find a willing host for the deep geological site for the used fuel bundles.

In conclusion, CANHC fully supports the approvals of the EA for the refurbishment project and the applications by OPG for a renewal of their operating licences.

We would like to thank the CNSC for the opportunity to comment on these matters and also for bringing these hearings into our communities.

Thank you.

MR. CHAIRMAN: Thank you.

Questions? Dr. McDill?

MEMBER McDILL: What is the mandate of CANHC or the mission statement, or the vision, perhaps?

MS. THOMPSON: Our mission is to ensure that the nuclear host communities maintain the best interest of their communities in an ongoing, proactive relationship with the Canadian nuclear industry and the regulator.

And we have several objectives: to promote common interest, to promote and enhance members' effects in dealing with senior levels of government, the Commission, and industry, and to gather and share information.

MEMBER McDILL: Thank you.

You don't go further west than Manitoba, not to Light Source in Saskatchewan or TRIUMF in B.C.? Is there some reason ---

MS. THOMPSON: You're correct; we do have a member from Saskatchewan.

MEMBER McDILL: But not British Columbia?

MS. THOMPSON: No. You may remember several years ago, CANC did host representatives from communities in British Columbia that did attend the Canadian Nuclear Association and meet with -- and actually toured the Darlington facility.

MEMBER McDILL: Thank you, Mr. Chairman.

THE CHAIRMAN: Mr. Tolgyesi?

MEMBER TOLGYESI: Yes. Tell me, the

membership is voluntary or compulsory?

MS. THOMPSON: It is voluntary.

MEMBER TOLGYESI: And what you offer to your members as a help, as advice, as support, as whatever?

MS. THOMPSON: We work together in regards to best practices, when there are issues, whether it's hearings, items with industries themselves; we work as a group to promote best practices amongst ourselves.

MEMBER TOLGYESI: So you share your expertise or knowledge from one municipality or community to other ones?

MS. THOMPSON: Linda Thompson, for the record.

That is correct in regards to -- we are working on communication work now and sharing that. As you are aware, as Clarington spoke, the Mayor of Kincardine will also be speaking later, we are all members; we share comments and information on peer review process and how that works as many of us are involved in those processes also.

MEMBER TOLGYESI: And the last one; what was your reaction or what was the action of your association following the Fukushima?

MS. THOMPSON: We were involved -- received

the information from the association. Also, many of our member communities received information from the facilities in their communities. We did share those.

We did have information and have meetings with CNA and other groups to understand some of the impacts moving forward and at our annual general meeting we also did receive updates from both -- I believe it was CNSC Staff and the CNA.

MEMBER TOLGYESI: Mr. Chairman, the last one. I'm sorry, I made a mistake.

The last one is, what relations or communications you maintained with other countries? Does it exist this kind of association in Japan, in France, or other places? And what you do, is there exchange between you?

MS. THOMPSON: I'm not aware of other associations but we -- through difference conferences, we have been involved; many of the mayors have done tours, we have done tours in Switzerland -- or I should say in Sweden, Finland, and a number of other countries involved with difference conferences. We have spoke at the CARL Conference in regards to public consultation in Sweden and been involved in many other conferences.

THE CHAIRMAN: Thank you.

Anybody else?

So you -- if another community wants to hear all about mayor's experience in a nuclear community, you are ready and willing to go in there?

MS. THOMPSON: Absolutely. And we did have the opportunity several years ago with a community from the west that was interested in understanding information. We had a tour -- a number of tours here in Ontario met with the representatives of CANC, Health Canada, the Durham Nuclear Group, OPG. We did have a tour of the Darlington facility. And we would again open up to any community that was interested and is involved at looking at any type of nuclear facility to provide that opportunity.

THE CHAIRMAN: Thank you very much.

MS. THOMPSON: Thank you.

THE CHAIRMAN: We move now to the next submission by the Canadian Association of Physicians for the Environment, as outlined in CMD H13.6 and 13.6A.

And I understand that Dr. Vakil will make the presentation.

Please proceed.

12-H13.6 / 12-H13.6A

Oral presentation by the

Canadian Association of

Physicians for the Environment

DR. VAKIL: Thanks for giving me the opportunity to speak today. I'm representing the Canadian Association of Physicians for the Environment which is a group of physicians and other health professionals that are concerned about environmental effects on human health. And I work as a family doctor; I work in Kingston in the Family Medicine Centre at Queen's University.

So, when I looked at this environmental assessment, I was surprised how little mention there is of health and how little addressing there is of the controversial health issues around nuclear reactors.

And what I read was what I've heard frequently from the nuclear industry and also from the Ontario government, that there were no risks and no worries regarding health around nuclear reactors because the chronic low level emissions that are emitted on an ongoing basis from reactors are too low to be causing illness.

And I'll describe as I go why I disagree with this. And my feeling is -- and I'm representing CAPE, this group of physicians, and other health professionals and citizens -- that the Darlington refurbishment should not be approved until these health

issues are appropriately addressed, which they are not presently in the environmental assessment.

There are many issues around health in the nuclear industry and this is some one of them, and I'm not going to get into too many details because what I'm really concerned about mostly is these low level chronic emissions that are constantly coming out of reactors.

Scientists world-wide basically now accept what is called the "linear non-threshold model" of health and radiation exposure which means that any amount of radiation is harmful. So even background radiation is causing illness in everybody or elevates the risk of it with everybody.

There's a recent study from -- out of U.K.; they looked at lots of models and measurements and they estimated that about 20 percent of childhood leukemia is attributable to background radiation. So even background radiation, which is natural, is still causing leukemia in children.

We know that children are extremely sensitive to radioactivity; some studies estimate as much as a hundred times more sensitive than adults. Women are more sensitive and embryos and foetuses are exquisitely sensitive to the effects of radioactivity which makes it extremely important that pregnant women be protected

against any unnecessary radioactivity.

We also have to accept that we don’t understand everything about this. So when we say that these chronic low level emissions can’t be causing illness we have to admit that we don’t know that.

So when you look at the studies that have been done, they started out in the U.K. in about the eighties when people started to be concerned about seeing a lot of children getting leukemia near their facilities. This prompted the Comer studies and there has been, I think, 14 or 16 of them since the late eighties.

Some of them have in fact shown an association between leukemia, childhood leukemia, and reactors. Again, they’re small studies, they’re ecological studies which are not a very good type of studies.

But nevertheless, they have -- some of them shown a concerning relationship. These have been replicated in other European countries. We’ve done very few studies in Canada, a couple out of the late eighties, early nineties. The really -- only the one that we have done is radiation and health in Durham Region which I’ll talk about in a minute -- that came out in 2007.

Since then, better studies have been done, the KiKK study out of Germany and the Geocap study out of

France which have basically shown that there is an increased risk of childhood leukemia in children living near reactors.

But the Radiation and Health Study which is really, like I said, the only one that has been done in Canada, has many, many weaknesses and limitations.

First of all, it’s an ecological study which, as I said, is the weakest form of study. The radius is up to 10 kilometres around the reactors that the population they studied -- which is long. They don’t take into account any migration out and in and there has been a lot of flux in population. The numbers are small.

They also define a child as being under 19 years old. So any increase in really little children under five is not going to be shown.

They had to pool the congenital anomalies, which are birth defects, because there are so few of them, and then again, if there’s an increase in any one type, it’s not going to show up on a study like this.

They are also missing the first five years of data after Pickering opened.

So, despite all these limitations, they did show some increases in different types of cancer and an abrupt increase in combined cancer after Darlington opened. As well as an increase in Down Syndrome, which is

concerning because we know that’s radio-sensitive.

The authors concluded that these -- these -- this required further study, which has not been done, but then they went on to try and reassure everybody that there are no health effects.

In 2008, Germany did a very robust study, methodologically. It’s a case control, which is a much better type of study than an ecological study. And they looked at children living near all 16 reactors at different radiuses around the reactor. And they found that children under five living within five kilometres of every single one of those reactors had up to twice the risk of developing leukemia.

This study was replicated -- this study by Geocap, which came out earlier this year in France, they did the same kind of study, case control, and they found that children under 15 living within five kilometres of every one of their 19 reactors had an almost twice the risk of developing leukemia.

Now, the German and French governments and the nuclear industry, of course, didn’t want to really find this out and they scrutinized it inside and out and did conclude that, in fact, there are -- there is an increased risk, but they insist that it’s not related to the chronic low level emissions. And it must be something

else.

But there are explanations for these low level radioactive emissions to cause childhood leukemia. One is that, as I said, children are way more sensitive, some think as much as 100 times more sensitive. That in itself could explain it.

There also long half-lives to some of these emissions. There are spikes in the emissions. And we have to perhaps look again at how we're measuring the -- how we're modelling the measurements of exposure.

So tritium, as somebody had mentioned before, has a half-life of 12 years. This means it's around in your body for 120 years. You only lose about five percent of it per year, which means that it accumulates. So every year, if we say that you have a certain amount of exposure coming out of reactors per year, you have to remember that 95 percent of it was there from the year before. So it's constantly accumulating.

Some of these emissions have very long half-lives. So this could explain why low level emissions cause leukemia in children.

Also, when we're given the annual amounts of radiation, it's either averaged out or it's added up and we get an annual amount. But is this -- this is a graph that shows a power station in Germany just a few

days in September. As you can see, it's very, very low and then there's a massive spike about 500 times what the low level is and then it goes back down again.

And this occurred when they opened up the reactor to change the fuel bundles.

So granted in -- the Candu reactors have on-line fueling, but there has to be, at some point, a time when they open the reactor and change the fuel bundles. And we don't know -- because we are only given an annual total amount, we don't know if there are massive spikes around here, Darlington or Pickering, until we see daily measurements.

Another problem is when we're looking at tritium, there's a lot of controversy about how it's -- the effective dose that's measured. We know the amount of radiation, but these emitters go through a whole series of calculations to determine the actual biological effectiveness, in other words, how much it's affecting a person.

And some of these -- some of the very respected radiation biological agencies worldwide have suggested that we need to change the weighting of tritium, that it's actually much more dangerous than we think. So if we were to change the weighting from one, which is what it is, to two or three, which, in fact, is what

Environment Canada had recommended in the early 2000s, this would effectively double or triple the emissions that we've calculated. This could explain children getting leukemia near reactors.

So CAPE recommends that the CNSC should publicize daily readings of radioactive emissions instead of just giving a total amount so the public is aware of the spikes in emissions. Also, the CNSC should comply with recommendations to change the weighting factor of tritium from one to two, even three, which would double or triple the measured dose.

