

**Canadian Nuclear  
Safety Commission**

**Commission canadienne de  
sûreté nucléaire**

**Public hearing**

**Audience publique**

**May 30<sup>th</sup>, 2013**

**Le 30 mai 2013**

Pickering Recreation Complex  
1867 Valley Farm Road,  
Pickering, Ontario

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Pickering (Ontario)

**Commission Members present**

**Commissaires présents**

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

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

**Secretary:**

**Secrétaire:**

Mr. Marc Leblanc

M. Marc Leblanc

**Senior General Counsel:**

**Avocat général principal :**

Mr. Jacques Lavoie

M. Jacques Lavoie

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Pickering, Ontario

--- Upon commencing at 8:33 a.m. /

L'audience débute à 8h33

**OPENING REMARKS**

**MR. LEBLANC:** Good morning. Bonjour, mesdames et messieurs. Bienvenue à la continuation de l'audience publique. Welcome to the continuation of the public hearing on the Pickering Nuclear Generating Station.

The Canadian Nuclear Safety Commission will resume the public hearing that it started yesterday. For those who were not with us later yesterday afternoon, the Commission was able to go through all of the written submissions.

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

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

We would also ask you to identify

yourselves to make the transcripts as meaningful as possible.

I will also remind everyone that the hearing is being video webcasted and that archives of the video webcast will be on our Web site for a three-month period.

As a courtesy to others in the room, please silence your cell phones and other electronic devices.

Monsieur Binder, président et premier dirigeant de la CCSN, va présider l'audience publique d'aujourd'hui.

I would just like to remind the intervenors -- because that's what we are going to do today, we have a long list of intervenors -- that you have 10 minutes to make your presentation and then the Commission will take whatever time they need for the question period.

So with this I will wish you a good day and a very productive day.

Mr. President?

**THE CHAIRMAN:** Thank you, Marc, and good morning. And welcome to the continuation of the public hearing of the Canadian Nuclear Safety Commission and welcome to all of you who are joining us via webcast and teleconference.

Mon nom est Michael Binder. Je suis le

président de la Commission canadienne de sûreté nucléaire.

And for all of you who were not here yesterday, I will begin by introducing the Members of the Commission that are here with us today.

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 just heard from Marc Leblanc, the secretary of the Commission. and we also have with us here today monsieur Jacques Lavoie, Senior General Counsel to the Commission.

So I'd like to start by hearing the submission by a group of nuclear engineering student, as outlined in CMD 13-H2.105. And I understand that Mr. Ray Mutiger will make the presentation.

Please proceed.

**13-H2.105**

**Oral presentation by**

**Terry J. Price, Ray Mutiger, Mason**

**Verkruisen and Eugene Saltanoff**

**MR. MUTIGER:** Good morning, Mr. President and concerned citizens. My name is Ray Mutiger.

I am a graduate student from the University

of Ontario, Institute of Technology, undertaking my master's in nuclear engineering. Math and physics are my strong suit. I am going to try my best at public speaking today; so I ask you to please be patient.

I am here today to express our support for the renewal of the power reactor operating licence for the Pickering Nuclear Generating Station, on behalf of Terry J. Price, Mason Verkruisen, Eugene Saltanoff and other fellow students at UOIT.

First of all, I'd like to start off by thanking the Canadian Nuclear Safety Commission for holding this public hearing. We believe that nuclear reactors are one of the most awe-inspiring machines devised by mankind.

The Canadian deuterium reactor, or CANDU reactor, fits approximately a sixth of the space shuttle power output into a cylinder about as long as a city bus and about the height of two giraffes.

These reactors around the world produce electricity at a steady state, 24 hours a day, 7 days a week, rain or shine, day or night, high winds or no winds at all.

In light of past nuclear power plant incidences around the world, some would think that we, as Canadians, have been blessed with the good fortune to have



these machines operate safely for decades. No; as we'd like to attest, it is much more than a blessing, much more which keeps these machines operating safely.

It is the efforts of countless engineers meticulously checking and rechecking every calculation, the efforts of countless managers and support staff prioritizing a safety culture to ensure that day-to-day operations remain well within established safety parameters.

As a result, Canadians are privileged to some of the highest living standards of the world due to the steady supply of energy put out by our CANDU reactors. In Ontario alone, over 50 percent of our power comes from nuclear energy.

We depend on it to provide electricity to, well, the traffic lights on the commute to this hearing, to use our computers to keep in touch with family and friends overseas, and to power the lifesaving medical equipment in our hospitals without constantly wondering when the next power outage will interrupt our daily routine.

When students enroll in the nuclear engineering program at UOIT, they are subjected to four years of, in our opinion, one of the most intensive engineering programs conducted by internationally

recognized researchers and professors.

We are exposed to the safety culture of the nuclear industry on the first day. The first day of classes, we study nuclear safety. We also have to have a working knowledge regarding radiation health physics.

We learn about As Low As Reasonably Achievable principles, analyze mistakes in nuclear operating procedures and designs as seen in Fukushima and Chernobyl. We learn from these lessons to ensure that our CANDU reactors remain some of the safest in the world.

Not only are we exposed to the safety culture of nuclear power, we are also subjected to some of the most stringent marking schemes an undergraduate student will ever encounter.

The word "thermodynamics" still sends shivers down the spines of many of our students who recall receiving zero for simply putting a decimal in the wrong spot or using the wrong units in a final answer.

We learn to work hard, be skeptical of our own work and above all ensure that we are confident of our answers after careful forethought.

As engineering students, we look forward to applying the skills we learn to keep Canada supplied with relatively carbon-free energy. We've spent countless sleepless nights working on assignments, projects and

studying in the hope that we can keep Canada a leader in nuclear safety and power generation.

We know the generation of engineers and scientists before us worked tirelessly to make Canada the forefront of nuclear science and technology and we, as nuclear engineering students, would like to be part of the generation that carries their legacy forward.

We don't want to let other countries overtake the Canadian lead in innovation of nuclear power and technology, and we don't want to let years of nuclear safety experience end.

And so we ask you, as concerned citizens and members of the public, to support the renewal of the Pickering Nuclear Generating Station power reactor operating licence.

Thank you.

**THE CHAIRMAN:** Thank you.

Comments, questions?

Monsieur Harvey?

**MEMBER HARVEY:** Thank you for your presentation. You didn't have any problem, I mean, it was very clear, and we do appreciate it.

And in your program, among how the course is given, what place is given to environment and health and safety?

**MR. MUTIGER:** Ray Mutiger, for the record.

We take -- in my undergraduate class, we take a few courses. We take environmental effects of radiation, radiation protection, nuclear waste management where we learn about the environmental assessment required.

In our nuclear plant design class, we learn about design of siting a location, how to make sure we have an environmental assessment. Nuclear energy, we want to make sure it stays green and we want to make sure that generations after us have a planet to live on.

**MEMBER HARVEY:** Okay. What about the potential risks or risk analysis?

**MR. MUTIGER:** Ray Mutiger.

We take two classes; we took a probabilistic risk safety assessment course, so we learn about probabilistic risk management.

We also take -- we also study some of the other examples in history, so we learn from those examples. So that way we understand what risk is, how to calculate it. We also take a risk management course, so we learn some of the fundamentals of risk management and engineering.

**MEMBER HARVEY:** Thank you.

**THE CHAIRMAN:** Anybody else?

Dr. Barriault?

**MEMBER BARRIAULT:** Just briefly, on the issue of occupational health and safety, do you have any courses offered in that area?

**MR. MUTIGER:** Yes, we do. We have an occupational health and safety graduate course, which is available to students to study.

We also have -- in the first year, we have a safety -- we have a small plant safety course to teach us about some of the occupational health and safety around.

**MEMBER BARRIAULT:** Thank you.

Thank you, Mr. Chairman.

**THE CHAIRMAN:** Anybody else?

So when you told your family and neighbours, friends -- do you live in the neighbourhood, by the way?

**MR. MUTIGER:** I'm from Richmond Hill. I go to school in Oshawa, it's sort of the neighbourhood.

**THE CHAIRMAN:** So when you told everybody that you're pursuing a nuclear career, I don't know if you heard -- not everybody agree with you about how wonderful a nuclear career is. What do you say?

**MR. MUTIGER:** I say not everyone is going to agree with it at first. I find if you approach them

calmly, you talk to them, and you really explain your position, at the end of it, most of them will tend to support you.

**THE CHAIRMAN:** Okay. Thank you. Thank you for your presentation.

I would like to move on to the next submission by the Organization of the Canadian Nuclear Industries, as outlined in CMD 13-H2.40 and 2.40A.

And I understand Mr. Oberth will make the presentation.

Please proceed.

**13-H2.40 / 13-H2.40A**

**Oral presentation by the  
Organization of Canadian  
Nuclear Industries**

**MR. OBERTH:** Good morning, Commissioners, CNSC staff, OPG colleagues and members of the public.

Thank you for offering the chance to give our views on the relicensing of Pickering, and I would start by telling you a little bit about who we are.

The Organization of Canadian Nuclear Industries represents 180 private sector suppliers of products and services to the Canadian and offshore nuclear

industry.

So our members understand the quality requirements and the discipline to be an important supplier to this industry and we've supported the operation of Pickering with our products and services for 40 years and will do so for the next seven or eight.

Our member companies, many of them are small, medium-sized enterprises, are located in communities across Ontario. We employ about 10,000 people, specifically in the nuclear sector, out of a total of 30,000 total direct jobs in our industry. These are skilled, well paid jobs and are vital to the economic health of these communities, creating long-term employment opportunities for people like our young colleague to my right.

So my position is that nuclear power, of course, is critical to Ontario's economy. You may have seen reports of various studies lately, such as the Fraser Institute, that talk about the competitiveness of our sector.

But we are the cornerstone of our economy. Nuclear supplied 56 percent of Ontario's electricity in 2012, and the six operating Pickering units produce more than 3,000 megawatts of electricity at a cost of about 5 cents a kilowatt hour. And if you compare that to the

price of FiT contracts for wind, it's about one-third the price of wind, which comes in at 13.5 and about one-seventh the price of solar.

So if we replace Pickering with more expensive renewables that has a negative impact on our economy, which is felt by everybody in this room.

As I mentioned, experts are forecasting that the price of electricity in Ontario over the next 5 to 10 years is going to increase by between 30 and 50 percent. That impacts every job, every home, every hospital in this province.

Removing 3,000 megawatts of low-cost power from Ontario's energy mix would accelerate these price increases and have serious economic consequences.

You can see on this chart that Ontario's power supply balance -- power supply mix is diverse. And at the moment, as you can see by the curve towards the left, we do have a slight surplus of generation during peak hours.

But we assert that as we move towards the refurbishment of units at Darlington and Bruce, that this short term surplus of peak power will diminish and that Pickering and its 3,000 megawatts is important to keep our supply mix in balance.

In particular, I want to talk about the



strong safety record of Pickering. The CNSC's annual station performance report shows that Pickering meets and exceeds performance targets in 14 areas. Station staff have worked 10 million hours without a lost time injury, something they should be very proud of.

Following the events in Japan, of course, the entire industry had another relook at the safety of its plants and OPG confirmed that Pickering was safe and has the appropriate systems and procedures in place in the unlikely event of a Fukushima-type emergency.

OPG has invested \$100 million and will invest another 100 million in additional inspections and maintenance to ensure that the station continues to be safe and reliable in its remaining operating life.

The latest Ontario Ministry of the Environment annual greenhouse gas report describes climate change as the defining issue of our times, and I think people are finally taking this issue as serious as they should.

In fact, New York Mayor, Michael Bloomberg, in the wake of Hurricane Sandy last September stated, and I quote:

"The events should compel all elected leaders to take immediate action to deal with the risks of climate

change."

And to some degree, that's what this hearing is about. Because the replacement of Pickering's base load electrical output by extending the operation of Ontario's coal units would create an additional 15 million tonnes per year of greenhouse gases.

We believe that it would be irresponsible to take this type of clean low-cost generation off the mix and replace it with something that creates greenhouse gases.

In fact, I'd like to show you a curve coming from the Bruce Power Web site that shows how over the last few years with the re-powering of units at Bruce, that coal generation in Ontario has decreased substantially. This is a very desirable trend. It's something that every Ontarian who breathes and cycles and walks and runs should be happy with.

Taking Pickering off the grid would reverse this very desirable trend and take us back to more production of coal-fired generation.