And the CNSC should undertake a large case control study of childhood leukemia within five kilometres of Pickering and Darlington reactors.

All these things should happen before any environmental assessment is approved and before the refurbishment goes forward.

We have reliable research showing elevated risks of leukemia in children living near reactors. As I've explained, we have -- we can explain how low level chronic radioactive emissions are causing this leukemia. And we have to remember children are canary -- children with leukemia are canaries in the coal mine. That if they are getting leukemia from reactors, it's a given that it's harming other people, too.

Thank you very much.

THE CHAIRMAN: Thank you.

Questions? Dr. McDill, you want to -- I'm sure you're done.

MEMBER McDILL: The first -- I'm sorry, I can't see everybody in the audience all day.

Have you been here all day, or just recently? So you -- I understand it's your working position so it had some challenges.

This morning I asked staff to talk about the German study and the French study, and we have some different interpretations than yours. And I'm not sure how much interaction you've had with staff on, for example, the KIKK study and how it -- the interpretation may be different than your interpretation.

So I'm going to ask Dr. Thompson, once again, because I think it's helpful, particularly since other people are coming and going during the day like yourself, to talk again about compare with KIKK and Geocap in particular -- KIKK and Geocap? And I -- you're in health? Maybe you could also reply to the study from -- the local study?

DR. VAKIL: Thank you.

DR. THOMPSON: Patsy Thompson, for the record.

What I'll do is I'll quote almost directly from the Geocap study that the intervenor has used as a demonstration or as containing evidence that there is childhood leukemia.

And so to just summarize, the Geocap study repeated the methodology used in the German KIKK study by looking at cancer, including childhood leukemia, with distance from the NPPs using a sort of radius.

What they also did was to do coding by dose in different areas around the NPPs. So they've done by circumference, by radius and by geo-coding according to the dose, so dose groups.

And so the French Geocap study, when they looked at the link between childhood leukemia and distance, found that there was an increased incidence with distance. When they looked at the same incidence data, but into -- taking into consideration the coding by dose, the relationship disappeared. So the incidence was no longer elevated when their relationship was to dose rather than distance from the NPP.

What the French study also said is that, contrary to the classic assumption, the distribution of population in terms of dispersions of radionuclides cannot be represented by a simple function of distance from the NPP. And so distance is not a good representation of

dose. That’s directly from the paper.

They also say that the dose-based geo-coding is a method that could overcome the limitations of studies such as the KIKK study that only looked at distance.

In terms of the other studies that are available looking at childhood leukemia, in the U.K. there’s been one cluster of leukemia around a processing facility that has lasted over a long period of time. It’s not in a nuclear power plant and it is a cluster of leukemia that has lasted. But there are leukemia clusters in other parts of the world where there are no NPPs, so it’s not something that is unique or around nuclear facilities.

There are also similar studies that were done in other countries. There was a study done in Finland where the complete residential history and computed -- was looked at relation to the NPP and it was weighted by time spent in the house.

And the Swiss study looked at addresses at birth and diagnosis and looked at cumulative proximity to the NPPs.

Neither of those studies that actually followed people over time found a relationship between living close to an NPP and having an increase instance of

cancer -- in childhood leukemia.

The KIKK study alarmed everyone when it came out, including the CNSC. No wants -- no one wants to regulate in a matter that would cause health effects. We all paid attention.

The studies were reassessed by a number of individuals who were independent of the KIKK and the German government, and those independent reassessments looked at the fact that around the German facilities when Krummel was excluded the -- the relationship with distance almost disappeared. And so, the cluster is around the Krummel plant or it seems to be that way, and also that the further reassessments indicated that the -- whether you're living in an urban region or a rural area seemed to have a greater impact on the incidents of childhood leukaemia than being -- living close to the NPP.

What I would also say is that we have a fairly good study of childhood leukaemia in relation to -- to exposure to radiation and it was published in 2003 and the authors are Brenner et al and it has shown that when the foetus are exposed in utero, those 10 to 20 millisieverts, there is an increased incidence in childhood leukaemia, but that's 10 to 20 millisieverts.

Around the Darlington NPP we're looking at a dose of 0.006 and I'm missing a zero, one more zero.

And so, the phenomena or the -- the incidents of radiation and -- and childhood leukaemia is well known but with the studies we have it requires fairly significant doses for us to see the relationship.

DR. VAKIL: I would disagree with that. I think there are many studies that show that far less than 10 millisieverts to children and to foetuses cause childhood leukaemia. As I'd said, there's a study done that came out in 2009 by Wakeford that showed that background radiation which is usually less than 2 millisieverts is causing leukaemia in children in U.K..

And as -- I want to also point out that I've had this conversation many times with many people. This is a very controversial area and the science around it is incomplete and we're still just guessing about all of this and I think because, unlike most countries who build their reactors in rural areas, we've built our reactors in very populated area especially if you include everybody downwind and downstream, so I think certainly in Canada, we owe it to the public or you owe it the public to at least do a case control study in Pickering and Darlington looking at childhood leukaemia.

MR. KYLE: So, Robert Kyle here. With me is Mary-Anne Pietrusiak and we spoke this morning and I'll probably just reiterate some of our comments and then turn

it over to -- to Mary-Anne for -- for her comments. So I think this morning we acknowledge the limitations with our study design. It is an ecological study and the report points out both the strengths as well as the weaknesses of the study. I think I pointed out it’s -- it’s, you have to be careful about cherry-picking both high rates and low rates and making inferences from either but rather look at, if you will, the patterns that did occur versus what one would expect if, in fact, there was a health effect and I don’t think the report said that there’s no health effects. I think what the report said was the pattern that was observed is not the same as what would be expected if there was a health effect.

Finally, I pointed out that the report made a number of recommendations regarding moving forward and I listed out some of the -- some of the steps that we’ve taken to address all of these recommendations. Two things I didn’t mention was first that we are and have analysed at the sub-municipal level and divided Durham region into 46 health neighbourhoods to act as a means of being more precise with respect to health effects in Durham region should the data be there to be analysed at the sub-municipal level.

And secondly, we’ve done some work with Cancer Care Ontario to try and correct some of the

limitations with respect to the study design although the work really has focussed on Pickering rather than Darlington and is probably not to remain to -- to these hearings. So those are my comments. Mary-Anne, I don't know if there's anything else you wanted to react to. I thank you, Mr. President.

MS. PIETRUSIAK: Hey, Mary-Anne Pietrusiak from the Health Department, just again to repeat some of our findings from Radiation and Health 2007. We did look at 18 cancer groupings, five types of congenital anomalies as well as stillbirths comparing them with Ontario. So as Dr. Kyle said, we did not see any pattern that would suggest that the Pickering Nuclear Generating Station or Darlington was -- was causing health effects in the population.

Of course, childhood cancer and childhood leukaemias are a particularly important health effect to look at and that was included in the report. We did not find significantly high levels in Durham region. I did look additionally at that zero to 4 population for childhood leukaemia that was suggested from the German study and I did not find a significantly higher rate in Clarington or in Ajax-Pickering although there was a significantly low rate in Ajax-Pickering in 1993 to 2004.

As Dr. Kyle mentioned, we are continuing

always to do a number of different health -- health reports and health surveillance. This is part of our mandate as the Health Department, not necessarily specific to nuclear, but a number of different health issues. We have looked at 46 health neighbourhoods within Durham region looking at a variety of different health indicators, not cancer because the numbers are too low for those small populations but a number of reproductive health indicators as well as things like injuries, smoking, a number of lifestyle factors that we are looking at across Durham region.

And the other point was that we did -- we have been partnering with Cancer Care Ontario to look specifically at a retrospective cohort study around Pickering. This was in relation to cancer incidents. The number of leukaemia cases overall, not even just specific to childhood leukaemia were too small for us to -- to look at with that methodology and it was looking specifically related to Tritium airborne emissions, not just distance from the plant.

THE CHAIRMAN: And can I ask you, you mention -- you mentioned Cancer Care Ontario a few times, but Cancer Care Ontario would have records on Pickering, Darlington, Bruce Power, presumably it’s the same Ontario government. If there were any anomalies in those

communities associated with leukaemia, would they not automatically detect this?

MR. KYLE: So, Robert Kyle for the record, Cancer Care Ontario is the stewards of the Ontario Cancer Registry. It depends how the data is being used, what research questions are being posed and what information products that CCO produces as to whether or not they're on the lookout for cancers associated with nuclear power plants.

You'd need to have somebody from Cancer Care Ontario to speak to is this an active area of investigation? Do you know offhand, Mary-Anne? Sorry.

MS. PIETRUSIAK: Mary-Anne Pietrusiak, I would say that their most active was related to this Pickering case study and that was really, it was, they have some funding that they receive from Geoconnections to look at small spatial areas and Pickering case study was one. There was another around Windsor looking at lung cancer and air pollution. So they were using those examples as tools to see whether they can use this for public health monitoring.

So, on a regular basis, I don't believe that Cancer Care Ontario would be looking for -- for, sorry, cancer effects around the nuclear plants. They would be looking at overall cancer trends and specific

cancers. There's a lot of different ways you can cut the data. It depends upon your questions that you're asking.

THE CHAIRMAN: Dr. McDill?

MEMBER McDILL: Thank you, I have just a couple more, Mr. President. With respect to the spiking that was shown in Germany in 2011 which I assume was a -- probably a significant refuel, is that something that would be expected out of any Candu with online refuelling? When might that sort of thing, this is a noble gas one, but when might that sort of thing occur?

MR. TREMBLAY: Pierre -- Pierre Tremblay for the record.

As you probably know, the Candu's are on power fuelling and so we essentially – it's an on going activity. We would typically refuel one reactor. Each reactor is refuelled at least once a day basically.

And that, essentially, requires us to latch on to the -- both ends of the reactor, if you will, open the pressure boundary and refuel. So we monitor emissions on a daily basis and basically there are operational issues but, basically, it's a daily occurrence for us.

MEMBER McDILL: As opposed to, say, a BWR or something like that, which would refuel a quarter of the reactor at a time or a third?

MR. TREMBLAY: Typically, the light water

reactors would have an 18-month to two-year outage cycle and it would be required to essentially refuel at that time, that's correct.

And again, I think we've talked about the overall emissions on an annualised basis being but a mere fraction of the limits and so there is some perturbation from day to day but very small.

MEMBER McDILL: If the intervenor wanted to see daily emissions, is this something that can be tracked in an easy way?

MS. SWAMI: Lauri Swami.

What I would say is we don't currently publish our daily emissions data; however, if we had such an anomaly as we saw in the German results, that would be reported to the CNSC.

I'm sure my colleagues at the CNSC would bring that forward as a report to the Commission. We would be responsible, of course, to terminate that emission, put in place corrective actions to prevent recurrence.

So it would be a fully regulated activity, and we would certainly be required to report that.

MEMBER McDILL: May I just add a question. What level in terms of millisieverts in one day are you required to report to the CNSC?

MS. SWAMI: Lauri Swami for the record.

I don’t have the numbers off the top of my head. They are various for the various types of emissions that we have and they are specified. The limits are strictly regulated limits. We’re based on dose impact and we back calculate to what those limits would be on a daily basis or a weekly basis, depending on the emission type. And those limits are then specified, whether it’s an action level or whether it's an administrative level that we would be required to report against.

That information is available. I just don’t have it off the top of my head.

MEMBER McDILL: Maybe staff can make a stab at answering that question.

DR. THOMPSON: Patsy Thompson for the record.

I’ll just correct one thing and then perhaps my licensing colleagues will take over in terms of the structure for reporting of action -- exceedances of action levels.

But one thing I would say for sure is it’s not in the order of millisieverts within this.

MR. JAMMAL: Ramzi Jammal for the record.

The licence has emission limits and -- as Dr. Thompson has mentioned. And the values are

established through rigor modelling and actual emissions.

So the CNSC radiation protection and the dose limits of the CNSC are within health limits. So in other words, the limit itself is for the protection of the workers, and the environment, and the public.

In the licensing release limits and the reporting limits are based on way below any health effect, and those limits are set in the licence through levels. In addition to the levels in the licence, the licensee established what we call action levels and administrative levels. And those are fractions of the health limits or the heath effects.

And the reporting to the CNSC takes place when they exceed the action level because from CNSC perspective that is an indicator of potential loss of control of the program. And we take action, we investigate through inspections, and we ensure that the corrective actions are in place.

Again, the dose limits are within health limits under the CNSC regulatory requirements. The establishment of the release limits is based on best operational limits and applying the ALARA Principle.

THE CHAIRMAN: Give us a flavour of the number?

DR. THOMPSON: Patsy Thompson for the

record.

Essentially, the limits are based on -- emission levels for radionuclides are based on one millisievert regulatory dose limit. And the –- and it applies to what we call the critical group. So in the communities, a lifestyle, the age, the characteristics that would correspond to the most exposed individual, often infant in the community; it’s back calculated. That sets the dose limit -- or the release level at one millisievert.

We then have action levels and administrative levels. They’re a fraction of the dose limit of the one millisievert, and that is the trigger for reporting. And I would say that over the last many, many years, the doses to members of the public, the most critical individual, which is an infant living close to the facility, is a fraction of a microsievert essentially. So its 0.6 microsievert; so several orders of magnitude below the public dose limit.

And if there were spikes of the nature that the intervenor has described, we would never see such low doses in the environment. But there are mechanisms in place with action levels and administrative levels and an exceedance of those is a reportable event to the Commission.

DR. VAKIL: Can I comment?

THE CHAIRMAN: Let him give the numbers first.

MR. JAMMAL: Sorry to disappoint you, Mr. President. It's Ramzi Jammal for the record.

The numbers -- I've been informed that Health Canada does have fixed point monitoring that is monitoring stations –- sorry, that the monitoring stations are fixed in nature, and they gather daily information.

Mr. J.P. Auclair is in the audience here. He can elaborate on this.

Now, on the numbers, we can refer to the licence itself. So the action level is a fraction; okay, 0.1 percent -- sorry, 0.1 millisievert depending on the elements and the radioactivity that’s being released. So again, there is always a safety margin that varies from one one-hundredth, to one one-thousandth of the dose limit.

MS. SWAMI: Lauri Swami, if I might.

I have found the actual numbers, and I don’t think you want me to go through all of the numbers. But I could pick out that we have the derive release limit for tritiated water vapour to the atmosphere is 5.9 times 10 to the 16 Becquerels on an annual basis. And if you go across, you can look at what the weekly release limit

would be, which is 1.1 times 10 to the 15.

And if you go to an action level, which is as described, the calculated value, it would be 1.2 times 10 to the 14th on a weekly basis.

In order to calculate what these action levels are, we have a process and protocol that's been reviewed and agreed to with the regulator which talks about investigation levels, action levels, and eventually you get to the derive release limits. And these are based on various dose impacts on whether it's a yearly basis, a monthly basis, or a weekly basis.

So it's not simply one number. It's a series of numbers that I could certainly make available, but I tried to summarize it here for you.

THE CHAIRMAN: Go ahead.

DR. VAKIL: Yeah, but this brings back the point of the dose conversion factors and the weighting factors, which could be far, far too little for some of the emissions, particularly tritium. So that when you're talking about Becquerels when you're converting them to sieverts, which is what you have to do to get the effective dose of the actual effect on the human, the dose conversion factors and the weighting factors that you have to use in these models are inaccurate.

THE CHAIRMAN: So what about the weighting

factor; anybody want to talk about that?

DR. THOMPSON: Patsy Thompson for the record.

What I could say it’s been a topic of scientific discussion for at least a decade. And the CNSC has a research project that’s been co-funded by IRSN on tritium effects in mice, and one of the things we're looking at is a comparison of the effect of tritium against a gamma radiation to look at the RB factor that the intervenor has mentioned, but if we were to assume that an RB of 2 or 3 is appropriate, then instead of having a dose of 0.0006, we would have a dose of 0.0012. It’s still a very, very small dose and orders of magnitude -- in the public dose limit of 1 millisievert.

DR. VAKIL: But there is also the dose conversion factor that is also multiplied. It’s not just the weighting factors, which is absurdly low for tritium. I don’t know exactly what it is but I know it’s low.

DR. THOMPSON: The dose conversion factor is taking into consideration the physiology, the biokinetics and for -- tritium behaves like water and it’s very well understood in organisms, including humans.

THE CHAIRMAN: Isn’t that the thing that is being looked at by the ICRP or some international bodies who are debating all of this?

DR. THOMPSON: Patsy Thompson, for the record.

The CNSC and other organizations have made recommendations to the ICRP to consider changing the RB factor for tritium and the ICRP position is that given other aspects of the framework that the current system is protective and they have indicated that they do not intend to change the RB factor. But the fact remains that the CNSC is doing research in this area. Other organizations are doing research in this area and if it were appropriate, we would make the change.

THE CHAIRMAN: Okay, anybody else? Ms. Velshi.

MEMBER VELSHI: A question for you. One of the recommendations that the intervenor makes is that there should be consideration for a large study, a health study.

Tell me; what are some other considerations that go into deciding whether one should have something more than an ecological study and is one warranted?

MR. KYLE: So Robert Kyle here.

I’m not an epidemiologist but I think the answer lies in if you are expecting an effect, how big would your sample size need to be; over how many years would you have to conduct the study; are you able to

understand and control your confounding factors; who's going to conduct it, et cetera, et cetera.

So I think for the most part, it depends on the robustness of the design, the effect that you're trying to achieve, can it be done, can you control for confounders, over how many years would you have to do it. And I'm going to have to turn it over to my epidemiologist friend because I'm not an epidemiologist but I think it would be caught up in the science required to do a proper study design.

MS. PIETRUSIAK: Mary-Anne Pietrusiak here.

In terms of doing a case control study, I think it would be very difficult just to limit to Darlington and Pickering because they're just two plants. If you're looking at, for example, the KiKK study that was with 15, 16 plants and the France study, 19 plants, so you'd be limited by your sample size by those, say if you were just going to limit to Ontario or Canada, as part of an international study that could potentially happen. That obviously takes a lot more coordination that would be required at a more national level.

THE CHAIRMAN: Are you aware the Americans are trying to do exactly that and they're running into a design huge fight amongst the experts on how to do this. And if memory serves, I thought they are now doing a pilot

on a pilot kind of a notion to try to determine how to do this. Did I get this right?

MS. PIETRUSIAK: Mary-Anne Pietrusiak here.

I'm not exactly sure where the Americans are in terms of their studying, but there are -- it is a very difficult thing to study because it's small effects you're talking about, very low levels of dose and how can you study that and see effects. It's difficult and there's no way around it. It's difficult.

THE CHAIRMAN: But we just heard, this is -- you blew me away here, that now background radiation kills. Begs the question as to why we're not all dead now?

MS. PIETRUSIAK: Well, it just increases the risk.

THE CHAIRMAN: But how do you measure that? We just found out how difficult it is. How does 2 mill -- you know, 1.8 millisievert which is the average in Canada, how are you going to detect the impact of that?

MS. PIETRUSIAK: Well, that's your background rate of cancer. But there was a study done by Wakeford, came out in 2009 in U.K. who has managed to study this and his estimate is that 20 percent of children with leukaemia in the U.K., it's attributed to background radiation.

THE CHAIRMAN: Staff?

DR. THOMPSON: Patsy Thompson, for the record.

Could I ask, Rachel Lane is back at the CNSC office; she's the staff epidemiologist. She's got some information on the Wakeford study. I think the conclusions of the Wakeford study are not exactly what is being presented.

THE CHAIRMAN: Rachel, are you still at work? What's happening? Well, if not today, we'll try to ---

MS. LANE: Hello.

THE CHAIRMAN: Hi.

MS. LANE: Can you hear me?

THE CHAIRMAN: Yes, we can.

MS. LANE: Okay, good. Hello, Rachel Lane, CNSC epidemiologist.

Richard Wakeford's study, he actually did not calculate the childhood leukaemia cases in Great Britain. What he did was he estimated that using conventional risk models, he predicted that about 15 to 20 percent of childhood leukaemia cases in Great Britain may be attributed to natural background radiation, although the uncertainties in these values are considerable.

For example, this study derives from the

experience of the Japanese A-bomb survivors which is what he based his calculations on, are very different than the Great Britain population. The bottom line is that this study was not an actual study of children in Great Britain. It was using, basically, the LNT to predict how many childhood leukaemia cases one may be able to estimate.

Thank you.

DR. VAKIL: Can I just comment? But scientists accept the linear non-threshold model, which means any amount of radioactivity is harmful. So it's not surprising that a certain percentage, whatever it is, of childhood leukaemia, as well as any cancer, is due to background radiation.

THE CHAIRMAN: Okay.

DR. THOMPSON: If I could, Mr. Binder, in terms of the LNT, I think the radiation protection community does use the linear threshold relationship to design radiation protection programmes and the CNSC is no different.