People often cite the example of Germany as a country that has done some noble things by shutting down some of its nuclear plants and relying on renewables. The facts are quite the opposite. This is actually a slide from the solar, the Fraunhofer Solar Institute in Germany.

And you'll see that, in 2012, a greater proportion of Germany's electricity came from brown coal and hard coal than from clean sources like wind, solar and nuclear. And, in fact, Germany has increased its greenhouse gas footprint as a result of its efforts to move away from nuclear.

We don't want to follow the example of Germany in this province.

My conclusion of our organization is that we strongly support OPG's application for a five-year renewal of the Pickering Operating Licence so that Durham Region and Ontario can continue to benefit from significant socio-economic and environmental benefits resulting from the continued safe operation of this important nuclear generation facility.

Thank you.

**THE CHAIRMAN:** Thank you.

Question?

Mr. Tolgyesi?

**MEMBER TOLGYESI:** Could you tell us: Did you compare nuclear safety performances to other energy sources sectors?

**MR. OBERTH:** I don't -- I can't quote the specifics but if you compare the safety or the impact of other forms of generations such as coal on the lives of

people you will find that nuclear is one of the -- is the safest form of nuclear generation.

I don't have -- I can't quote the data. I think you just have to look at the safety record of Pickering. It's been operating for 45 years and there has never been one incident that has impacted the public in Ontario.

OPG colleagues can back that up.

**MEMBER TOLGYESI:** I was talking also about safety performance of this sector as such.

Their employees, you know, accidents, frequencies, that's what I was meaning.

**MR. OBERTH:** ... has operated 10 million hours without a loss time accident. I think that record speaks for itself.

**THE CHAIRMAN:** Thank you.

Anybody else?

Dr. Barriault?

**MEMBER BARRIAULT:** Merci, monsieur le président. Thank you, Mr. Chairman.

In your slide 5, you quote that the OPG has spent a 100 million in getting the plant, I guess, up to scratch or in safety and that they have another 100 million to spend for future inspection and maintenance.

How far does a 100 million go in a

maintenance of a plant?

I guess maybe I should ask OPG to respond to that and, you know, is this budget -- or is this a budget figure or just a guesstimate in terms of maintenance and repairs?

**MR. JAGER:** Glenn Jager, for the record.

The \$100 million that I believe Ron is referring to is our continued operations planned investment and, in fact, it totals over the life of that plan, \$197 million. That is over and above the normal investment that we make into the power plant.

So ordinarily, during the course of operation, there is regular capital investment that is part of our business plan and that is made each and every year.

I'll give you an example. We are refitting and refurbishing all of our fuel handling machines, and on the Pickering A units, Units 1 and 4, we have spent in excess of \$30 million to do that and, on Units 5 to 8, approximately \$34 million will be allocated to do that. That's going beyond 2015.

So when you add that up, that's about \$64 or \$65 million. That is over and above the continued operations investment and that's just regular capital investment to maintain the plant.

So \$200 million goes a long, long way when it's in addition to the normal investment that you make for the plant.

Some of that investment is allocated to analysis and studies of ageing effects primarily in the fuel channels contribution but also examines the full suite of systems and structures associated with Units 5 to 8 and that guides us into the necessary maintenance.

This is a commitment that we have made to the CNSC and supplied in our continued operations plan. That investment concludes at the end of 2014. So we have committed to complete all the necessary work and analysis by the end of 2014 as part of that continued ops investment.

I would also say that, on Units 1 and 4, that went through a return-to-service investment which was significant for both Units 1 and 4. That was completed previously.

So the \$200 million is in addition to significant investment that is performed on an on-going basis and has already been invested in previous years on the previous units.

I can ask Carl Daniel to provide some of the examples of the items that the continued ops plan invests in to give you a sense of the work that is

undertaken for this overall program.

**MR. DANIEL:** Carl Daniel for the record.

The Continued Operations Plan includes a number of items that will support safe operation of the plant to the end of 2020. I will give you a few examples.

A number of 4-Kilovolt breakers have been refurbished and 600-volt breakers. So far there are 900 that were scheduled, 800 are complete.

We've got motor control centre cell replacements. Of those, we've got 800 scheduled for replacement, 200 have already been completed.

Large pumps and motors are being refurbished. Large pumps, refurbishments, we've got 60 planned, 35 are complete. And for the large motors, we've got 40 planned, and 26 are complete.

We started work doing major refurbishment on standby generators. One of those is complete. We are also in the process of doing a cable inspection and testing programme and that is actually completed. We have done 30 of the 30 cables.

**MR. JAGER:** Glenn Jager for the record.

Just in -- finally, with all this investment, you know, we always look to results and a lot of that was spoken to in Day 1 in our opening presentation.

But the plant performance is really speaking to the investment that we have made and we have seen that in reductions in forced loss rate, improvements in fuel handling, reliability in the associated reduction in de-rates that comes with that and improvements in safety system reliability as well.

So broadly, in many indicators, we are seeing improvement, improving performance in the plant. And that tells us we're doing the right things and we're making the investments in the right spots.

So it is significant and it does have results.

**MEMBER BARRIAULT:** I guess it begs the question: As you progress towards end of life of this plant, do you see any change in the monies available for maintenance and upkeep?

In other words, as time goes on, are you, you know, tempted to -- shouldn't say cut corners -- to decrease the investment in the operation?

And how do you manage that situation?

**MR. JAGER:** Glenn Jager, for the record.

Each year, we review our business plan going forward which spans three to four years and, as part of that, we submit and provide an assessment of the plant's performance and its future needs.



And I can tell you that there is no circumstance in which the company has not made the necessary investment to improve the performance of the plant. We recognize the seriousness of the business that we're in, the importance of good performance of the plant. It makes good business. It's important to safety.

And the Board of Directors and the CEO of this company stands very strongly behind the power plant and, in every case, has made the necessary investment year over year.

So the resources are there, we have the capability to execute that and we have done so year over year and the plans are very robust in terms of setting that.

How do we set that?

Well, we're measured against industry targets and we benchmark regularly across the industry what is excellence. We have independent groups that come into the plant and really lay out for us what is the gap that we need to close because the performance of the industry continues to improve.

And that's how we judge where we are and it also gives us guidance on what we need to invest and what we need to maintain.

So right through to 2020, we are constantly

measured against those benchmarks. We have to plan and execute the work to maintain performance to hit those benchmarks and it's our commitment to the regulator and to the Province of Ontario to hit those performance targets right through to 2020.

**MEMBER BARRIAULT:** Thank you.

Thank you, Mr. Chair.

**THE CHAIRMAN:** Thank you.

Anybody else?

Ms. Velshi? No?

Anybody else?

Just a short question. You obviously support the licence renewal but the way I hear you, you would like this operation to continue even beyond the five years.

What I'm asking is for your opinion. Are you worried about any of the ageing issues?

**MR. OBERTH:** The OCA office is about -- is less than a kilometre from Pickering and I walk past it every day on my lunch-hour walk. And of course everybody in Ontario wants that plant to be well maintained and I am confident that the staff at OPG have the engineering expertise, the operational experience, to monitor the condition of the asset, and to take the preventative actions.

So it's really confidence in the operator, in the engineering that backs the operations, and confidence in our own members that will be there to work with OPG to provide the fixes and the maintenance to keep the plant operating safely.

**MR. CHAIRMAN:** Thank you.

Any final word?

**MR. OBERTH:** I think you have heard from an excellent operating utility yesterday, and I think the confidence of the Commission is well warranted in the type of people that OPG has retained and trained and operates that plant. So that's my final statement.

**MR. CHAIRMAN:** Thank you.

I'd like to move to the next submission from monsieur Duguay, as outlined in CMD 13-H2.109.

I understand Mr. Duguay is joining us via teleconference.

**MR. DUGUAY:** Yes. Good morning, Mr. Binder.

**MR. CHAIRMAN:** Good morning. We can hear you, please proceed.

**13-H2.109**

**Oral presentation by**

**Michel Duguay**

**MR. DUGUAY:** Okay, so -- my name is Michel Duguay -- Michel Duguay, Professor at Laval University in Quebec City.

The title is: "Proposal to Increase or to Decrease the Probability of a Nuclear Accident at Pickering B Through the Prolongation of this Power Plant".

I draw attention in the paper that I presented, to the fact that nuclear engineer, John Waddington, has been -- wrote a paper in October 2009 where he expresses opinion that the probability of a nuclear accident in Canada should be decreased by a factor of 10.

So in other words, he finds the present situation to be a factor of 10 away from what could be considered to be acceptable.

So I -- in reading the documentation of OPG regarding the extension -- the life extension of Pickering B, I was struck by the number of critical comments that came from the CNSC staff.

Over the years I have read a lot of documents from the CNSC, technical documents, and I have been impressed by the thoroughness of the analyses that are done by the CNSC nuclear engineers and nuclear physicists. But at the same time I have gotten more and

more worried about CANDU technology.

My background for a long time was in the U.S. I was part of the IEEE Energy Policy Committee that used to meet in Washington a few times a year. And there were several nuclear engineers on this committee, and this is where I first learned about the difficulties of the CANDU reactors.

The American nuclear engineers were worried about the fact that all these hundreds of pipes run through the reactor core, and under neutron bombardment, under the effect of various physical and chemical effect.

There is considerable deterioration, the degradation that takes place in these tubes so that operating at very high pressure and high temperature, it increases the risk that the pipe could suddenly burst and cause a whole lot of trouble.

So I notice in this recent documentation, this exhaustive exchange between OPG and the CNSC, that there was a lot of disagreement; that the OPG nuclear engineers were not in agreement with the CNSC analyses.

But my own reflection about this is that the CANDU reactor is very complex, very large. You do inspection with ultrasonics, you're trying to check out the wall thickness of these pipes and whether you have micro-cracks that might propagate suddenly.

But overall it's a very difficult operation. All your engineers are much more aware of this than I am.

So I think that when someone like John Waddington who has experience in the nuclear industry -- considerable experience in the nuclear industry, when he says that efforts should be made towards decreasing the probability of an accident by a factor of 10, I think that he would be -- he is rendering you a service.

OPG spontaneously decided to close down two reactors at Pickering A because of all the problems. So it would seem to me that the plan that you had proposed in February, 2010, of shutting down Pickering B after 210,000 hours of operation, that the rationale that you had then, two years ago, it seems to me is still applicable.

And in the meantime there's been more documentation about the ageing of these pipes and it is worrisome. So I urge nuclear engineers at OPG to reconsider their proposal to extend the life of Pickering B.

You talk a lot about -- all the time about jobs in Ontario in the nuclear sector. And you know the French have a policy now of dismantling nuclear reactors in the first 10 years after a reactor is shut down. And this dismantling, decommissioning of nuclear reactors

requires a whole lot of work. It requires hundreds of people, so lots of jobs can be maintained in this dismantling operation.

And the expertise -- the expertise that is developed in doing that can be used elsewhere. The United States is going to be shutting down a whole lot of nuclear reactors and the same thing in Europe and other countries. So the expertise that will be gained in doing this work can be used elsewhere.

So I think that nuclear engineers could look forward to keeping their jobs, but working on the decommissioning side instead of trying to extend the life of reactors that were not designed to work that long -- that had not been designed initially to overcome the problems that were only discovered later. So I think it is a pretty dicey situation.

Now, one thing I would like to go back to that I have often discussed with the CNSC, is that there's a question of the probability of an accident happening. And I asked the CNSC at the hearing for Pickering -- for Darlington in December, I asked the CNSC to provide numbers and the probability that a nuclear -- a severe nuclear accident could take place in the Toronto area, and I have yet to see figures from the CNSC on that.

The basic problem you have is that while

one reactor may have fairly low probability of having an accident, when you have 10 of them, it increases the probability by a factor of 10.

I think that Waddington's proposal should be taken very seriously.

In the last few weeks there has been a new report that came out of Europe about nuclear reactors in general, and in particular about the CANDU. And they made the very severe, these Europeans, severely criticized the CANDU technology, and they also criticized a little bit the CNSC.

The world has come to learn after the Fukushima catastrophe that the nuclear regulators are too many times, too often, too close to a nuclear industry; they're not independent enough.

It seems to me that the case of life extension for Pickering B could turn out to be a very -- an historical case. It could be an important case where the CNSC will assert that if the proper levels of safety are not met, then the best thing to do is to shut down the power plant and go into decommissioning.

So I regard this hearing here as being a sort of a test case to see if the CNSC is able to back up its own analyses of the OPG situation and act according to the recommendations made by its own nuclear engineers.