But going from the LNT to design radiation protection programmes and ALARA and estimating that there will be so many cancer cases, that's where we have a difference of opinion. And one example I would give is that the CNSC recently re-assessed 42,000 workers from

Canadian nuclear power plants and some AECL workers for whom we have individual dose information, including tritium dose information. And for those 42,000 and some-odd workers, there is no relationship between exposure to radiation and dose. The actual, the incidence is minus 1.2 so there is no relationship between cancer incidence and dose.

And for those workers, we also have tritium information and the tritium exposures are significantly higher than what we find in members of the public around Darlington. And in that study as well for 42,000 workers, there is no relationship between tritium exposure and cancer incidence.

And so that's the disconnect between the LNT where we can use the LNT to develop ALARA programmes but LNT is not a good estimate of radiation effects and the 42,000 workers is a demonstration of that; there is no radiation effects on their health.

THE CHAIRMAN: Okay, thank you. You have the last word. Anything else you want to add?

DR. VAKIL: I just want to reiterate that as people can see, it's a very controversial issue that's been looked at since the eighties. And so I do think here in Canada we basically have no study to reassure the public that these reactors are not causing illness. So I

do think we should do a large-case control study here. And I would be very interested to see the daily emissions, if the OPG is able to provide those.

THE CHAIRMAN: Thank you. Thank you very much.

We'll move to the next submission by the Durham Nuclear Awareness as outlined in CMD 12 H-13.200 and 13.200A. And I understand that Mr. Brackett will make the presentation. Please proceed.

12-H-13.200 / 12-H-13.200A
Oral presentation by
Durham Nuclear Awareness

MR. BRACKETT: Hello. And for the record, I'd to say I'm tired, hungry and nervous. And as you know, my name is -- yeah, all of the above. My name is Jeff Brackett and I'm here representing Durham Nuclear Awareness. How do I progress? Okay, thank you.

Yes, I'm here representing Durham Nuclear Awareness. We are a group of citizens that live and work in Durham Region in the shadow of Darlington and in the shadow of the Pickering Nuclear Generating Station. Thank you very much.

And our goal has always been to raise

public awareness about nuclear issues. And our process is simply to educate ourselves and ask questions and ask more questions. And hopefully these questions will open up an understanding of the issues and involve more and more of the public in the decision-making process here.

We’re local people that have lived with this Darlington project for one generation and will live with it for many more. We’re 20 years into the Darlington nuclear reactors and we’re just one generation in at this point. But it will be thousands of generations before we can close the book on the issues that arise out of how we kept the lights on for these last 20 years.

I’m amazed at the way the nuclear industry portrays the Darlington refurbishment plan as a mid-life tune up for the station when in fact the 22-year-old, $14-billion station has reached a premature end of life crisis. It’s either rebuild it now at a cost estimated to hover around 10 billion dollars or do the only responsible thing left and shut it down before it breaks down on our human highway somewhere down the road.

So here we are at the Darlington refurb/continued operation/find a temporary solution for nuke waste hearings. There’s just too much to cover. And although it’s our firm belief that it’s absolutely unacceptable to burden future generations with our nuclear

waste and that we should stop producing it, today I'll focus on nuclear emergency planning and, as I see it, focus on the Commission's refusal to address this review -- in this review the possibility of accidents which would result in uncontrolled large releases of radiation. And these types of accidents should be a part of our nuclear emergency planning.

DNA's concerns and recommendations began with the screening report, which was very disappointing for us as it ignored the lessons from Fukushima, in our view. While major accidents are happening once a decade, the possibility of this is ignored in the screening report.

Worldwide catastrophic nuclear accidents are not supposed to be happening. Not once in a million years, but they are, as you've heard, once about every ten years. And this is ignored in the screening report.

It's astounding to us that the screening report also ignores the recommendation of the Joint Review Panel calling for a multi -- calling for a review of multi-unit radiation releases at Darlington. You know, I think it was about 20 years when DNA brought up the idea that we really need the plan for multi-site accidents. So it's nice that the Joint Review Panel is catching up a little bit and suggesting that we look at multi-unit

accidents.

The failure to address serious accidents leaves our communities vulnerable and unable to cope with -- our emergency plans are unable and unready to cope with large releases of radiation. Our recommendation is that this Canadian Nuclear Safety Commission should not approve this Darlington Environmental Review until large radiation release accidents are considered and the robustness of a nuclear emergency planning is confirmed. Sorry.

As you have heard previously, in preparation for these hearings we asked the Canadian Environmental Law Association to review the draft screening report and identify omissions and concerns related to emergency planning. And they have done that for us and you have seen that and read it.

But our high level of primary observations are that the Commission barely addressed emergency planning in the Environmental Assessment Report, that it only considered small radiation releases; these are controlled radiation releases, in fact, deliberate radiation releases. The plans don’t account for accidental releases of radiation. And the report, you did not confirm evacuation capacity over the life of the plant as population grows around this station, which it inevitably will.

So we asked you to address a whole series of concerns related to emergency planning and this was not done. It's particularly disconcerting to us and it just goes from bad to worse that when the CNSC ignored the recommendation from the JRP. A lot of good recommendations in that report, the new build report. Things that dealt with tritium levels in drinking water, set-backs from the station, land use re-costing of the -- the cost of a nuclear catastrophe, re-evaluation of the *Nuclear Liability Act*. All of these things were good recommendations that I don't think were included in this scoping document. But to us the most important thing that you missed or ignored was recommendation 63.

> "The panel recommends that prior to construction, the Nuclear Safety Commission -- Canadian Nuclear Safety Commission require OPG to evaluate the cumulative effect of common cause severe accident involving all of the nuclear reactors in the site study area to determine if further emergency planning measures are required."

And I don't see how the public or communities can have any confidence in the CNSC, as an independent watchdog, when you ignore recommendations from

a body such as this. And so our request again is that multi-unit accidental radiation releases must be considered before this environmental review is approved.

And it gets worse again with the recent revelation that Emergency Management Ontario has made a request that the CNSC review larger radiation releases in the current review in light of Fukushima and the JRP recommendation. The Commission apparently didn't receive this request, but has subsequently the EMO's request. Thus the JRP, the Government of Ontario and community groups such as Durham Nuclear Awareness all support, we all support reviewing emergency plans to cope with large external releases of radiation. But the Commission does not.

And so we recommend again that the Commission be responsive to well-documented public concern and review large accidental radiation releases before this environmental review is approved.

In closing, DNA's conclusions and requests, which I'll just read off for you:

> "The CNSC has ignored lessons from Fukushima. While major accidents are happening once a decade, they're ignored in the screening report. This misrepresents the risk of Darlington's

continued operation.

Second, the CNSC has been unaccountable and ignored requests by Government of Ontario, the JRP and NGOs to consider multi-unit accidents and large radiation releases. And it is the CNSC intransigence that is putting our communities at risk. The CNSC has only provided unsubstantiated assurances that emergency plans will acceptably protect Ontarians in the event of large radiation released during the continued operation of Darlington.

Our recommendation is that a public review of the ability of emergency plans to respond to multi-unit accidents and large releases must take place prior to this environmental assessment or before this environmental assessment can be approved.

And:

"DNA recommends that this environmental review be upgraded to a

panel review."

Thank you very much.

THE CHAIRMAN: Thank you. Question? M. Harvey.

MR. HARVEY: Many items have been already discussed earlier today, but I would like to have the staff comments on page 4 about the recommendation from previous public consultation -- I mean, from the JRP.

MR. McALLISTER: It's Andrew McAllister, for the record.

The CNSC staff has not ignored the Joint Review Panel recommendation on multi-unit reactors.

What should be important to note is that in the Government of Canada's response to the Joint Review Panel report, it accepted the intent of this recommendation, noting that the CNSC has established a task force to examine the lessons learned from the Japan earthquake. And it will evaluate the operational, technical and regulatory implications of the nuclear event in Japan in relation to Canadian nuclear power plants.

The CNSC Fukushima Task Force has provided recommendations related to multi-unit accidents and related emergency response. This is being implemented under several CNSC Fukushima action items.

These are still open for Darlington and

acceptable progress is being made, and OPG has requested closure of certain items. OPG is required to address these items regardless of the Darlington refurbishment continued operation project going forward.

So in summary, it hasn't been ignored. It is being considered under the Fukushima task force under our regulatory framework.

MEMBER HARVEY: OPG, you want to comment?

MR. TREMBLAY: Yeah, Pierre Tremblay, for the record.

I'd concur with that. I mean, it relates to my earlier comments that, you know, the issues and the lessons learned from Fukushima are, in fact, a part of ongoing industry learning and activity.

Perhaps to just talk about a few specifics to put that on the table, I would ask Mark Elliot to talk a little bit about this aspect.

MR. ELLIOT: For the record, Mark Elliot, Chief Nuclear Engineer.

When we talk about the accident that's described in the environmental assessment, yes, that was a single unit accident and it was a 10^{-6}, and it's been well discussed here today.

But in doing that and in doing our Fukushima work, we have looked at -- at less probable

accidents, one of them being the complete station blackout. I won't use the other term for that one. But the complete station blackout has been looked at.

And with the features that you see -- you saw on the video today, the multiple layers of passive safety features, there -- what you get from that is time.

There's time to respond. There's time for -- first of all, for the emergency planning actions to take over and, if necessary, evacuate. And there's time to mitigate.

And one of the things that the EA doesn't take into account that we have added since Fukushima is that emergency mitigating equipment. So that equipment that's shown again on the video, the pumps, the generators, that's all in addition to what's described in the EA.

So that equipment would be used to stop the progression of the accident and there is time to do that given all the safety features that are there.

So we have looked at multi-unit events. We know there's time to react. And the other thing we've done is, on the emergency preparedness side, we've looked at worse -- worse consequence events in terms of our emergency planning.

And I'd like to ask Jim Coles, our

Emergency Planning Director, to just talk about those beyond design basis types of events that we're now factoring into our emergency planning.

MR. COLES: Thanks, Mark. Jim Coles, for the record.

At OPG, some of the enhancements we've made to our Fukushima -- or I'm sorry, our response to Fukushima, we've made many enhancements to our emergency plans. Mark mentioned the emergency mitigating equipment.

One of the first things we had to do is write procedures and training -- develop training to train our staff on how to use this equipment to deploy it in an emergency situation.

Now we have to do drills to exercise that capability. In fact, just last week we completed another drill testing the deployment of that equipment.

The beyond design basis accident scenarios have always been an element of our drill and exercise program that we exercise with the Durham Region and in the province. In order to give the province a challenging scenario to test these aspects of their response, we have to break things that don't normally break. We have to go outside the design basis, if you will.

So recognizing that historically we've looked outside of the design basis for drills and

exercises, we're going farther in 2013. And we already have an approved drill and exercise program that expands on the deployment of the emergency mitigating equipment that we currently now have.

But we will also be adding on the severe accident management guideline response that's been developed with industry over the last couple of years and now implemented at OPG.

So two elements there. All of this has been dovetailed into our consolidated nuclear emergency plan. So our plan's been updated already to capture these new elements of severe accident management, as an example. And we will be drilling to that new plan all through next year leading up to a large-scale exercise in 2014.

MEMBER HARVEY: Thank you.

But just a compliment of formation. Everything starts with the static security system. So by any means, is there any possible place that those systems wouldn't work? I mean the static systems. I mean the rods and the -- I'm sorry, my French is no good.

MR. TREMBLAY: No, no. Merci. Pierre Tremblay, for the record.

No. Clearly, the operating systems -- the main operating systems are the subject of a lot of reliability work and testing and so on. And so we

maintain and are required to as part of the licence, maintaining a certain -- a specific reliability for those systems and when they -- should they become unavailable, required to take the unit to the guaranteed shutdown state.

So we'd maintain a high reliability. Clearly there are probabilities of failure. But again, going back to Fukushima, we rely on a whole lot of things to go wrong. We go beyond the design basis of the plant and say okay, it's just happened and now deal with it.

And that's really the point that Mark and Jim are making around what have we done to enhance in the extremely unlikely situation where the process systems fail and the safety systems fail and the backup systems fail and so forth.

So we're going well down the road of answering a question that President Binder asks us from time to time. And that is, what's the worst thing that can happen and how do you deal with it?

MEMBER HARVEY: A last question. The staff from page 5, what is presented to us is emergency management, EMO, has requested that CNSC review large radiation releases in the current review in light of the Fukushima and the JRP recommendation. And I would like to have your comment on those paragraphs here.

DR. THOMPSON: Patsy Thompson, for the record.

We -- when we were made aware that we had not received the EMO letter and taking into consideration when finalizing the draft screen report, we met with the EMO in November and presented the information that is summarized in the CMD H13.8 where we discuss why we believe that the issues raised by EMO are fully addressed within the regulatory framework, not just the environmental assessment but moving forward in terms of the Fukushima lessons learned and the refurbishment.

And our understanding is that, following this meeting and the explanations -- the discussions around the purposes of the EA, what was considered in the EA and what would be considered -- what is being considered outside of the EA by other regulatory activities that the Emergency Management of Ontario were satisfied.

But I don’t know if there’s still someone from EMO to --

MEMBER HARVEY: Is that the case? Is somebody from EMO here?

MS. STUART: Good evening. Allison, Stuart for the record.

I’ve now said good morning, good afternoon

and good evening.

In terms of the meeting that we had with CNSC in terms of our desire to have a greater inclusivity of events beyond the normal planning horizon.

We were satisfied with the responses that were provided to us by CNSC staff; however, we also recognize that this isn't the last time that we will be sitting here and this isn't the only opportunity that we have to continue to push what we think is really important. And I'm not doubting anybody else thinks is -- that they're thinking it isn't really important in terms of emergency management, how we plan, how we exercise, how we modify, et cetera going forward.

So on behalf of Emergency Management Ontario and the province, we're comfortable with where we are at today and we'll continue to monitor it.

THE CHAIRMAN: What will you be able to do by 2014 should the refurbishing proceed and the EA get approved? What do you think makes sense to present at the refurbishment application?

MS. STUART: Allison Stuart, for the record.

And we're in a process of evolution, so I think that we would be wanting to present a provincial position that recognizes the various aspects of planning

that go beyond the more traditional planning scenarios. But in addition, we would be able to speak to the partnerships that we have with the various -- you know, right now we're talking about OPG. But in general, with the -- our partners in terms how are we working with them in that expanded view of the world, being able to speak to that at subsequent hearings and identifying any areas of concern as well as, hopefully, areas of significant progress.

THE CHAIRMAN: Dr. McDill?

MEMBER McDILL: Thank you.

I think many of the roughly 200 interventions have some concern about well them RBAs, really big accidents, really bad accidents. And I think it's fair to say that the link between the draft screening report, the Fukushima response and emergency preparedness is not as clear as the public would like or perhaps needs.

And I'm hoping that by the time we get to 2014 that that box will be closed.

That's a comment.

With respect to the intervenor's presentation on page 3 -- 2, the intervenor says:

> "Municipalities within 100 kilometres of Darlington should have capacity to independently radiation levels in the

event of an accident."

I think this maybe goes back to something Mr. Jammal brought up just a few minutes ago with respect to fixed point.

Is there any capability, perhaps not for independent monitoring, but Health Canada monitoring?

MR. AUCLAIR: Thank you for the question. Jean-Patrice Auclair, Health Canada, for the record.

So yes, in fact, we have six stations located around Darlington in population centres, including Scarborough, Markham, Bowmanville, Ajax, Oshawa, essentially encircling on the land side, the Darling and Pickering sites. And they're far enough away that they're not likely -- they're going to see what's been released after the fact.

So -- and these are monitors that are running 24/7 all the time and we're monitoring them as -- and we're completely independent of OPG. So we have those over on the Bruce facility as well, and others.

MEMBER McDILL: So let's call it fence line monitoring or station monitoring should capture any sudden excursions and ---

MR. AUCLAIR: And then we ---

MEMBER McDILL: --- and hopefully will never see anything ---

MR. AUCLAIR: Well, we would see -- we would see any release. We see -- the detectors that we can see radon, naturally occurring radon, we can see rainfall events at our stations because the radon concentration rises at ground level during a rain storm, so we would see anything that would be released, including if the wind is blowing in the right direction as opposed to over the lake. We would see any discharge -- any normal operating discharges that are within the licence -- that are within the licence limits.

MEMBER McDILL: Does this address the intervenor's -- your concern?

MR. BRACKETT: Well, I'd be interested, just to be clear, tritium?

MR. AUCLAIR: No, this is -- these are gamma detectors, so they would -- they do grow as beta. They would pick up all of the airborne releases that would include tritium, but not just -- they're not selective, if that's what you mean.

MR. BRACKETT: Right, okay. Is this data available in real time to the public?

MR. AUCLAIR: Not yet, but we're working on it.

MR. BRACKETT: Do you have a time line for that?

MR. AUCLAIR: We -- the -- it's not a technological problem; it's a political problem.

MR. BRACKETT: Exactly, yes.

MR. AUCLAIR: I can't answer politics; sorry.

MR. BRACKETT: Thanks for working on it.

MR. AUCLAIR: Yes.

THE CHAIRMAN: But you do have some data that's provided annually, periodically. I thought I saw some ---

MR. AUCLAIR: Yes, yes.

So what we do is we -- I mean, in truth, the data doesn't change very much in terms of there's no -- the -- what you see are natural variations, generally, in the background levels, and that's what we post.

So there's not much of interest until there is an event like Fukushima or Chernobyl where -- and there's obviously a peak interest in looking at this data.

So what we post publicly is we post monthly summaries of the values and we post them a quarter at a time, so we'll post three at the moment. We're posing three months' worth of data four times a year to cover the full year.

THE CHAIRMAN: That's not good enough, in your ---

MR. BRACKETT: It's a start, and I appreciate that.

THE CHAIRMAN: Okay. Also, remind me where -- I thought the Natural Resources had some monitoring devices. Their mobile unit, remind me again what Natural Resources have in terms of monitoring.

MR. AUCLAIR: I can answer that, too, if you wish.

So there's actually a number of airborne capabilities as well as carborne capabilities, and since the 2010 Olympics we also have mobile capabilities in terms of things that can be carried by individuals.

So we have built a capacity with Natural Resources Canada, and we have exercised them as recently with Ontario as their exercise in October at Huron Challenge where we have our airborne capabilities which will -- which can be attached to either helicopter or fixed-wing aircraft and fly over an area to give you the ground measurements.

And they land. They need about a processing time of an hour or so. And then that information is downloaded into our servers and available to the decision makers, in this case the Province of Ontario.

And that was exercised, and it worked

beautifully in Huron Challenge.

The same with the carborne data. The carborne data is a little faster because we can make use of cell phone and other technologies at ground level to transmit the data in closer to real time as opposed to waiting for the aircraft to land.

And that was also demonstrated during Huron Challenge and is working, so -- and that gives you what, essentially, the vehicles are tracking along the roads that they're travelling and background radiation.

THE CHAIRMAN: Dr. McDill?

Anybody else?

You have the last word.

MR. BRACKETT: Thank you.

President Binder, I was really impressed when you asked the Mayor and the fire department from Clarington whether the plan -- I might not be phrasing it exactly as you, but whether or not the plan dealt with doomsday events.

I was trying to figure out why you asked them that. And my impression was that they didn't know. They didn't know.

I'm sure that I know and you know that the plan doesn't deal with doomsday events, so why you asked them that was enlightening because they had not a clear

response to that.

They -- I think they didn't want to say that the plan only goes so far, or maybe they didn't know that the plan only goes so far because people I talk to every day in Durham region about this, they're surprised as can be, to learn that the nuclear emergency plan does not address the accidental release of radiation, that the plan assumes that all releases of radiation during an emergency event are deliberate and timed.

It’s a stunning revelation to people, and when people learn that that they’ve been let down in this way, it’s just not acceptable.

And I wish I had -- as part of my last word, I wish I had the phone-a-friend option that everybody has here, and phone a friend back at the office and all your experts and the expertise in the room. It’s incredible.

I’m sitting here; I’ve got a day job. I’m working myself crazy trying to understand the issues and present to you. And as part of your phone-a-friend routine here, you’ve got people on your staff side, people on OPG’s side, and they’re all discussing things about the serious accidents that are discussed and how they’re addressing our request that you look at severe and multi-unit and so on.

But, you know, none of these things are on the table in this environmental assessment. And so I've got to reiterate that we need this bumped up to a full panel review, and that's my last word.

THE CHAIRMAN: Okay. Well, you asked me a question, why I asked.

MR. BRACKETT: Yes, sir.

MR. CHAIRMAN: Well, I'm surprised it's the first time you heard me ask this. I've been asking this since last year, since the big event, and I can tell you what my assessment -- where we are is we had some plans for emergency management. We're just trying to ascertain how good they are, and I think you heard from EMO and from our staff, there's always room for improvement, and we're going to insist that there will be improvement before the refurbishment.

But when we hear -- if we decide to go with the refurbishment in 2014, I would hope that there will be a robust plan dealing with severe accidents.

MR. BRACKETT: Thank you.