And finally, I'd like to say to you that since I come from Quebec that you must be totally aware that practically every night on television there's this Charbonneau Commission that talks about the corruption and the collusion in the construction industry in Quebec and engineers are often called to witness.

And so the whole question of engineering ethics, the codes of ethics that engineers must respect, as do federal employees, well, these ethic codes require that the public be informed, you know, on a scientific basis of the risks of a nuclear accident.

And again, we reiterate our claim made many times in collective letters that we sent to the CNSC, that CNSC should respect the Canadian nuclear law and reveal the dangers that threaten the Toronto population in particular, but also the Quebec population the winds would carry radioactive gases over Quebec as well.

And so you have a duty stemming from the Canadian law, from the codes of ethics to really come forth and tell the story as it really is.

And so this would be my basic plea that I would make today.

So thank you for your attention.

**THE CHAIRMAN:** Thank you.

Okay, questions? Who wants to go first?

Ms. Velshi?

**MEMBER VELSHI:** A couple of questions, the first one is just staff. If you have a comment on what the intervenor is quoting John Waddington as saying about safety goals, perhaps you can give us -- we haven't talked about it at this particular hearing -- some background on how those safety goals have been established, how they compare with international goals and has there been a move afoot anywhere in the world to revise safety goals. And what your comment is on this particular recommendation.

**MR. DUGUAY:** To whom is the question addressed?

**THE CHAIRMAN:** It's to staff. We'll get back to you, you will have the final word anyhow, monsieur Duguay.

**MR. DUGUAY:** Thank you.

**THE CHAIRMAN:** Staff.

**DR. RZENTKOWSKI:** Thank you. Greg Rzentkowski, for the record.

First I would like to clarify the safety goals are established to ensure that likelihood of accidents with serious radiological consequences is extremely, extremely low. And also that the potential of radiological consequences from serious accidents is limited to as far as practicable.

So what John Waddington was saying in his paper is the notion of further reducing those safety goals for future generation of reactor. And he was suggesting that the reduction should be by an order of magnitude.

So that means that the risk associated with operation of future reactors should be 10 times lower than the reactors we have in operation today.

**MEMBER VELSHI:** So for current operators, has any country changed their safety goals to line up with whatever the goal may be for the new generation of reactors?

**DR. RZENTKOWSKI:** Safety goals are rather used internationally as targets. The reason is that this is a maturing -- maturing concept and the PSA supporting development and calculation of safety goals is also a maturing methodology. It's not fully fit for the regulatory application.

And so in Canada we also use safety goals as a target. We request the licensee to calculate those safety goals and if the numbers are above the limits then the safety improvements are absolutely mandatory.

If the numbers are between the limits and the targets then the safety improvements have to be put in place if practicable. If the safety goals are below the targets then the safety improvements are expected when

practicable.

This is our approach. But it has to be understood the safety goals are not formally a part of the regulatory framework in Canada. And also internationally they are being used as expectations but not hard regulatory requirements.

**MEMBER VELSHI:** But even as expectations, do those expectations as they do in other areas, change over time to become more demanding?

**DR. RZENTKOWSKI:** Absolutely, absolutely they change over the time. Even if you look at the limit and the targets there's a factor of 10 difference.

So imagine you travel on the highways at the speed of 10 kilometres or 100 kilometres. It's a huge difference. So what we do we move further, further towards the target.

Do we revise those numbers? Currently not but we will have to revisit this concept after Fukushima.

The reason is we know already that all the safety upgrades which has been implemented after Fukushima have effectively reduced the targets for safety goals by a factor of 10, and for some combination of events even for a factor of 100. So that means that currently applied values of the safety goals are becoming obsolete.

**MEMBER VELSHI:** Thank you.

My ---

**THE CHAIRMAN:** Can I jump in? I'm not sure that, you know, this is kind of a theoretical discussion. I think the intervenor asked a specific question about a probability of a large accident. Why can't -- he claimed that he has never gotten a number from staff.

What's a probability of getting an accident, a large accident? Why can't we give a number? One in a million, one in a thousand, what's the number?

**DR. RZENTKOWSKI:** We publish those numbers, but safety goals are given in the unit of reactor years.

So the intervenor is, to some extent, right saying that we are not giving the numbers because, expressed in reactor years, this is only like a design requirement or design target.

In order to calculate the real risk based on that; you have to multiply the number by an average of years of operation. You have also to multiply this number by the number of reactors in a given area to obtain the risk.

So what Mr. Duguay has done in his paper or in his intervention seems to be conceptually correct because he started really from accepting the concept of the safety goals. This is for the first time I see Mr. Duguay accepting this concept.

However, some of his assumptions in his calculation have to be revised. First, for all 10 reactors in the Toronto area the average probability of core damage is close to the CNSC target and not to the limit as assumed by Professor Duguay. Therefore, the probability he calculated should be reduced by a factor of 10.

In addition, the Fukushima related safety improvements introduced another layer of safeguards against external hazards which reduces the probability of an accident by at least another factor of 10, for a total reduction of the probability by a factor of approximately 100.

Next, it is also important to note that in relation to risk, one has to consider both the probability and consequences of accidents. In the case of core damage goals the calculation Professor Duguay performed there is no consequences to the public and environment. The core damage frequency is purely an economical target because there's no consequences to the environment and to the public. However, the reactor has to be shut down and decommissioned.

So therefore to quantify the risk associated with nuclear power plants in Toronto area, we have to consider the large release frequency safety goal

which is 10 times lower than the core damage frequency. It means that the probability calculated by Professor Duguay should be divided by yet another factor of 10.

To summarize, Professor Duguay estimated that over the next 30 years the probability of reactor core damage accident in the Toronto area is 3 percent. Not a small number as he says and I agree.

However, as I explained the probability of core damage is in fact 100 times lower. That is once in about 3,000 years. And the probability of an accident leading to limited radiological releases is about 1,000 times lower, that is once in about 30,000 years. It has to be recognized that these numbers are just an approximation.

I would also like to make a comment on the rolling-a-dice analogy if the Commission is interested in that because this is the analogy Professor Duguay also described in his intervention and I think this is the concept which resonates with the public.

So should I continue?

Professor Duguay compared directly two numbers which happen to be similar but unfortunately they are scientifically uncorrelated.

There is only half a percentage correlation between those two numbers. This is equivalent of saying

for example that one can use a vacuum cleaner to commute to work instead of a car because it also has wheels.

So what can be done to correlate these numbers? The probability of core damage or of large release is the sum of individual frequencies of approximately 200 initiated events. So what it means is that the frequency of core damage, or frequency of large release, is not just one event. It's the sequence of all postulating events we can imagine which can eventually lead to accident conditions.

For example, for Pickering, approximately 200 initiating events were taken into account to calculate both the core damage frequency and the large release frequency safety goal. That means that we have to assume that approximately 200 people in the casino should roll a dice at once because we have 200 independent events. Therefore, a single throw of five dices instead of two dices, as Professor Duguay said, giving five sixes instead of two sixes would approximately be equivalent to the calculation presented by Professor Duguay.

This is to illustrate the point that, although the numbers are statistically equivalent, the probability of a single event is significantly lower than that provided by Professor Duguay.

And just to complete this analogy, a single



throw of nine dices giving nine sixes would approximately be equivalent to an accident leading to radiological releases in Toronto area. This is a very, very small probability.

Thank you.

**THE CHAIRMAN:** Monsieur Duguay, we don't want to get into statistics 101 here, but do you want to reply to this?

**DR. DUGUAY:** Yes. Well, I think that Dr. Rzentkowski has made a -- has given us a very nice explanation of the probabilities in the comparison with my own figures. While I would invite the CNSC to publish what Dr. Rzentkowski just said, also I would like to remind you that there is always a difference between calculations and experiments.

I've been myself an experimental physicist for most of my career, but I also dabble with theory, and everybody in theory knows that you have to compare theory, theoretical calculations, with experimental results. So, you know, there's a big factor there that has to be taken into consideration.

But again I would invite Dr. Rzentkowski to publish that, perhaps on your Web site or whatever, and

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**THE CHAIRMAN:** Okay. I think they're

nodding their heads.

**DR. RZENTKOWSKI:** Yes, I would like to direct Professor Duguay's attention to our CMD where the probability numbers are given for both Pickering A and B.

In addition, I invite Professor Duguay to my presentation in Toronto in 10 days where I will be presenting the papers in the Convention of Canadian Nuclear Society to explain what are the probability numbers for safety goals for all Canadian power plants, explain what is the idea behind and how this is implemented in practice, and how this will migrate into the regulatory framework.

**THE CHAIRMAN:** And when you make such presentation in the public, they will be posted on the Web site?

**DR. RZENTKOWSKI:** It will be posted in both official languages on external Web site of the CNSC, yes.

But, in addition, there will be also a paper which will explain this concept in more detail.

**THE CHAIRMAN:** Okay, thank you.

**DR. DUGUAY:** Okay. I will make sure to listen to your presentation.

**THE CHAIRMAN:** Thank you.

Ms. Velshi?

**MEMBER VELSHI:** My second question was to

OPG. On page 2 of the intervention, there is a statement attributed to CNSC staff on the component condition assessment not being done or not being available for some of the key components. It's the third paragraph down, I think.

Can you comment on that, please?

**MR. JAGER:** Glenn Jager, for the record.

I'm sorry. I'm trying to understand your question.

**MEMBER VELSHI:** So there's a statement here that the steam generators feed and fuel channel components, the condition assessment of those have not been assessed and not known, because, you know, they were going to -- there was refurbishment that was planned.

And so my question is: is that statement still applicable today, and are you -- have you done your condition assessment, and do you know or is there a risk here that these may not function as you are hoping they will?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask our Chief Nuclear Engineer, Mark Elliott, to speak in a moment, but I would say, yes, we did that assessment. We completed the condition assessments.

The conclusions of that assessment was that

systems are robust, they are safe and fit for service; also defined the necessary work that we needed to do on all those systems and components right through to 2020.

So that was a very good study and reference for us to develop the plan for continued operations, and I'll ask Mark Elliott to comment further on that process.

**MR. ELLIOTT:** Mark Elliott, Chief Nuclear Engineer, for the record.

We start with the CNSC RD document, RD334, which is on ageing management, and then we produce an OPG document, OPG governance on how to do this ageing management. And it requires that you do look at the condition of all the components.

And we did this first for Pickering B when Pickering B was being assessed whether it was going to be refurbished. We did a formal component condition assessment and there was over 400 different components that got looked at or component categories, all the major components of course: steam generators, pressure tubes, those types of things. So that was done in a very rigorous manner.

I've looked at those personally and verified that they are solid, they are rigorous, and what happens from that is that each of the components are assessed as to what has to be done to make sure they're

reliable to the end of life.

So there's a number of actions that come out of those and those actions got put into this continued operations plan that Mr. Jager talked about and Mr. Daniel talked about.

So you start with the CNSC requirement, our own governance, do the condition assessments, find out what you need to do, and then put those into a plan and get it funded. So that's how this was all -- this was all put together.

You know, if there is a -- if there is something that the intervenor would like to see in our component condition assessments, we can certainly do that. We've got them available.

**MEMBER VELSHI:** Well, let me then direct the question to staff, who this has been quoted from, as saying that those condition assessments were not produced.

Is this just a time difference?

**DR. RZENTKOWKI:** About five years -- Greg Rzentkowski, for the record.

About five years ago, OPG considered to refurbish Pickering station. As a part of preparation for refurbishment, they had to conduct an integrated safety review. This review includes also a very comprehensive and systematic assessment of fitness for service and

condition of all major components.

I believe that our comments are stemming from the comments expressed on the ISR process in general, but those are just technical comments provided back to the licensee.

You know, we are the regulators. We never accept anything the first time. So that's normal.

But I will ask Mr. Santini to describe what is the current process of this assessment.

**MR. SANTINI:** Miguel Santini, for the record.

Before I go to Mr. Frappier for the technical response, I will describe a little bit of the process.

As Dr. Rzentkowski mentioned, there was an evolution from the ISR evaluations for the refurbishment of Pickering B to the continued operation plan evaluations for the end of life of the Pickering B station.

And during those reviews -- and just to rephrase what Dr. Duguay says in the submission -- these were not criticisms. These were simply our evaluations of this evolution.

Now I would like to pass it on to Mr. Frappier.

**MR. FRAPPIER:** Thank you. Gerry Frappier,

for the record, and we'll get the details from Dr. John Jin in a second, but first of all I want to agree completely with Dr. Duguay that the CNSC engineers and technical staff are very tough on OPG, like we are on all the licensees. I mean, that is our job.

We do the independent technical review on behalf of the Commission, and we are going to go into lots of details, and we're going to -- and we have transparency so those details become available to the public and, obviously, to yourselves.

So as Miguel was just explaining, the ISR process is a difficult process for licensees to go through. There's a lot of technical detail that gets reviewed and, when these comments were being put forward, we did not have the information with respect to the pressure tubes and those pieces because, as was stated at the time, the thinking was that they might go through refurbishment.

Since then, we've been doing other things once they've decided that they were not going to be going through that.

I also want to make a comment on, in general, ageing management.

So as OPG referenced, we have a very important document in RD-334 which requires the licensees

to have a very comprehensive and systematic ageing management process in place, which includes both analyzing all the degradation mechanisms, making sure they understand how ageing is going on, making sure they then plan for what they're going to be doing about it, execute it accordingly, and then continue monitoring inspections and increase monitoring inspections as required.

That applies to all the systems in the nuclear power plant and, in particular, any one that has safety significance.

So with that as a bit of an introduction, I would ask Dr. John Jin to talk about what we know about the feeder pipes and pressure tubes and steam generators.

**DR. JIN:** John Jin, for the record.

I am the Director of the Operational Engineering Assessment Division.

My division is conducting the technical assessment of the structural integrity of the major pressure boundary component and concrete -- containment as well.

Regarding the conditional assessment, the licensees conducted the conditional assessment of those components in a quite comprehensible way.

**THE CHAIRMAN:** Can you get the microphone closer and speak louder, please?



**DR. JIN:** The licensee conducted the conditional assessment of the pressure boundary component and the CNSC staff reviewed very thoroughly for its adequacy and comprehensiveness.

And for the adequacy for the continued operation, there is nothing to add more.

**THE CHAIRMAN:** Ms. Velshi.

**MEMBER VELSHI:** That's fine. Thank you.

**THE CHAIRMAN:** Monsieur Harvey.

**MEMBER HARVEY:** I just want to clarify your point.

On page 2 of Mr. Duguay's submission, the second paragraph from the bottom, I think he seems to compare the thickness of the pressure tube to the thickness of steel vessel of pressurized water reactor.

So could you, the staff, clarify that point because he's saying at the end that the CANDU -- that corrosion may -- because it's much more -- less thick that the corrosion may considerably weaken the high pressure tube and could lead to a tube rupture.

So is such a comparison correct?

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

We could explain it in great detail but I would rather take a real short version of that.

It's that the pressure and the thickness of the metal obviously depends on the volume of pressure that you have as well. So if you look at the American systems where they have these very, very huge pressure vessels that, for equivalent level of pressure, you need quite a bit more steel than for us with a small pressure tube. So the volume is quite smaller.

If you want more details on that, I can ask one of our engineering staff to explain the equation to you.

But I'm sure it's a very -- it's a very -- we could have had the student today give us his view of it. The thermohydraulic calculations he's talking about, we would have talked about that certainly in Thermohydraulics 101.

**MEMBER HARVEY:** No, that's okay, I think

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**THE CHAIRMAN:** We assume that OPG would make a kind of short reply to the thinning of the walls?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask our Chief Nuclear Engineer, Mark Elliott, to speak to that.

**MR. ELLIOTT:** Mark Elliott, Chief Nuclear Engineer, for the record.

This flows from the conversation we had

yesterday about design limits. The pressure tubes, when they're first installed, are 4.2 millimetres thick. They do thin a little bit towards the end of life and the thickness at the end of life -- 247,000, you know, 2020 -- would be 3.87 millimetres; but the design limit is 3.69.

So this is just another example of where there is ageing going on. We're monitoring it closely. We've projected where we believe it'll be and it's within design limits.

But we're going to continue to check. So on every outage, we'll continue to go back and check that this prediction that I've just given is true and maintains -- maintains its credibility all the way through.

So we will not stop inspecting and every outage, we will verify that we're safe.

**MEMBER HARVEY:** What percentage of all those tubes are you checking?

Are you -- you will check all the tubes on a certain delay or?

**MR. ELLIOTT:** We check -- the inspection campaign, the inspection program is kind of a risk assessment type of campaign. We look at those pressure tubes where we've seen things before and go back to the minor flaws that we've seen.

We'll go back to those and check and our

experience is that those flaws don't change over time. So that's one way.

And then, from then on, it's kind of a statistical approach where we continue to sample all the -- not all of them but a large number to get a statistically sound basis for continued operation.

**THE CHAIRMAN:** Okay.

Anybody else?

Okay, Monsieur Duguay, your last ---

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I would like to make a last comment on this aspect of thinning of the pressure tubes.

It is very important to understand that the design limit is about 30 percent higher than the operating limit. There's a significant safety margin built in.

**THE CHAIRMAN:** Okay.

Monsieur Duguay, you'll give the final word.

**MR. DUGUAY:** Yes, thank you.

Well, I appreciate the attention, the time you've given me to expose my point of view. I appreciate very much this long discussion that has taken place, but I think that Mark Elliott just confirmed the need to look at the probabilities because the way that they are checking

the tubes is based on a statistical approach so that has to find its way into the probability calculations.

And so, fundamentally, one has a -- what one could call a "dicey situation" and you have a requirement in the *Code of Ethics* to inform the public of the dangers that are involved.

So I'll be looking forward to listening to Greg Rzentkowski's presentation in Toronto but, in a wider approach, I think that OPG itself has to be giving out to the public, informing the public about all these probabilistic effects that threaten the public.

So thank you for your attention.

**THE CHAIRMAN:** Okay. Thank you. Thank you very much.

I would like to move on to the next submission by Durham Nuclear Awareness, as outlined in CMD 13-H2.133, and I understand that Mr. Gundersen will make the presentation.

Please proceed.

**13-H2.133**

**Oral presentation by**

**Durham Nuclear Awareness**

**MR. GUNDERSEN:** Thank you very much,

bonjour.

My name is Ernie Gundersen, spelled S-E-N. I'm a Chief Engineer at Fairewinds -- there's a "e" in the middle of that, and I come to you from Burlington, Vermont.

The closest nuclear plant to my house is the recently shut down CANDU reactor in Quebec.

I am here because of your program that allows experts to be -- your public participation funding and I deeply appreciate that. That's entirely different than in the United States.

Also this -- the give-and-take in these hearings is entirely different than in the United States. I recently spoke to the Atomic -- to the Nuclear Regulatory Commission and, there, I spoke and they said: "Thank you." and there was no dialogue. So I appreciate the public funding and the fact that there is a dialogue.

I've heard today and yesterday, many people talk about the integrity of the staff, how they're wonderful neighbours and how they contribute to the community. I submit to you that that's not why you're here today.

I personally knew the reactor operators at Three Mile Island. I was a senior vice president in the nuclear industry with Bachelors and Masters in nuclear and

operator's licence, but I had people on my staff working at Three Mile Island. And I got to know the people who worked there.

They were wonderful. Their kids played soccer, they went to church and they were people of high integrity.

Later, I got to know the operators at Chernobyl. And again, their families lived in the area and people of high integrity and a great safety ethic.

I've written a book which is a bestseller in Japan called "Fukushima Daiichi: The Truth and the Way Forward". And I've gotten to know many Japanese operators as well, and again, excellent engineers who knew their thermo and loved their thermo, and men of women of integrity. And a corporation, in Tokyo Electric, that lavished funds on their communities as well.

So it's not about the integrity of the corporation or how smart the individuals are who work there. We're talking about a technology that can have 40 great years and one bad day. And I submit to you that that's why you're here, is to make sure that we don't have one bad day on the Pickering reactors.

The Pickering design is as old as Fukushima Daiichi Unit 1. Daiichi Unit 1 started in 1971. It was designed in the sixties, constructed in the late sixties

and went online. It had just received its licence extension to operate an extra 10 years. It hit its 40<sup>th</sup> year one month before it blew itself to smithereens.

Daiichi 1's failure was different than Daiichi 2 and 3. They all experienced the unexpected, but Daiichi 1 failed first because of age-related problems in its design. So there are more similarities to the Fukushima Daiichi 1 than to Pickering than Daiichi 2 and 3.

The -- you know, I studied -- I got my Bachelors and Masters in the late sixties, early seventies, and I studied the CANDU design. And it was -- at the time, there were many, many alternative reactor designs out there and it was certainly a design worth pursuing. It was clever with the online refuelling and natural uranium that deplete -- that -- the deuterium fuel.

But history has shown that it is not as reliable as other units because of its complexity. All these pressure tubes and the problems associated with it over time have left the CANDU design behind.

It effectively is an evolutionary dead-end, almost like -- in Europe, we had Neanderthals that eventually disappeared, although they mingled with the people who did survive.



Well, the CANDU design is very much like that. There have been no -- world-wide, less than 10 percent of the nuclear reactors are the CANDU design and those are predominantly in Canada and in India. And the Indians started with the CANDU design to build bombs.

So if you separate those two countries out, world-wide, there's only about 3 percent of the plants in the country -- in the world are of the CANDU design and no new reactors have been ordered of the more modern CANDU design.

So we're dealing with a technology that was well worth trying, but is proving itself to be an engineering evolutionary dead-end.

I'd like to talk about the two problems, how to avoid that one bad day. And it boils down to two areas; the first area is the ageing, and the second area is the unexpected.

The ageing issue has to go to the probabilistic risk assessment, which we talked about earlier. But it also has to talk about in a perfect world, a lot of the calculations you've heard before are in fact true.

But you must remember that at Bruce, a pressure tube failed after seven years. It didn't get to 200,000 hours, it failed after seven years. There was an

unanticipated pressure transient that caused that tube to fail.

We heard yesterday that the tubes grow because of the neutron fluence and they're locked at one end and they grow one way and then halfway through the cycle, they're locked at the other end and they grow back the other way.

Well, at Darlington, they discovered that seven tubes were locked at both ends. In a perfect world, that doesn't happen, but in reality, it does.

The Darlington then went and took a look at other -- the other reactors and found that each reactor had three tubes that were locked on both ends. The net effect to that is that it introduces stresses that aren't anticipated in the presentations you've heard earlier.

So in a perfect world, these tubes might go beyond the 210,000 effective full power hours, but in fact, there are operational transients that can cause them to fail if they exceed that 210,000 hour limit.

One of the problems is the inspections. And you mentioned that the -- how many tubes are inspected. And it's somewhere between 20 and 30 tubes per outage out of almost 400. So we're looking at 5 to 8 percent of the tubes are inspected.

In order to do that inspection, all the

fuel must be pushed out of the tube and it can't be put back in which is one of the reasons that the CANDU design is so expensive. You're essentially throwing away a year and a half worth of good fuel in each of the tubes that you plan to inspect.

But that does two things; it causes the tube to vibrate because it's lighter. And it also, when you start back up, you fill that tube with new fuel, which changes the neutron fluence. It's not like the tubes around it anymore.

When the tube is accessible, a very small scraping of the material is made and analyzed to determine the -- how much hydrogen is in the fuel. But it is a very small sample, and in my opinion, it's a frighteningly small sample.

This issue of probabilistic risk assessment is driven by statistics. And when you're the oldest unit on the block, as Pickering is, all of the data which you're basing your decision on moving forward is based on newer units.

I'm 64 years old and if I go to my doctor and say, "What's going to kill me", she's going to look at people that are 50 to 80 and say, you know, "Cancer and heart attacks", in your age group.

Well, Pickering is at the end of the age

group. My doctor doesn't look at me and go back in time and say, "Well, 10 year olds fall off tricycles a lot".

But that's really what we're looking at. We're looking at old -- we're looking at the oldest unit making its probabilistic risk assessment moving forward on data from the youngest unit.

The oldest operating plant today is about 46 years old, so there's not a lot of probabilistic data out there to defend a case that things are going to be okay moving forward.

At the Big Rock Point Plant in the States, it was shut down, a small reactor, about 200 megawatts.

And it had a system like we have here at the CANDU reactors where boron could be rapidly injected into the core to shut it down. The CANDU design has this prompt void coefficient, which to my knowledge, not many reactors around the world have.

But anyway, Big Rock had this design to rapidly inject boron. And when the plant was being dismantled, the engineers discovered that the pipe had been plugged for eight years and would never have worked.

So in a perfect world, all these numbers jive, but in fact, in reality, things break for unexpected reasons.