MR. CHAIRMAN: Thank you.

I think we need a biological break for about -- what shall we say ---

MR. LEBLANC: Ten (10) minutes?

MR. CHAIRMAN: Ten (10) minutes. So that

will make it 7:15.

--- Upon recessing at 7:05 p.m./

L'audience est suspendue à 19h05

--- Upon resuming at 7:19 p.m./

L'audience est reprise à 19h19

MR. LEBLANC: Please take your seats. Thank you.

MR. CHAIRMAN: Thank you.

Okay. We move now to the next submission by the Municipality of Kincardin, as outlined in CMD 12H-13.24 and 13.24A. And I understand that the Mayor of Kincardine, Mr. Kraemer, will make the presentation? The floor is yours.

12H-13.24 / 13.24A

Oral presentation by the

Municipality of Kincardine

MAYOR KRAEMER: Well, thank you, President Binder, and thank you to Commissioners of the CNSC.

And I'd just like to say, to start off with, that I don't have any phone friends either.

But I guess the point of our submission

here today is just to say a little bit about the municipality, where we are. Kincardine is situated in Southwestern Ontario on the eastern shore of Lake Huron in the County of Bruce.

Kincardine is home to Canada's first commercial nuclear power station, the 200 megawatt Douglas Point single-unit CANDU station which was operated safely from the mid-sixties to the early eighties.

We are also home to eight other CANDU reactors organized in two four-unit stations, Bruce A and Bruce B, and as far as I know, I believe it to be the largest nuclear complex in the world.

And the purpose of our submission is to reinforce, I think, the Municipality of Clarington and Durham Region's experiences with the nuclear industry and to say that we believe that it will very beneficial to Clarington, to Durham Region, and to the Province of Ontario.

We have experience with all of the operations that are being contemplated in Durham Region. We have just finished -- in our region, we've just experienced the refurbishment of Units 1 and 2 at Bruce A, which I'm sure the Commission is quite well aware of, as well as expansion of our nuclear waste facilities.

And in the Municipality of Kincardine, we

have been a host community for almost 50 years. So I think that we have an awful lot of experience with this.

One of the places I didn't really intend to talk about but I'm going to expand on a little bit, from an emergency preparedness perspective, we have confidence that OPG will safely manage any issues or events at the facilities, and there has never been an emergency event that required an emergency response at any of our nuclear installations.

That said, as a three-term mayor of one of the world's largest nuclear power plants, I've taken my responsibilities for emergency planning very, very seriously, and I'd just like to speak to you a little bit about Dr. Binder's doomsday scenario and how that would happen, and perhaps shed a little light on Commissioner Harvey's original question, if I could.

Like the CNSC Commission, emergency preparedness is that the plan is never finished. It's a process of building a plan, testing a plan, reviewing the plan, and then implementing the changes that you identify through it.

You heard some talk earlier about Fukushima and about what's happened, and has there been responses, has there been changes made because of it, and I believe the answer to those questions is, yes, that, you know, the

way that an emergency plan from a municipal perspective operates is that by the very nature of the event, you don’t know what it’s going to be, and there are certain commonalities between any event, and even an event at a nuclear station may not be a nuclear event.

There are electrical systems, heat-generating systems, all sorts of other things that could be part of a scenario. As well as that, many naturally occurring events may also bear similarities to an event. The like would be contemplated by the CNSC. So one of the scenarios -- or one of the -- I guess, the founding concepts behind emergency planning from our perspective is that the plan has to be fluid and has to be responsive to any eventuality that may come out.

And so it’s organized in a very clear path that gets the expertise that’s available locally together right away.

The industry is responsible for what we call an emergency within the fence, and then we’re responsible for what happens outside the fence.

And so what would happen is that one of your first steps would be the opening of the emergency operation centre. The emergency would then be an attempt to understand it as well as possible, and then to deploy appropriate local resources to the emergency is how it

would roll out.

From there on, the plan takes into account -- and has various people that would sit at the emergency operations centre. Emergency -- EMO, or Emergency management Ontario, sits there; our county sits there; Social Services sit at it; fire; rescue; police. Everyone that can have something to do with the emergency, whether it’s nuclear or otherwise, sits at that table.

And then depending on how the emergency would develop, the resources are called upon from -- first from the local area, then from the region, and then from the province itself, and so it marches back, depending on the scale and the size of it and resources are called in, dependent on what type of a situation you have.

An example of one of the ones that we did recently was in a chemical emergency, how would you deal with that? We would not have HAZMAT teams and that locally, so we would have to call on those from other jurisdictions, most likely the Province of Ontario itself.

And one of the key theories behind it is that would be how just about any major emergency would be dealt with. So just to shed a little light on that.

I just wanted to -- it’s been a long day. I just wanted to show a few slides here. I just want to explain a little bit about the plant. Like I said, we had

nine nuclear reactors in four stations. This is B. Bruce A is over there, and the little dome is the original CANDU plant.

In my presentation, I speak about the fact that our local constituents very, very strongly support the nuclear industry.

Back in the late nineties, when Bruce A was shut down, the largest protests ever shown in our community happened in support of keeping Bruce A alive, and there was large, large protest over shutting it down, not opening it up.

We also were a community that has been looked at for a third station, for Bruce C. And the polling results in our community for support for new build are off of the scale. You know, new build support 81 percent, 84 percent, good news for local economy, 94 percent. So our community, even though we -- you know, we have a lot of experience with it, support for the industry is huge.

With that we have the Western Waste Management Facility that has operated for many, many years and takes all of Ontario’s -- at this point as far as I know -- low and intermediate level waste. And it has been a very, very, well managed in the long-term and has given us great confidence in the industry.

Enough confidence, as I'm sure you're well aware, to approach the industry about doing a permanent repository for low and intermediate level within our community. And it has -- it has received solid support through polling and through years of communication. All decisions have been made on television, and been part of open council debate, store-front polls, any way possible to make sure that the community is aware of our intent. There's a little bit of a picture of it. Seventy-four (74) percent decided -- vote decided to support the project.

And just to talk about -- I'm moving quickly here because it's late in the day, so and I'll leave myself for time for a little bit of -- a few questions.

Just talk a little bit about our communication with the industry. We, as you know, have two operators in our community; we have Bruce Power as well as OPG. We feel we have excellent -- excellent communication and excellent relations with both of them. We also are in regular routine communication with the Nuclear Waste Management Organization.

Unlike the last presenter, I feel quite confident in the mandate of the CNSC and I believe that the Commission works very hard to protect all Canadians

and all Ontarians on this important issue.

We regularly attend the Canadian Nuclear Association, as well as working with our neighbours through the County of Bruce and the Canadian Association of Nuclear host communities.

Kincardine, we very strongly believe, that the work of the NWMO and its adaptive phase management program stands a very good chance. We think that finding a willing host community is achievable, and at to date there's been 21 communities put their name forward for the various stages of hosting.

I guess to conclude, we feel that -- that like the new build, a refurbishment of the existing plants will result in new direct and indirect and induced employment opportunities in the region and the local area. Our experience is that new business activity and opportunities due to increased spending associated with the projects are for sure going to be felt. And stimulation of the local and regional economies during each phase of the project will be felt.

OPG has been an excellent -- has been an excellent community citizen. They've received recognition from the municipality and gratitude from many of our local organizations. They provided sponsorship for such things as Kincardine's Cottage Festival and Highland Games,

Summer Music Festival, Bluewater Summer Playhouse, Lake Huron Learning Centre, Women's House, the list goes on and on.

So I guess, just to summarize before the question period, I'd just like to say that the Municipality of Kincardine believes that the Darlington refurbishment initiative and renewal of its operating licenses will be very positive for the province, for Durham Region, and particularly for Clarington. And that our past experience and past practices OPG will very safely manage the construction, operations and waste management obligations of their current facilities and will continue to do so at the Darlington facility.

THE CHAIRMAN: Thank you.

Questions?

Okay, I will bite. Talk -- talk to us a little bit about this -- the low level and intermediate -- you say that you still have the community support for that and -- but not all your neighbours, municipalities are in support of that.

Are you talking to your other mayors, colleagues, that share the waterfront? Let's put it this way.

MAYOR KRAEMER: Yes. Well, four of our neighbours have signed up to -- to go to the -- through

the various phases of the NWMO process. I believe -- or five of our neighbours. The list right now is Aaran-Elderslie, Huron-Kinloss, Saugeen Shores, South Bruce and Brockton; so five of our neighbours have signed up to be examined through the process.

And yes, we do meet regularly. Our system of government -- the county council is comprised of the mayors of each of the lower tiers. So I sit at county council with the heads of council for our entire region. So we meet three times a month, minimum.

THE CHAIRMAN: The reason I ask you because -- again, I'm reading the press and I hear that some of you member of the community I think given up on you and they're going to talk to the mayor for Sarnia.

MAYOR KRAEMER: Yeah. How far should I go on that one?

The mayor of Sarnia, I believe, in my view, is making quite a decision to intervene in our local politics in the way he has given the facilities that they have established along -- along the St. Clair River -- sometimes referred to as Chemical Valley.

But I believe that our community -- I have received no letters in opposition to it that -- of any -- there are some people that are starting to -- I guess like -- support is not unanimous, like in any other community.

Support is very, very strong.

The confusion between, I think, low and intermediate level waste as well as the -- I guess the initiatives of five communities to take a look at it, to have the -- to have the courage and forethought to take a look at hosting a repository has, I would say, excited maybe some of the opponents to it.

And if I could just conclude, one of the things having somewhat enter -- felt that we may go this way, I'd just like to say that nuclear power is not alone in opposition when it comes to -- when it comes to how people feel.

Can I have this slide on please? Can you put the slide I have up?

Coal -- more controversial than nuclear in Kincardine by far is wind power. It seems amazing to me, but it's far, far, far more controversial. The Mississauga gas plant, that's one of the -- touted as one of the major ways of generating power -- strongly opposed and killed a $600 million detriment or some darn thing like that, as well as the Keystone oil pipeline.

So all major forms of energy generation, in my view, have opposition and have their -- with many people, reasons why they may or may not be opposed to them. My belief is that by far, the majority of our

residents support the industry, its safety record, and the CNSC oversight of same.

We have had a very good relationship with the industry and they've operated extremely safely and are very important to us, as I believe they are to this region.

Thank you, Dr. Binder.

THE CHAIRMAN: Okay. Thank you.

Anybody?

Monsieur Harvey?

MEMBER HARVEY: Just one question to the Mayor Kraemer. How would you compare the -- because Darlington and Bruce are slightly different in that sense, that the surrounding population is quite different. So how would you compare the emergency measure in the evacuation plan for your region, what has to be done here?

MAYOR KRAEMER: I'm not familiar with the fundamentals of their plan, but the basics of the plan, I believe, are dictated by provincial legislation. So the operations of certain things like the Emergency Operations Centre, the Communication Centre, many of the key components will be common to all communities in Ontario with regards to those minimum requirements.

The difference is, I believe, to communities such as ours is that there is an extra onus on

us to be prepared for events that we really don’t really know what they might be. It’s one of the things when you hear CNSC staff talk about events that are, you know, one in a million years. Coming up with scenarios even to test those events are very difficult to do, so it’s more of a -- more of ensuring that you have a plan that can be rolled out and expanded as needed and trusting that the training of the various organizations is there for you, that the plan is built around.

And I believe that Clarington’s will have this very much in common with ours on being able to call up and bring in the expertise that’s needed in the various fields. Some parts of the plan may require a heavier onus on public health. Some of them may be social services. Almost all of them have in common with the Emergency Evacuation Centres and there should also be, I believe, although I’m not familiar with it, but decontamination for the workers and that are something that would be contemplated and planned for in a nuclear host community’s emergency plan but not necessarily, say, in a community in the North, or where a different issue or different criteria may be necessary.

THE CHAIRMAN: Okay. Thank you. Thank you very much.

I would like to move now to the next

submission, which is an oral presentation from Ms. Darlene Buckingham, as outlined in CMD 12-H13.20.

Ms. Buckingham, the floor is yours.

12-H13.20

Oral Presentation by

Darlene Buckingham

MS. BUCKINGHAM: I'm here as a member of the public.

So Commissioners, President Binder, a scorpion reached a stream and did not know how he was going to cross over as he couldn't swim. He spied a frog and asked if he could climb on his back for a ride across the river.

"Do you think I am crazy?" the frog says. "If I let you on my back, you will sting me and I will die."

"I can't swim, the scorpion replies, and if I sting you, I will also sink and die."

The frog agrees that this makes sense. So he lets the scorpion hitch a ride on his back. About halfway across the stream, the scorpion stings the frog. The frog screams, "Now, we are both going to die! Why did you sting me?" The scorpion replies, "I am a scorpion.

It is in my nature.”

So what is the nature of nuclear energy? Without uranium, there would not be any nuclear energy. So what is uranium? It is a mineral that is mildly radioactive because all of its isotopes are unstable. However, when mined, milled, processed and fissioned, these daughters of uranium are released into our water, air, and food, and are extremely unstable, radioactive, and toxic to life.

Uranium, when outside of its natural habitat and when taken up by plants, animals, and ingested and breathed in by humans, causes damage to DNA which results in cancers, sterility, and birth defects.

The best solution now is to put this highly toxic waste back into the rock it came from by digging a whole thousands of feet below the surface encased in cement and steel.

Due to the high cost to store nuclear waste, now estimated at $35 billion and counting, the temporary solution is to store this waste on the shores of the Great Lakes, putting the source of drinking water for millions of people at risk of nuclear contamination. So here the problem begins.

There’s a huge divide and clash in the analysis of people who do not see nuclear energy as a

prudent source of energy due to the extreme heat and toxicity of its waste products and those who do see it as a viable, essential source of energy.

We are here today to discuss the EA licence for refurbishment and operating license up to 2055, plus continued storing of the waste on the shores of the Great Lakes. Many know this is sheer folly to continue to create such toxic waste and create such risks to ourselves into our life. How can this happen?

After participating in former public sessions, I have come to the conclusion that there is a huge difference in the way the nuclear industry analyzes risks and the ways those who understand nuclear energy is very dangerous analyze nuclear risks, and how we come to very different conclusions.

To many others, as well as myself, the environment is in the entire Earth. We look at the big picture of the impact of nuclear energy from cradle to grave so the costs and risks we look at are far greater than the industry reports to the public. When the nuclear chain from mining uranium to the end of life and decommissioning of nuclear reactors is taken into consideration, the impacts to the environment, the costs in terms of billions of dollars, and the health hazards are not worth taking the risk for the return in electrical

energy that the fissioning of uranium provides us with.

The industry does not look at the big picture and does its analysis in small parcels allowing them to say that nuclear energy is clean because boiling water by the heat released by fissioning uranium does not release CO_2. But, in reality, if the whole chain were analyzed, the truth is nuclear energy has a large carbon footprint and creates incredibly toxic waste that is dangerous for hundreds of thousands of years.

Telling the public that nuclear energy is clean is deceptive. We clearly see the discrepancies in being told nuclear energy is safe, inexpensive, and peaceful, and the reality of what nuclear energy entails.

We look at the overall impact to the Great Lakes and see them as the source of our life and health and do not want radioactive daughters of uranium leaching into the water. We do not want to risk our water, the most vital resource to life that we have, so that we can turn on our lights. We know there are better ways of using the sun, wind, heat of the earth, tides, to name a few technologies that are sustainable and far less dangerous than nuclear. So we ask ourselves; why the risk?

We see the global impact to the people of Fukushima, living in gymnasiums, separated by cardboard

walls, having lost their homes, their pets, their livelihood, and facing a future of cancer, sterility, and sick children, also knowing this crisis is far from over even though the mainstream media is not covering it.

We know the daughters of uranium are blowing in the wind and travelling in our oceans from this nuclear accident and the industry is not being upfront about the release of these dangerous radioactive materials into the public's water, air, and food.

We see the exorbitant amount of money, hundreds of billions of dollars spent on building nuclear reactors and the amount of money it takes to maintain and refurbish these reactors to keep them safe and there are still spills and accidents.

We are still paying for the stranded debt on our bill for the reactors built in the eighties and you ask us to believe that there will be new reactors and maintaining the ones we have until 2055 is going to be cost-effective.

The biggest difference between those who are nuclear-proponents and those who seek better, safer technologies to power our world is that without uranium, there would not be nuclear weapons.

We are on the brink of war with Iran because of the war applications of nuclear energy. We've

seen nuclear energy spoken about every day in the media as a cause to go to war. And this is peaceful?

We see that after 60 years, the nuclear industry still does not have a safe method to deal with high-level nuclear waste and that OPG wants a licence to continue to store these toxic wastes on the shore of the Great Lakes, putting the single, most important element to our health and our vitality at risk; the very water we drink.

In university, I wrote a paper on the differing life views of Edvard Munch and Henri Matisse. Munch's vision being a dark, dismal, apocalyptic vision of life, epitomized by his iconic painting "The Scream" contrasted with Matisse's painting "The Joy of Life," the colourful, vibrant vision of life, with music, dancing outside in harmony with nature.

It was at this time that I chose to live with a vision of life to be -- that life is to be lived in peace and enjoying the beauty of the world we find ourselves in. The highest truth I've learned is to do no harm and to take care of life.

Why am I telling the CNSC this story? Because the waste isolation pilot plant east of Carlsbad, New Mexico, licensed to dispose of nuclear waste for 10,000 years is considering using "The Scream" as a

warning pictogram for future generations that it is not safe to dig here. “The Scream” is a very apt symbol for the destructive nature of uranium a symbol that even artisan scientists can agree upon. Do we really want to live with science of the screen, littering our landscape marking deadly nuclear waste that we created? Is deadly waste the legacy we want to leave to future generations? The truth about uranium when unleashed is that it does harm us. And it is a powerful weapon of war. There is no way around this analysis. It is also human nature to be able to choose in a world with nuclear waste, nuclear accidents, and the threat of nuclear fallout is not the world I choose to live in.

That is why I am here to ask the CNSC and the OPG to consider other options to nuclear energy over the next 10 years. Locking into nuclear energy as the only way to power our world, is holding us back from the myriad possibilities to power our world with sustainable, resilient sources from the sun, moon, wind, and the warmth of the earth. The design possibilities are limitless.

If we can build nuclear reactors that are an engineering feat, why can’t we build technology that surpasses our wildest imagination and our biggest dreams to find clean renewable energy for all people? Why are we putting ourselves to such trouble, expense, and risk when

there are better ways to power the world?

I am also asking the CNSC to consider looking at the world in a different way, seeing the interconnections between all life and begin to analyze the risk of nuclear energy in this life from cradle to grave. Looking at it at any other way will continue to allow the thousands of toxic chemicals that have been not only released by the nuclear industry but by other industries as well creating a toxic soup that could very well tip the viability of our planet earth. If we do not begin to analyze environmental and health impacts of the cumulative and synergistic effects of all toxic waste and make better decisions on how we power our planet and live in peace we will sink along with the scorpion and the frog due to the vary nature of uranium and other toxic substances that we cannot control and we are using unwisely.

I will conclude with a quote by Carl Sagan, a scientist, “A new consciousness is developing which sees the earth as a single organism and recognizes that an organism at war with itself is doomed.” We are one planet and I, in conclusion, I think we need a new vision of how we power our world. Thank you.

THE CHAIRMAN: Thank you. Question? Anybody want to, okay let me. I’d like – this is something that we hear a lot about and maybe staff can

help in terms of nuclear energy is a large carbon footprint.

DR. THOMPSON: Patsy Thompson for the record.

The number of assessments that have been done for different forms of producing electricity including nuclear where we look at carbon budgets and other things. And so taken in isolation the nuclear power plant per se is not a significant source of CO2 or other ozone depleting substances. I think what the intervener is referring to is doing a life cycle compilation of at each stage from mining, to processing, to fuel fabrication, and to waste. If you add all of that the carbon footprint is higher then just the nuclear power production, but my recollection is when those assessments are done for nuclear power plant and other sources of non-renewable energy from a life-cycle point of view nuclear power still comes out as less of a source of CO2 then coal, gas and other non-renewables.

THE CHAIRMAN: Mr. Harvey?

MEMBER HARVEY: Just to follow that. Would it be possible to get those figures? That comparison between the different means of producing energy?

MR. TREMBLAY: Peter Tremblay for the record. If I might we do have some CO2 emission

generation type life-cycle and it does show nuclear very low compared to for example natural gas, even solar, or photovoltaic in terms of CO2 per kilowatt hour. So that's available we can certainly make that available to you. So if that's ---

THE CHAIRMAN: And let's include the full life-cycle.

MR. TREMBLAY: Yeah –- it's a life-cycle assessment includes the mining, all aspects of generation.

MS. BUCKINGHAM: Am I able to make a comment?

THE CHAIRMAN: By all means.