There's two numbers in my report, and only

two, mercifully, that I'd like to bring to your attention. On page 10 of the expert report I put together, the -- what has been bantered about is a high degree of confidence has been mentioned periodically.

Well, that's defined in one of the reports that I reference in my expert report at the top of page 10, a high degree of confidence is in excess of 70 percent sure.

I teach math at the local university in Burlington and 70 is just barely passing, but that's defined as a high degree of confidence.

The other number is on page 13, which is, in my opinion, the most disturbing number using probabilistic risk assessment. The large release frequency for -- for the Pickering units is within 20 percent of the safety limit. It's  $8E^{-6}$  -- is what's calculated and the safety limit is  $1E^{-5}$ .

I noticed in the report -- I took this from called " $1E^{-5}$ " "the safety limit". The slide was changed yesterday and it was called "the safety goal". To my mind a limit is something that is intolerable and using these favourable assumptions the probabilities are extraordinarily close to the -- to the limit.

The -- the other piece of the "bad day", if you will, is to expect the unexpected. As I said, I've

studied -- I've been to Japan twice in the last -- in the last year and I've studied the accident extensively and the accident at Fukushima Daiichi was not caused by a -- by a tidal wave. That was -- that was the incipient thing.

But what happened was the -- there was something called a "loop loss of offsite power" followed by a -- something called "a LOUHS", L-O-U-H-S, loss of the ultimate heat sink, and that caused the station blackout and without electricity the plant could not be cooled.

The plant would have failed anyway, even if the diesels had not been destroyed because the water source at the -- at the edge of the ocean was destroyed.

There are numerous ways to cause the loss of the ultimate heat sink. That's the ultimate heat sink, in your case the lake. At Daiichi, it was the -- it was the ocean. And all of which will lead to the same type of accident that we had at Fukushima Daiichi.

**THE CHAIRMAN:** Could you please conclude ---

**MR. GUNDERSEN:** Yes. Okay.

**THE CHAIRMAN:** --- so we can get into a discussion about your paper.

**MR. GUNDERSEN:** Two quick points.

The last piece is that the Pickering units

are quite similar to Daiichi in that you can have multi-unit problems. We had one unit explode at Daiichi and it -- and it damaged the units on either side of it. They topple like dominos.

The -- the vacuum building at Pickering is a single building designed for a single accident. If you have a multi-unit accident -- the lessons from Fukushima Daiichi show you can have a multi-unit accident -- you only have one vacuum building.

And last but not least is the nearness to a major population center.

I've been at 70 nuclear reactors around the country and around the world and Indian Point is -- is 40 kilometres from the outskirts of New York City. That's about the nearest similarity. And you're 30 kilometres from the centre of Toronto.

Emergency planning here, like in Japan, is a significant problem.

Thank you.

**THE CHAIRMAN:** Okay, thank you.

Who wants to start?

Dr. McDill?

**MEMBER MCDILL:** I think a good place to start would be discussion on the multi-unit issue and maybe we could have OPG and staff comment on that, please?

**MR. JAGER:** Glenn Jager, for the record.

We have evaluated those types of events and, certainly as a follow-up to the Fukushima Daiichi event, I would say that OPG has, in many respects, taken the lead in that area.

And -- and we have not just studied it, we've taken action to improve the safety and the response for those types of events.

I'll ask Mr. Elliott to speak in more detail about our post Fukushima actions and the analysis of those types of events.

**MR. ELLIOTT:** For the record Mark Elliott, Chief Nuclear Engineer.

We realize that the Fukushima was a common mode accident, an accident that happened to all the units and that those things can happen.

We were already aware that you can have multi-unit accidents and if -- if we go before Fukushima, we have -- we have a number of systems that are available for those types of accidents.

For, let's say an earthquake, we have earthquake resistant emergency power generators, emergency water system and they're sized to be able to handle the power needs and the water needs for all the units. So that's how they are sized.



And -- so we're aware of multi-unit events. We have been and we have systems in place for -- for those before Fukushima.

Now, after Fukushima, the -- the station blackout event or the loss of offsite power and loss of ultimate heat sink that the intervenor is talking about was looked at again and the equipment that we've purchased and put in place is all individually for each unit.

In other words, there's -- there's pumpers and diesel generators that can supply each unit so -- at the same time. So we are -- we are ready to -- to be able to support all the units if they went through something like a Fukushima.

So we have enough equipment to be able to do that.

**MEMBER McDILL:** Staff?

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I would like to echo what was presented by OPG staff. Looking at multi-unit events is probably the main lessons learned from the Fukushima accident and we take it very seriously. So there is many action items under Fukushima to look at potential improvements in this regard.

However, even before Fukushima, we

recognized the aspect of sharing equipment between the multi-units. And I will try to say very clearly that sharing is allowed only if there is the net benefit to safety.

I can give you an example. A vacuum building, for example, because of what was already mentioned here today. A vacuum building is not a containment, this is an additional layer of defense which allows to reduce the pressure in the containments under accident conditions. That's the only reason why this is a common feature for all the -- for all the Pickering containments.

And for safety systems, we don't allow sharing at all which is different, for example, from other reactors designed because. In Candus, we don't even allow for sharing of the shutdown systems and the reactor regulating system which is normal practice in another designs.

I would like Mr. Gerry Frappier to expand this answer.

**MR. HARWOOD:** Chris Harwood.

**DR. RZENTKOWSKI:** Oh, Chris Harwood, sorry.

**MR. HARWOOD:** For the record, my name is Chris Harwood. I work in the Directorate of Analysis and Assessment.

Mr. Gundersen is correct that there is less redundancy in a Candu containment but all designs are different and I think it's quite clear that Candu has more redundancy in terms of prevention and mitigation.

The Candu design is such that, in a loss of heat sink accident that we're discussing here, that's a fairly slow developing accident and it gives a lot of time for the operators to recover by, for example, recovering their normal onsite power, their normal offsite power, the standby power and the emergency power -- all of which are installed systems -- and the recently added portable generators and pumpers.

So there's tremendous redundancy there and there's time to use it.

So I think that's really I -- all I want to add to what Greg has already said and to what OPG have said.

**MEMBER McDILL:** Perhaps the intervenor would like to comment?

**MR. GUNDERSEN:** The only comment I'd like to make is that the -- the studies from Fukushima are -- are listed in my report but the -- most of those, the important studies from Fukushima, won't be done until 2015.

Now, this plant's scheduled to have its --

to ultimately shutdown in 2018 so any of the important lessons from Fukushima won't be implemented in this design.

You know, we're taking credit for Fukushima studies when, in fact, there's no time to implement the improvements.

**MEMBER McDILL:** Perhaps staff can comment on our -- our current understanding ---

**MR. HARWOOD:** Chris Harwood, for the record.

If I can -- if I can just respond to that?

The improvements that I spoke about, the addition of temporary equipment, that's already in place. So we're not waiting until 2015.

The studies that Mr. Gundersen is talking about relates to one of the Fukushima action items which is to investigate means to protect the containment and prevent uncontrolled releases.

Yes, it's true, CNSC's target date for completion of that work is 2015, but I should add that that action item has already been closed based on information submitted by OPG for Pickering B, and we are expecting, fairly shortly, to get the information from Pickering A as -- as they complete the probabilistic risk assessment for Pickering A.

The two main issues related to protection of the containment and limiting of releases in hydrogen mitigation and in filtered venting, the hydrogen mitigation is almost complete in the Pickering units.

It's complete in three units I believe and should be complete in -- within about a year. OPG can probably give the exact dates for -- for the remaining units. It's just waiting for outages to allow access to finish that work.

In terms of filtered venting, the -- Pickering already has filtered venting which is designed for coping with design basis accidents.

It's recognized that that filtered venting system requires power and that, in a loss of electrical -- complete loss of electrical power can be a problem, but as I've already pointed out, the emergency generating equipment -- the portable generating equipment is already installed. So again, that work has moved forward.

The action item that we're talking about here is looking for further improvements. So we have ---

**THE CHAIRMAN:** Okay.

**MR. HARDWOOD:** We have looked at -- we already have a great deal of improvement already in place and maybe more to come.

**THE CHAIRMAN:** Can I -- I'd like to

intervene here.

I thought the most important lesson from Fukushima is, you've got to bring asset offsite to shut down where everything else fail. You've got to bring asset offsite. I think it's been now done or going to be done in the States. It's going to be done in Canada.

So that was the biggest lesson. Forget about all the mitigation and if you have to write off the plant itself, it doesn't matter, as long as you can shut down the machine.

Is that not the biggest lesson? We don't have to wait to actually understand it.

**MR. GUNDERSEN:** Having -- having assets offsite that are separated from the -- whatever the problem is onsite, is clearly a critical issue.

I -- to my way of thinking, it's -- the biggest lesson is something I say, but -- so yes, you're right. I was at the Hamaoka plant which is south of Tokyo and, not only are they putting this infrastructure a long way away from the plant, but they're also putting bulldozers so they can push equipment out of the way to get the equipment to the plant.

So it's not a matter of having it there, but when the infrastructure collapses around it, you might have to build infrastructure to get it there quickly.

So I would agree that -- that an important lesson is to get assets removed from the site, but not so far removed that it -- you rely on a lot of infrastructure because it's likely infrastructure will break down too.

My -- the biggest lesson I took away is I've been saying, you know, sooner or later, in any foolproof system, the fools are going to exceed the proofs and I -- I just believe that the -- the numbers that we throw about, you know, the one in a million, if you take a million and divide by 400 nuclear reactors, there should be a meltdown on the order of every 2,000 years. In fact, we've had seven meltdowns in 35 years.

So the -- the statistical approach we're using to support moving forward isn't supported by the -- the data. We've had -- we've had five meltdowns in -- in 35 years.

**THE CHAIRMAN:** Dr. McDill?

**MEMBER McDILL:** I think staff wanted to reply to that, or not. I have another question if staff doesn't want to and I know ---

**DR. RZENTKOWSKI:** I wanted only to confirm that the main lesson there learned, driving the Fukushima Action Plan, is expect the unexpected.

And you can see that there is certain regulatory shift from accident prevention which was below

Fukushima to accident prevention in mitigation after Fukushima; mitigation both onsite and offsite.

Onsite, we already implemented severe accidents management guidelines for every single facility, and those guidelines are designed right now for multi-unit events. It's not single unit that it used to be in the past.

Offsite, we discussed this yesterday, we are focussing on improvements to emergency response and I believe you agree with me that we made good progress in the past few months.

Mr. Jammal would like to complement this response.

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

The intervenor mentioned multiple things about implementation Fukushima Action Plan. The CNSC did not wait for the lessons learned that the intervenor has mentioned, 20 years from today. As a matter of fact, the CNSC and Canada has led the world with respect to the enhancement of safety as the lessons learned of the early stages of the Fukushima Action Plan.

In addition, I co-chair the IAEA comprehensive report that's currently being drafted, that includes and involves international technical experts and



we are appearing before the International Technical Advisory Group that the intervenor will know the name of, Dr. Richard Meserve, who is chairing that -- the ITA group that we have to report to them.

So to wait 20 years, the CNSC did not wait 20 years. As a matter of fact, the design of the CANDU is safe, is robust, based on the evaluation that was done.

The previous intervenor, Mr. Duguay, talked about a report in Europe. The only credible reports out of Europe were the European Commission stress test that evaluated CANDU designs in Europe under Romania, and they were given passing grade with respect to the design itself and the capacity to -- as Dr. Rzentkowski mentioned, from the prevention to the mitigation of the accident.

So the robustness of the design is still valid; the safety case is valid. We've enhanced the capacity to deal with beyond design basis accident and the integrity of the safety is not being compromised.

And I personally was, before the USNRC, describing the process that Canada has used with respect to filtered venting and the benefit of filtered venting.

So the containment integrity is paramount and the design differences, which is the BWR and the U.S. design versus the CANDU design and the containment capacity in filter venting, speaks for itself to include

the spent fuel and the design of the fuel that has enriched uranium.

**MEMBER MCDILL:** Thank you.

OPG?

**MR. JAGER:** Glenn Jager, for the record.

Yes, and as I mentioned earlier in the Fukushima actions, we -- we didn't just evaluate the operating experience from Fukushima, we -- we took action and we took action promptly.

That equipment is in place, as described by the CNSC, but not only that, operating crews have rehearsed it and -- and drilled the use of that equipment. So we're fully confident that it would be effective and -- and mitigate the kinds of events that I talked about here.

I'll ask Mark Elliott, our chief nuclear engineer to speak in more detail about the status of our progress and remaining evaluations.

**MR. ELLIOTT:** Mark Elliott, for the record.

Where we are with the Fukushima Action Plan is there was 45 actions that were on Pickering are closed -- closed and accepted, closed by the CNSC; 22 are left. Those 22 will be completed by the end of 2014. The target date is 2015, we're a little bit ahead of that.

And the actions started off being very much physical and that was -- that was the right thing to do.

Let's get some physical equipment out there to deal with what might happen. And that's why we bought those generators, bought those pumps, bought the hoses, laid them out, got ready. We've now moved on from that.

We've got buildings onsite to house that equipment and there was -- there was initial training and -- and fairly rapid familiarization I would say, as opposed to detailed training. We've moved on to detailed training.

What we're doing now is trying to make that system even better. If you remember the video that I -- that we showed at one of these hearings, a plug and play system.

So we're doing the modifications to the plant so that, if an event like this happened, you could very easily inject the water, inject the power. And those modifications are going on now.

And then, the next thing is this big drill that's happening in May of 2014. So that's the one that really pulls it all together. We've got the equipment, the plug and play equipment, the detailed training, the emergency response that you heard from yesterday. Put it all together in a 2014 very wide-ranging drill and that will be kind of the culmination of a lot of things to say that OPG and Canada, basically, can handle this kind of

event.

**THE CHAIRMAN:** Okay, we got to move on.

Dr. McDill.

**MEMBER McDILL:** Thank you.

My second question is: As the intervenor brought it up and there's considerable interest in the community who are with us today, could I ask staff to discuss the sequencing of events that would occur in the event of a pressure tube failure?

Just take us through it.

**DR. RZENTKOWSKI:** In the event of pressure tube failure.

Yes, I tried to discuss this yesterday, but I will gladly repeat it today. First of all, I would like to state that this is the design basis event.

So what it means is that this event is not going to develop to accident conditions, which would affect safety of workers, affect the public and affect the environment. It would be fully controlled inside the reactor building, not even by safety systems, but simply by operating systems.

And thus that's precisely what happened in 1983 when tube ruptured in the Pickering A reactor. So I will describe the sequence of events, what exactly happened there.

In 1983, a pressure tube ruptured in Pickering A, Unit 2, that resulted in the discharge of heavy water at the initial rate of approximately 900 litres. Later on, this discharge went down to approximately 200 litres because, simply, the pressure in the heat transport system dropped and there was not enough Delta P driving the flow through the opening.

The reactor was operating at full power at the moment the rupture took place and was manually shut down once the operator determined that a sizeable leak had developed. None of the automatic plant safety system were called upon to operate. At no stage of the incident were emergency procedures called for or necessary.

No fuel failure occurred during the incident and releases of radioactivity from the plant remained at normal levels at all times.

So it was not even required to actuate the special safety system of the reactors to control this event.

**MEMBER McDILL:** Thank you.

Does OPG have anything to add?

**MR. JAGER:** No, we do not.

**MEMBER McDILL:** As it was the intervenor who brought up the pressure tube failure, I'll ask if he would like to comment.

**MR. GUNDERSEN:** No, the point I was trying to make is that tubes can fail before they get to 210,000, let alone 240,000.

**MEMBER McDILL:** Thank you, Mr. Chair.

I can come back on that.

**MR. JAGER:** OPG would like to comment on the 210, I believe.

**MR. ELLIOTT:** Mark Elliott, for the record.

The event that is being discussed here that happened at Bruce, which was described as something happening before 210 -- in fact, seven years after -- that was an event where it was not kind of out of the blue.

What happened was they were shut down and they were researching a particular situation and they were cold and pressurized the heat transport system cold; something that we know now is not a good thing to do.

And this is a long time ago when this happened.

And pressurized it to do a test and the pressure tube failed. So this wasn't running along at full power and something unexpected happened. This was an evolution that we know in hindsight we shouldn't do and we wouldn't do in the future.

But we have not had in-service pressure tubes fail from full power anywhere in the CANDU system.

Except for the 1983 event that we learned so much from that Dr. Rzentkowski described.

**MEMBER McDILL:** With respect to Bruce.

**DR. RZENTKOWSKI:** I would like to add one point, very important point we both missed to state.

After this 1983 event, the material for all pressures tubes -- actually, all pressure tubes were replaced because they were manufactured from new material.

So this was the lesson learned from the event.

**THE CHAIRMAN:** Okay, thank you.

Ms. Velshi.

**MEMBER VELSHI:** Thank you, Mr. President.

I have two questions. I'll start off with OPG first.

The intervenor talks about confidence levels and 70 percent confidence levels in fuel channels and 30 percent in steam generator performance, can you comment on that, please?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask our Chief Nuclear Engineer to comment on that.

**MR. ELLIOTT:** Mark Elliott, for the record.

That was really a business evaluation. When you're making business decisions, it's quite a bit

different than making fitness-for-service decisions on reactors.

But on a -- in a business decision framework, to say "Yes, we expect to go ahead with five more years of the life of Pickering", we wanted to have at least a 70 percent probability that that was going to happen to put in -- I talked about \$40 million -- to put in the \$40 million to do the research to prove that that was a safe thing to do and it was a reliable thing to do.

So 70 percent was really a business evaluation that, if we could raise the confidence in this extension of life to the 70 percent level, then it's a good investment, let's carry on with that. And so it's a business evaluation.

In terms of the actual pressure tube confidence, I have much, much more confidence than 70 percent in our ability now. We've done those -- that project, we've done those 18 reports, I have very high confidence that we'll be able to run to 2020.

But again, it's not just my confidence, OPG's confidence or even CNSC's. We're going to go and check every outage along the way that we're still safe, we still meet fitness-for-service right to the end of life.

**MEMBER VELSHI:** So what is your current confidence level?



**MR. ELLIOTT:** My confidence level is in the high 90s.

**MEMBER VELSHI:** And then, what about for the steam generator where there's a statement there's a 30 percent risk that you could get a failure in that?

**MR. ELLIOTT:** I'll ask Engineering Director, Carl Daniel, to talk about steam generators.

**MR. DANIEL:** Carl Daniel, for the record. The assessment on steam generators is also a financial one.

There was a period where the steam generators were rehabilitated in the mid to late '90s. Since that time, the pitting mechanism that was seen then has been halted.

From a business perspective, the assessment looked at: What was the probability of that starting again?

So it was a pure business assumption, what is the likelihood of that stopping -- or starting.

We have not seen any indication that it would and our steam generator chemistry and performance has been much better than it was at that time. We don't expect it to recur.

**MR. JAGER:** Glenn Jager, for the record.

You know, in summary, I would say that each

and every outage we examine these components. They are subject to a program which continually evaluates their fitness for service and, at the present time and going forward right through 2020, we're confident that those components are safe, fit for service, and will operate reliably.

**MEMBER VELSHI:** Is there a number you would give for your confidence level in the steam generators?

**MR. DANIEL:** I would agree with Mark's assessment along with the fuel channels. I would say it's in the high 90s.

**MEMBER VELSHI:** Thank you.

So ---

**THE CHAIRMAN:** Can I just -- I'd like a bottom line on this.

Let's assume it does fail, okay, so what? What's the health consequences?

Again, I'd like to always hear the bottom line here when the confidence is breached.

**MR. JAGER:** Glenn Jager, for the record.

Both those events are within our design basis and I'll ask our Chief Nuclear Engineer to discuss that sequence.

**MR. ELLIOTT:** Mark Elliott, for the record.

The pressure tube rupture is a sequence

that Dr. Rzentkowski described. It's within our design basis, would be handled by station systems.

There would be emergency systems ready to handle that if the station systems couldn't. So this is an event that we have handled and can be handled without offsite releases.

The steam generators, I'll turn that over to Carl Daniel to talk about.

**MR. DANIEL:** Carl Daniel, for the record.

The steam generators, the failure is typically a tube leak. Our ability to detect tube leaks is very, very low. We have had them in the past. We have detected them at a very low level, we've shut down at that point. We do an inspection to determine what the cause of that is. Remove the tube -- remove the tubes from service that are offending and also take a look at the inspection results in total.

The -- it's well-within our procedures, well-within our ability to respond to it. And the leaks are at a very, very low level.

**MEMBER VELSHI:** I'll ask staff this question on the steam generators and I understand this was for your business case purposes but if a licensee were to tell you that their confidence level was 30 percent, that there would be a steam generator failure what would your

response be to that?

**DR. RZENTKOWSKI:** That's a very provocative question you know but I will try to answer this nevertheless.

First of all, our regulatory requirements in this case is 95 percent, at 95 percent confidence. So that means two sigma approach. So confidence is not good enough, it has to be more, it has to be statistics supporting this confidence as well.

If we knew that one steam generator tube fails there would be no reason for concern. And I explain to you why. This is again the design-basis accident. Actually rupture of up to 10 steam generator tubes is a design-basis event which is not supposed to lead to any consequences for the workers, the public and the environment. And this is being analyzed in the safety report and it's proven to be the case. So I think you would have no concern.

However, our normal practice is that if suspect tubes are being observed during the normal inspection the requirement is that they have to be taken out of service by plugging. This is the normal practice.

So it's really economical decision at the end because this affects the effectiveness of the heat exchange in the steam generator. So the affected utility

has to de-rate the reactor to maintain the proper cooling of the reactor core.

And there is one more point; an observation of the integrated effect of ageing on both safety margin and fitness for service of the components is surprisingly simple.

It's simple because you have two key parameters in the heat transport system. The first one is the temperature in the inlet header. If the temperature in inlet header goes up that means the efficiency of heat exchange in the heat exchanger or steam generator is going down. So this is the first indication of ageing in the steam generators.

If the outlet header pressure goes up that means that heat exchange in the reactor core is also not sufficient -- not sufficient. And because of that there is the second phase, void, present in the outlet feeders and outlet headers which expand the volume of water and the pressure rises.

So you have a very quick indication that something is wrong in the system and some kind of the cleanup is required or even replacement of all the steam generators.

This is not that we are flying in the dark because both of those parameters are being measured

online.

**MEMBER VELSHI:** Thank you.

**DR. RZENTKOWSKI:** Mr. Gerry Frappier will complement.

**MR. FRAPPIER:** I just want to bring things back to what we're really talking about here. These percentages are not percentages of a chance of a catastrophic accident that's going to release a lot of radioactivity to the environment. What these numbers here they're talking about is in their business case.

So they have a chance at -- when they say there's going to be a failure, it's a failure of the business case.

In other words because of the strict safety requirements we have on steam generators, on pressure tubes and all this stuff, that they will be forced to shut down prematurely before the 2020 because they cannot meet the design requirements that ensure the safety of the plant.

**MEMBER VELSHI:** Thank you.

My next question is for Mr. Gundersen. On page 14 of your intervention 11.3, you make the allegation that the relationship between OPG and the Commission is eerily similar to the relationship between the Japanese regulator and the Japanese nuclear power generators. And

I wondered what evidence you have seen to lead you to make, you know, a damning statement like that?

**MR. GUNDERSEN:** Yeah, two -- two points. First when I -- when I write a report I try to get my numbers right. And there is -- there's no indication that this was a business number when I wrote the report. Just like there's no indication that the safety limit would get changed to a safety goal when I show up here.

The observation is based on, you know, 40 years of experience. But the CANDU design is -- has a limited universal participants and most of them are in the room today. And in situations where there's a limited number of participants the ability to get outside experts in is limited.

So it's my experience and speaking with -- you know -- Dr. Greenling -- Greening rather, who I quote extensively and others in the Canadian community.

But you know, I don't have -- you know -- the private records to show who was meeting with who when to further support that.

My example is that this is an isolated reactor technology where -- we called it -- I wrote a report on Fukushima Daiichi for Greenpeace last year and it's called the "Echo Chamber Effect", where if you get a bunch of experts in a room together and they all agree,

they just hear each other's reflections. And I think that's true with what's happening in Canada.

There are -- the people you see at these hearings aren't outsiders like me very often. It's the parties, and as a result of that, the information that you get is limited, so you become drawn into the echo chamber.

**THE CHAIRMAN:** I thought you were an expert on Fukushima and NISA and you absolutely said nothing about the relationship between the industry and NISA that is in comparison to the relationship of CNSC and the industry.

You did not appear -- you're the first time appear in front of us; I have no idea of who you're echoing here but it sure as hell that is not based any evidence that I've heard -- that I've read in your -- in your comments.