MS. BUCKINGHAM: I don't have it at my finger tips but there is a book that I have read, and I don't know what the name of it is. But I can certainly provide it to the CNSC and this is a complete analysis of the nuclear energy cycle from cradle to grave and when it was analyzed in that way there was actually a net loss in the energy that was produced. And I can certainly, I have that at home. I have it on my computer, there's so much information, you know, I didn't know what you were going to ask me but I would certainly be able to provide that book to the commission. It was a very very good analysis.

THE CHAIRMAN: Just give us the reference, we can find the book elsewhere.

MS. BUCKINGHAM: As I said I don't have the reference at my finger tips. I can certainly email you.

THE CHAIRMAN: Yeah, yeah, that's all I need.

MS. BUCKINGHAM: Okay.

THE CHAIRMAN: Anybody else? Any other questions? Dr. McDill

MEMBER McDILL: Thank you, for the intervenor I wonder if OPG could just briefly talk about the safety of the current drum storage containers that are sitting on the buildings at Darlington.

MR. TREMBLAY: Peter Tremblay for the record.

I'll ask Terry Doran the vice-president of nuclear waste to talk about the overall safety of our program and how they are stored, Terry.

MR. DORAN: The dry storage containers as was previously mentioned have been in use now for over 16 years. They go through a rigorous process with oversight from the CNSC during each phase from its original design through fabrication and ultimately licensing. Each of these containers are robust in design, containing high density concrete as well as outer shielding. They go through a rigorous process to secure the contents, they are leak test, they are welded, secured, they are part of

an aging management program to validate the robustness. They are designed for a minimum of 50 years and through continued monitoring expected to last for 100 years. So it's a very comprehensive cradle to grave approach.

MEMBER McDILL: And if for example a dry storage container were to begin to deteriorate is there anything that prevents the fuel from being over packed or repackaged every 50 to 100 years almost indefinitely?

MR. DORAN: For the record Terry Doran. We have undertaken a study just for that very unlikely event that the fuel would have to be repackaged. So it's not expected as part of our aging management that it would but we have initiated a study which reverses the process of removing the lid by transporting it back to an irradiated fuel bay. Removing the fuel within the bay, and that study is underway. We have the analysis for the tooling that would be required, we have a prototype dry storage container that we plan to do with what we'll call dummy fuel bundles in 2013, and then by 2014 be able to repeat the exercise with a fully loaded dry storage container to validate that we can repeat the process.

MEMBER McDILL: Does that give you any confidence?

MS. BUCKINGHAM: Well my only question, 5, 50 to 100 years when were talking about I mean the waste

depository or repository in Carlsbad they are talking 10, 000 years. So 50 to 100 years is not even close.

MEMBER McDILL: Maybe I could ask that, to go from short term to long term. And you can add in other countries.

MR. JAMMAL: Ramzi Jammal for the record.

I'll ask either Mr. Elder or Mr. Howard to provide you with the answers.

MR. ELDER: Peter Elder for the record, I'm Director General of Nuclear Cycle and Facilities Regulation, so the ones that are looking at sort of doing regulatory oversight of what in the Nuclear Waste Management Organization is doing.

This is an organization that is mandated by Parliament to look for a solution, long-term solution for the high levels of the spent nuclear fuel, so they are proceeding with a process to identify both -- the approached -- the approach that they're using is called Adaptive Phase Management. Again this is one that was recommended by them to the Government of Canada and it was accepted in 2007 that looks at, similar to the Waste Isolation Project, a deep geological repository as the final solution for the current Canadian Nuclear Fuel Waste.

That process is going through a site

selection process. They are well -- they are many years away from actual, starting the formal regulatory process, but they are, again, this organization is created by the Parliament of Canada and they have a defined mandate to find a solution and make sure that the current generators of the waste actually pay for the -- the solution.

MS. BUCKINGHAM: Well, my comment is is I have been involved with the deep -- deep geological repository and I've been, you know, paying attention to that and, again, it's, you know, 2035 is, I think, is actually what's the word I am looking for, is not really telling the whole story, like, when I look at the whole process and everything, 2035 is probably like, it's more like, you know, 50 to 70 years before they -- they resolve this problem and also as every year passes, the expenses are getting greater and greater.

I mean we were at 35 billion I think in 2003. We're at 2012, I mean, what are the costs associated with this and nuclear -- high level nuclear waste really has no other use. I mean, we're paying these billions of dollars, what are we going to do with it?

So it seems to me like to be a huge waste of money that could be better spent on -- on researching renewable and I, too, have issues about the present design of -- of windmills, you know, again, I still think we have

a long long way to go with the possibilities for design because, and I think that's something that we should be doing to get on top of it and start spending these billions of dollars on doing that rather than trying to store more and more high level nuclear waste, thank you.

THE CHAIRMAN: Mr. Tolgyesi?

MEMBER TOLGYESI: I will get back to these dry storage containers. It's welded, eventually, when it's loaded, it's welded. So, how do you test them, you know, to -- to make sure that there is no -- no, how do you call it, no escape of I don't know, radiation or whatever?

MR. TREMBLAY: Pierre Tremblay, for the record, I'll let Terry Doran talk about the process of encapsulation and the ongoing monitoring program that goes on to ensure that essentially there are no releases and, so Terry?

MR. DORAN: Terry Doran, for the record, so the process which involves the loading of the used fuel and the eradiated fuel base that they are then brought out of the bay with a transfer clamp. They are emptied of any residual water and cleaned and prior to transport to the dry storage facility. At that facility, we have the capability of putting on welds onto the lid to base. We put a 10 pass weld onto the facility. We have put it

under a vacuum that we test it. We fill it with an inert gas to make sure that there is no chance of corrosion internal to it, so it’s tested and under negative pressure.

The rigorous process that we follow is very much commiserate with the pressure boundary requirements, other than this is not a pressure vessel, but we follow the same ASME standards that would be required and then we have, as I mentioned previously, a long-term aging management plan to verify the robustness of the facility while in storage.

MR. TREMBLAY: Just, just maybe to touch on another element that was discussed and that is the -- the decommissioning funds and the waste storage funds. This industry is -- is unique in the sense that, you know, we look forward to the cost associated with the internment of the fuel and that money is set aside and we’ve just concluded an exercise with the Commission around validating the segregated fund and the adequacy of the fund. So I just wanted to add that piece, thank you.

THE CHAIRMAN: Okay, we got to move on. You’re the last word here.

MS. BUCKINGHAM: Just a last question, how much money has been set aside?

MR. TREMBLAY: Through the chair, I’m

sorry. Is there a question?

THE CHAIRMAN: Go ahead.

MR. TREMBLAY: All right, thank you. Terry Doran, please.

MR. DORAN: Terry Doran, for the record, I'll just find a piece of paper that gives me the exact numbers. Thank you, so as presented in our 2013 to 2017 consolidated financial guarantee, the requirement was $14.2 billion and there is a supplemental provincial guarantee of $1.5 billion, so the totality of that is the amount of money that's been set aside in segregated funds for the long-term management of nuclear waste.

THE CHAIRMAN: Thank you

MS. BUCKINGHAM: Thank you very much.

THE CHAIRMAN: Thank you very much. Before we move into the last intervention, I understand that Dr. Thompson has some update on some undertaking.

DR. THOMPSON: Dr. Thompson, I believe that Dr. McDill had asked if we had information on Tritium and drinking water in France around nuclear power plants and so we -- we have information and it's just a high level summary from 1972 to about 1980. The average was 18.5 becquerels per litre and between 2008 and 2010 the values ranged between 0.7 and 11.2 becquerels per litre. And the source is a February 2011 report from the ASN, IRSN and

the -- the French Ministry of Health.

MEMBER McDILL: For the record, I'll correct that it was my colleague to my left, Dr. Tolgyesi.

DR. THOMPSON: My apologies.

MEMBER McDILL: He looks like I do.

THE CHAIRMAN: And that's what I was told. So it's all here. Okay, let's -- it's getting a little late and let's move on to the final presentation today from Ms. Moynihan, is outlined in same day 12-H13.7 and 13.7A and I understand that Ms. Moynihan is joining us through teleconference. So let's test technology. Are you with us?

12-H13.7 / 12-H13.7A

Oral presentation by from

Laura Moynihan

MS. MOYNIHAN: Yes, I am.

THE CHAIRMAN: Please proceed.

MS. MOYNIHAN: Dear Men and Women of the Nuclear Safety Commission, I could describe what we already know about the use of nuclear power such as the 3 million year deadly radioactive shelf life of uranium, the billions of dollars that it takes to sustain and maintain a nuclear power plant and the billions and billions more

that will be needed to quote unquote “safely store the nuclear waste”. These are all very serious points.

I would like to ask you to consider the present and the future of Canadians. Excuse me, just a second. I would like to ask you to consider the present and the future of Canadians. Deciding to continue the use of the Darlington plant will not just affect ourselves, but 375,000 generations of Canadians. That is exactly the number of generations that will have to pass before our current stockpile of nuclear waste is safe.

Billions of people could be affected and would necessarily be responsible for the safe surveillance of this waste. Are we that selfish? If we hand off this toxic plate of pooh to future generations to handle, are we so sure we will survive? We’ve had two recent examples in the last 30 years where none of the safety measures could save Chernobyl in 1986 nor prevent a similar nuclear disaster in Japan due to an earthquake in 2011. I had a dream about a year ago where I was at Ground Zero of a nuclear explosion. It was powerful and terrifying. And in the dream I knew it was happening in Toronto. This dream suggests that not some distant generation will inherit our nuclear medusa. But that the people of our current day are also in grave danger and that our nuclear power plants are a threat to our society.

We must wake up and face that our decisions today are of grave consequence to future generations as well as to our own. I do believe Canadians and humanity as a whole will make the right choice. Because I also know that future North America will not be a continent of desert but will be blanketed by a lush continental forest.

In 400 years there will be one city and it will be situated at the western end of Lake Ontario. The city will stretch from Kingston all around to Lake Ontario's most southern tip. I would love this to be our planet's future. And Canada's as well. I pray that this committee will make an enlightened decision that considers all aspects and ramifications, both present and future.

And yes, close the Darlington nuclear power plant.

So ends my submission.

THE CHAIRMAN: Thank you.

Comments, questions?

I don't see any. Last chance?

You must be -- get very late in the afternoon here. So thank you ---

MS. MOYNIHAN: I realize that yeah.

THE CHAIRMAN: So thank you for your intervention.

MS. MOYNIHAN: Okay.

THE CHAIRMAN: And this concludes the hearing for today. We will reconvene tomorrow at 8:30.

So thank all of you for your patience and endurance.

Thank you.

--- Upon adjourning at 8:07 p.m./

L’audience est ajournée à 20h07