**MR. GUNDERSEN:** Okay. Thank you.

**THE CHAIRMAN:** Anybody else?

Can I -- do you have one more? Go ahead.

**MEMBER McDILL:** It's -- excuse me, it's right above the previous one that Ms. Velshi raised in 11.2, since you're here in front of us otherwise I would wait till the second round tomorrow.

Excuse me again.

Would you please comment on why you request



the Commission deny the delegation of authority to staff?  
Is -- in your point 11.2?

**MR. GUNDERSEN:** I'm sorry could you give me the reference again?

**MEMBER MCDILL:** It's in your document, page 14, right above the previous one. So you were just talking about 11.3, now I'm asking about 11.2.

While ---

**MR. GUNDERSEN:** Yeah, Arnie Gundersen for the record.

You know, I have seen promises of future performance, you know for instance just about five minutes ago we had the comment that in 2014 we're going to do a drill and -- but we want you to approve in 2013, based on a promise of future performance. And the example I was quoting there was similar.

There was information that the staff was going to analyze that would occur after this process was already -- the outcome of this process was already predetermined.

And so what I was suggesting there was that I think it would -- the appropriate thing to do would be to wait for that drill in 2014. You know, give them that licence for a year, see how it works. But to give a five-year extension based on promises I did not think was

appropriate.

**MEMBER McDILL:** Staff?

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I think there's a misinterpretation of the Canadian regulatory framework versus American regulatory framework. This halt point in the licence means that the licence can -- that the licensee may be ordered to shut down all the plants if we are not satisfied with the safety case presented to us. Maybe the American system is slightly different.

There is more. We can always -- we can always retract the licence given to the licensee and end commercial operation of the unit from the safety reason.

We have this power at any given time independent of the duration of the licence.

**MEMBER McDILL:** Does OPG want to add anything to that?

**MR. JAGER:** Glenn Jager, for the record.

Certainly, the way we consider our licence, we have to meet the requirements at all times.

We understand the conditions that are placed in the licence and the conditions that have been established including the hold points.

We fully intend to meet those commitments

and satisfy those conditions. Our track record is that we have met our commitments regularly and with confidence in all the conditions that the CNSC has established and, certainly, we've spoken about a number of those yesterday and through the course of this morning, both commitments regarding the environment, safety and other commitments that or requirements that the CNSC has established within our licence.

So we take that very seriously. We understand the authority of the CNSC and respect that, and we meet all those commitments.

**THE CHAIRMAN:** Thank you.

There are two quick questions on a statement that I think needs to be addressed. The first one is on page 13 of 22, the top paragraph says:

"Once again, Fairewinds analysis based upon available documentation shows that both OPG and CNSC have not adequately addressed the condition of underground wires at Pickering."

Can somebody explain what that means?

Maybe you can explain, Mr. Gundersen, where did that come from?

And is staff aware of Fairewinds' analysis?

Please shed some light.

**MR. GUNDERSEN:** Arnie Gundersen, for the record.

Anyone familiar with rubber in insulation recognizes that it deteriorates with time; you know, oxygen damage causes it to break down. A frequent ageing problem that I'm familiar with in all the work I do is the degradation of wires, either because of contact with moisture -- those wires that are underground -- or contact with -- just oxygen where they get brittle and the insulation starts to break down.

So the damage is not to the wire itself but to the insulation on the wire from moisture. A lot of wires, especially in this generation, were placed in humid situations in conduits that are under the buildings and things like that and are not easily examined.

I did look at what information I could find in the time I had available on ageing management of the wiring systems here at Pickering, and I couldn't find anything that gave me any confidence that the underground wires could be adequately tested and replaced if the insulation was shown to break down.

And again ---

**THE CHAIRMAN:** We accept the degradation, I'm just -- what I'm trying to understand is, if memory serves, I thought that was done.

I'm trying to ascertain whether it was -- addressing this particular issue and verifying it and inspecting it, was it done or not?

Maybe I'll start with OPG.

**MR. JAGER:** Glenn Jager, for the record.

I'll ask our Engineering Director, Carl Daniel, talk about the ageing management program for cables, both buried and otherwise.

**MR. DANIEL:** Carl Daniel, for the record.

OPG has an extensive cable ageing management program and a cable surveillance program as part of our governance.

As I reported earlier, as part of the Continued Operations Plan for Pickering B, there was a cable inspection and an insulation testing. The insulation testing looks at degradation of the cable sheathing. Thirty (30) of 30 of those cables were tested and are now complete.

**THE CHAIRMAN:** So in the same vein, on page 20 of 22, it's again the same kind of a general statement:

"At Pickering, for example, it is not technically possible to ascertain the condition of the kilometres of tubes and piping that wind their way through each unit."

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

We already described the periodic inspection program.

It's correct that we are looking only at certain population of older tubes but, nevertheless, we are selecting statistically those which could be most affected by ageing mechanisms.

And because of that, I think the population is fairly representative of the conditions in the reactor core.

In addition, the design of the pressure tubes -- the design of the CANDU reactors, in general -- is based on the leak-before-break principle. So if there is even a very small leak developing from one of the pressure tubes, this would be recognized very quickly by the operators and then action taken to isolate it, a certain pressure tube.

The pressure tubes can be only replaced during the outages and this is a very well developed practice. Many pressure tubes have been already replaced not only as an overall replacement during the refurbishment but also during normal operation.

**THE CHAIRMAN:** Okay, thank you.

**MEMBER TOLGYESI:** Just a very short one.

You were talking about 2014 drill. It is limited to OPG or it is involving also regional and provincial emergency authorities?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask Jim Coles, our Director of Emergency Preparedness, to speak to that.

**MR. COLES:** Good morning, Jim Coles, for the record, Director of Emergency Management and Fire Protection at OPG.

The exercise in of May 2014 is involving all agencies at federal, provincial, municipal and regional levels.

So Health Canada, as an example of federal level, Durham Region, the City of Toronto, the City of Pickering -- sorry, Clarington and as well the station at Darlington, obviously.

**THE CHAIRMAN:** Okay. Thank you.

Final words from you.

**MR. GUNDERSEN:** Thank you very much.

**THE CHAIRMAN:** Thank you.

We will break now and come back at five to eleven. Thank you.

--- Upon recessing at 10:39 a.m./

L'audience est suspendue à 10h39

--- Upon resuming at 10:59 a.m./

L'audience est reprise à 10h59

**THE CHAIRMAN:** Okay, we are back and I -- I understand that we have the ability to connect now with Dr. Adams and then get some update on seismicity, Mr. Jammal?

Dr. Adams are you with us?

**DR. ADAMS:** I am.

**THE CHAIRMAN:** Good.

**DR. ADAMS:** Am I clear this time? My apologies for last night.

**THE CHAIRMAN:** Oh, yes, very clear. Go ahead.

**DR. ADAMS:** Thank you.

I am Dr. John Adams, for the record. I'm a Seismologist with Natural Resources Canada.

There were a number of issues that were raised in the intervention last night, which I would address. The two issues: Using the historic earthquake records to come up with estimates of the shaking at very low probabilities. And the second was the issue of the Rouge River Fault and the geological investigation behind them.

I would say the earthquake represents a



slip on the fault in the basement rocks, usually deeper than several kilometres. And in a Canada-wide context, the seismicity around Pickering and Toronto is quite low. It's lower than around Ottawa and Montreal, for example, but higher than Winnipeg.

We see contemporary small earthquakes chiefly under the western part of Lake Ontario, that is, kind of offshore Pickering South, in the Niagara Peninsula and in the adjacent New York State and typically we see about one earthquake in a six-year period of magnitude 3, but that's a size which is mildly felt.

We have -- historically the largest earthquake in that region was a magnitude 4.7 near Attica, New York, which locally caused chimney damage.

We can extrapolate the contemporary rates, what it was described as persistent low-level activity by the intervenor I think, to the seismicity of the whole box between Pickering, Niagara, Western Lake Ontario and New York. And we estimate a rate of about one earthquake larger than magnitude 5 per 3,000-year period, but with a very large uncertainty.

If we take that 180-year record and we extrapolate down to low probabilities, we know that the uncertainty must be large.

The rate could be as high as one in 500

years, but it could also be much rarer. And in looking at the statistics, one should not focus just on the one in 500 years.

And furthermore, those earthquakes could occur at some distance away from Pickering, could be 150 kilometres away, and need not be close to it.

So I think that addresses the issue of the historic record. I would say it like this; we know the rate from 180 years and we use the mathematical model, which involves space and time, to estimate the shaking at the Pickering plant based on that record and we recognize that it does come with large uncertainty.

With respect to the discussion around the work by Drs. Eyles and Mohajer on the Rouge River fault, this has been the subject of much discussion over the 20 years since it was first written up. It's been raised at I think virtually every nuclear hearing. I think it would be perhaps unfortunate that the quotes from the Provincial Council of Women of Ontario focussed on only one chapter of that discussion.

The history is that the faults were first described in 2002. In 2003, I led a GSC assessment. As I said, we did not think that they were tectonic and due to earthquake but we thought they might be due to glacial shove, but we were not making a definitive statement to

that.

In 2003, the faults were drilled by Ontario Power Generation and that drilling conclusively, to my mind, proved that there was not actually any faulting at depth.

Godin in 2002 wrote a paper on that, and the citations from the intervenor were actually from a discussion of that paper by -- sorry, a comment on that paper by Eyles and Mohajer, and unfortunately they didn't also talk about the reply to those comments by Godin.

I would also say that in assessments that were done for the seismic hazard for the Darlington nuclear plant, there was a consideration that the seismogenic potential of those Rouge River faults would be zero. In other words, they were not considered to be seismogenic.

Thank you Mr. Chairman. I hope that addresses the issues that I was trying to address last night.

**MR. CHAIRMAN:** Thank you. You started very, very clearly, and then technology took over, and I think that it wasn't as good as we thought it would be.

So I wonder if you can, you know, send an email to us, thus articulating what you just said, so we have it for the record.

**DR. ADAM:** Okay. I can summarize that.

**MR. CHAIRMAN:** Okay. That would be really good and thank you for being here with us.

**DR. ADAM:** Thank you.

**MR. CHAIRMAN:** Okay. I would like to move to the next submission by the Greater Oshawa Chamber of Commerce, as outlined in CMD 13-H2.90. And I understand that Mr. Malcolmson will make this presentation.

Please proceed.

**13-H2.90**

**Oral presentation by the  
Greater Oshawa Chamber  
of Commerce**

**MR. MALCOLMSON:** Good morning, Mr. President. I am Bob Malcolmson, the CEO and General Manager of the Greater Oshawa Chamber of Commerce.

And just to give you a perspective, we have over 830 businesses as our members and they employ about 40,000 people in Durham Region. And Oshawa is located between Darlington and Pickering.

So it gives you an idea how important the nuclear industry is to us and we support the application for Pickering for relicensing for the next five years.

Nuclear industry is vital to both Ontario and Canada and it's a vital component of the Canadian economy. It employs over 70,000 people directly and indirectly, generating \$7 billion a year in economic activity and over \$1.5 billion both provincially and federally. OPG in Pickering and Darlington certainly add to that.

Nuclear industry in Ontario has 15.2 percent of the Canadian electricity is supplied with the province of Ontario drawing over 56 percent of its nuclear power -- electricity from nuclear power. About 15 percent of that electricity needed in Ontario comes from the Pickering plant.

And we understand at the Ontario Society of Professional Engineers that the Government of Ontario is committed to keeping nuclear power remaining at approximately 50 percent of the province's electricity supply, as it's outlined in its long-term strategy.

And since 2009, the Greater Oshawa Chamber of Commerce, together with the Ontario and Canadian Chamber of Commerce -- and that's about 420 Chambers of Commerce across Canada that have over 500,000 businesses -- have supported the position that the federal government, in cooperation with its territorial and provincial counterparts, needs to employ made in Canada

nuclear energy strategy.

Today I'm going to highlight three areas of performance that directly affect, in a positive way, Durham Region businesses in the Province of Ontario and Canada.

Safety: The nuclear industry has a demonstrated track record of safety. Following the unfortunate events of -- in Japan, OPG has confirmed its stations were safe and that they had appropriate steps and procedures in place. And we've heard that this morning.

And using those lessons learned, OPG has implemented additional equipment and procedures to add an even greater layer of safety, and we are comfortable with hearing what they have said today and both from the CNSC.

We understand that CNSC continuously monitors Pickering 365 days a year, evaluates the station in 14 related areas, and that OPG in all these areas has met and exceeded the expectations, and that CNSC staff are recommending approval of the five-year licence.

And as we heard this morning, they have the ability to shut down the plant if they find it is not safe.

We understand that over the last 40 years Pickering has been maintained and safely operated the station and employees have more than nine million hours

without a lost time injury. That is a great record.

The station's environmental performance is strong and emissions far below regulatory limits. And OPG works hand-in-hand with the province, planning, practicing and providing public information on nuclear emergency preparedness. So we are comfortable with that as well.

From the community aspect -- and I'll just touch on that -- is they keep us well informed. On a regular basis, we have communications through the business community with both the Darlington and the Pickering OPG plants. And they focus on these partnerships and we find that very positive for the community, and it keeps us on the edge with knowing what's happening.

Nuclear Power -- OPG just for example-- donated since 1999 over \$5 million in support of 1,700 local communities. So they are a partner in the community. They're there all the time, people talk to them, and they live and work where they are at.

OPG is a stellar example. The Pickering station provides a positive impact to the Canadian community through encouraging development of capabilities that help win business globally.

And on an economic side, if we take a look at that from a business perspective, you're looking at gross domestic profit taxes, significant revenues to both

the province and the federal governments.

The value of exporting and manufacturing nuclear energy is hundreds of millions of dollars, and CANDU and nuclear energy sector in Canada employs over 150 Canadian and Ontario companies, employing over 12,000 high-tech workers in the nuclear energy sector directly. Not the offshoot; there's over 70,000 people indirectly.

And there is a brain gain. We retain the Canadian scientists and engineers potentially and attract hundreds of leading international scientists. In Durham Region, we have the University of Ontario, Institute of Technology, with an undergraduate study in nuclear energy, and it fits very well in with the program here at OPG.

So from a perspective of electricity, for the past 40 years Pickering Nuclear has significantly contributed to meeting the energy needs of the people of Ontario, and virtually emission-free.

And I'd like to go back to the point of safety. OPG projects depends on -- projects depend on having the right people, and that goes for safety as well. And we believe that OPG has some of the best people in the business, the most knowledgeable and respected nuclear energy professionals in the business today, and many with over 25 and 40 years of experience.

Along with what we're seeing here today,



and what the OPG were comfortable that they should have a renewal of the five-year licence, Ontario has very few industries that offer the potential of on-going, long-term job and wealth creation.

The Ontario and the Canadian Chamber of Commerce agrees, and the consequences to the Canadian economy, without a national nuclear energy strategy, would be unmitigated.

Pickering station provides a large quantity of baseload electricity. Our understanding is that it is -- over its lifetime, has provided over 700 terawatt hours, and that's enough to power Ontario for more than four years.

And it's going to become more important, going forward in 2016, when they refurbish the Darlington plant, and it's our understanding that OPG is investing an additional \$200 million in inspections, and analysis and station maintenance, in order to keep the plant operating safely.

The Greater Oshawa Chamber of Commerce clearly supports a five-year licence extension of Pickering station, operated by OPG.

Thank you very much.

**THE CHAIRMAN:** Thank you.

Comments, anybody?

Okay, thank you very much.

The next submission is by North American Young Generation in Nuclear, Durham Chapter, as outlined in CMD 13-H2.102. And I understand that Ms. Shah will make the presentation.

I will allow you time to set up.

Go ahead anytime.

**13-H2.102**

**Oral presentation by**

**North American Young**

**Generation in Nuclear**

**(NA-YGN), Durham Chapter**

**MS. SHAH:** Gauravi Shah, for the record.

Thank you, Mr. Chairman and Members of the Panel.

My name is Gauravi Shaw and I have three years of experience working in the nuclear industry with Ontario Power Generation, and I currently work in the Performance Engineering Department at the Pickering nuclear site.

I am here today to represent the members of the North American Young Generation in Nuclear, or NA-YGN, Durham Chapter, as a public relations chair.

NA-YGN is an organization which unites young nuclear professionals, who are under the age of 35, or who have less than 10 years of experience, and provides them with opportunities for networking, professional development, and community outreach.

We are here to strongly endorse the renewal of the Pickering operating licence, for a five-year term, as well as the merger of the operating licences for the Pickering Nuclear Generating Stations A and B, located in Pickering, Ontario.

We believe that it is important to share our perspectives today since young nuclear professionals represent a significant percentage of all people employed at the Pickering nuclear site. Additionally, 65 percent of Pickering nuclear site employees reside within the Durham Region.

Like many other young professionals that we're representing today, I am getting the opportunity to learn and grow and develop a career as an employee in the nuclear industry.

At the same time, many of us are establishing ourselves, and starting families in the Durham Region as a result of these opportunities. One of OPG's safety trades is that nuclear technology is recognized as special and unique.

After graduating with the more general mechanical engineering degree, I chose to be a part of the nuclear energy industry, above all other opportunities, recognizing the unique and exciting nature of the industry.

I have been taught that respecting the risks associated with the technology is of paramount importance, and I feel safe and privileged to be part of the workforce at Pickering nuclear.

There are several socio-economic benefits to the region as a result of the Pickering Nuclear Generating Station, and with the highest priority given to personnel and public safety, renewal of the licence will ensure the region and our community will continue to reap these benefits.

Since the Pickering A and B generating station organizations have been amalgamated into one station, we support the request to merge the licences as well.

I am accompanied here by presenters Edward Zhang, President of NA-YGN; Lauren Corkum, Vice-President of NA-YGN; and Aubrey Au, Professional Development Chair; and they will now be speaking to you about why we think nuclear power benefits the region, about the socio-economic impact of Pickering nuclear, as well as how

safety is always the top priority.

**MR. ZHANG:** For the record, my name is Edward Zhang. I'm the current President of North American Young Generation in Nuclear, Durham Chapter. I have approximately seven years of experience in the nuclear industry with Ontario Power Generation.

Pickering Nuclear Generating Station, located on the shores of Lake Ontario, in the City of Pickering, has been a part of the community for over 40 years.

This site directly employs approximately 4,000 professionals, such as scientists, engineers, technicians, operators, and other supporting and contract staff.

The majority of them reside in Pickering, Ajax, Whitby, and other areas of Durham Region. They bring their career, their family, and prosperity into the region, and help the local communities thrive.

Pickering Nuclear Generating Station produces about 15 percent of the electricity needed across Ontario, and contributes to lower overall electricity costs in Ontario.

OPG operates the Pickering nuclear station, which consists of eight nuclear reactors, and their associated equipments. Six of the units are operational

and two units have been placed in a safe storage state since 2005.

These reactors located in Pickering, Ontario, supply electricity safely and reliably, and do so without generating large amounts of carbon emissions.

Nuclear power is on par with wind and geothermal power, with respect to carbon emissions per kilowatt hour, and generates less carbon than solar power.

By using nuclear energy to produce electricity in Canada, we avoid the emission of about 90 million tonnes of greenhouse gases per year, comparing to coal-fired generations. This is equivalent to avoiding the greenhouse gases produced by 18 million cars and trucks, about 12 percent of Canada's total greenhouse gas emissions.

Our use of nuclear energy also avoids the emission of an additional 10 percent of smog and acid rain-producing gases that would otherwise be emitted by thermal generations.

As young nuclear professionals, we believe that producing low carbon power is very important to ensure Ontario's energy future is sustainable. Nuclear power achieves this key objective while maintaining low operating costs.

This allows nuclear power to be the

cheapest source of non-hydro, low carbon power in Canada, selling on average at approximately 6 cents per kilowatt hour, significantly less than wind power, which is selling at approximately 13 cents per kilowatt hour, and solar power, which is selling at approximately 35 to 55 cents per kilowatt hour.

This is affordable and environmentally-friendly electricity, which the entire province can benefit from.

**MS. CORKUM:** For the record, my name is Lauren Corkum. I have four years of experience working in the nuclear industry with Ontario power Generation, and I'm currently working towards a Masters degree in nuclear engineering.

I'm here today as the Vice-President of the North American Young Generation in Nuclear, Durham Chapter.

As young nuclear professionals, we believe that it is important to invest in energy solutions which benefit all of Ontario, but, in particular, the local community.

We are proud of the strong relationship that has been established with the host community in Pickering, as a result of safe, transparent operations and

open communication.

The Pickering Nuclear Generating Station has also supported the community by sponsoring over 225 not-for-profit initiatives, and 235 local youth sports teams. Ontario Power Generation has also offered numerous scholarships to local community high school graduates for their high academic achievements in scientific fields.

Another way in which we support the local community is by focusing on excellence in environmental performance. The Pickering Nuclear Generating Station strives to ensure that its environmental performance is as low as reasonably achievable.

This ALARA principle is reflected in the internal targets which Pickering applies to numerous operating measures. For example, the critical group dose for Pickering in 2011 was 0.9 microsieverts which is less than .1 percent of the 1000 microsievert limit imposed by the federal government.

As nuclear professionals, we are also trained to seek continuous improvement. Pickering has exemplified this by reducing tritium emissions during this reporting period by 24 percent. This performance environmental stewardship has been recognized by external organizations. In 2012, the International Wildlife Habitat Council commended the Pickering Nuclear Generating



Station for its work to improve the habitat of bees and butterflies in the Pickering area. The Pickering Board of Trade has identified Pickering as an eco-business and the station has also been recognized for its efforts to promote environmentally friendly commuting practices.

In addition, a fundamental driver for why we, as nuclear professionals, support the re-licensing of Pickering is because nuclear power itself is a sustainable and environmentally friendly means of meeting Ontario's energy future needs.

Pickering's operation is critical to ensuring Ontarians continue to receive reasonably priced low carbon power now into the future.

**MS. AU:** Aubrey Au, for the record.

My name is Aubrey Au, and I'm the Professional Development Chair of NA-YGM Durham.

I joined this organization because I strongly believe in the future of nuclear power in the province of Ontario. I've been employed with Ontario Power Generation for the past four years, working in the projects design department.

I've consistently observed that no matter how simple or complex a task is, OPG has a strong focus on procedural adherence. Work procedures are written and assessed in great detail to provide clear instructions,

identify hazards and include steps to minimize or eliminate those hazards.

Workers whom I have encountered during the execution of work consistently use event-free tools to ensure that every task is completed safely and event free. They are shining examples of the strong safety culture that has recently resulted in achieving 10 million hours of work without lost-time injury.

As young nuclear professionals, we understand that safety is our number one priority. The design of our CANDU reactors is built on the philosophy of defense in-depth. This ensures multiple barriers are in place to allow for a safe operation and safe handling of radioactive materials.

Nuclear power has had an excellent record for over 45 years in Canada. Our industry is strictly regulated by the Canadian Nuclear Safety Commission and, in their latest report, CNSC confirmed that Pickering Nuclear operated with no harm to the environment, the health and safety of workers or the public.

Following the March 2011 events in Japan, Pickering Nuclear confirmed the station is safe and has appropriate systems and procedures in place in the unlikely event of significant emergencies.

Using lessons learned from the industry,

beyond design basis projects have been implemented to ensure an even greater level of safety.

Collectively, we at Pickering Nuclear have a responsibility to protect the public, our fellow employees and the environment. I am witness to the daily examples of the strong and healthy safety culture and that culture is the key ingredient to ensuring the overall success of our station.

**MS. SHAH:** Guaravi Shah, for the record.

In conclusion, NA-YGM Durham strongly endorses the renewal of the Pickering operating licence for a five-year term as well as the merger of the operating licences for the Pickering Nuclear Generating Stations A and B.

We support extending the benefits into -- further into the future by investing in the continued operation of these units, and we support nuclear power as it is a low cost, reliable and sustainable method of producing electricity.

It also provides many economic benefits to this region and the rest of Ontario. As young nuclear professionals, we have a passion to be part of Ontario's energy future.

Thank you.

**THE CHAIRMAN:** Thank you.

Comment? Questions?

Monsieur Harvey?

**MEMBER HARVEY:** Thank you for your presentation and I just have one question which is: How have you been -- you mentioned that safety is very important, how have you been introduced?

You are at the beginning of your career and how have you been introduced to safety culture and what does it represent for you?

**MS SHAH:** Thank you for your question.

I would like to direct this question to Aubrey Au, please.

**MS. AU:** Aubrey Au, for the record.

I believe OPG has a very strong safety culture and, every day, we are witness to the safety culture at OPG.

We have the health and safety traits from MBO that have been rolled out to all employees, and we're constantly reminded that we have personal accountability and that all individuals have a personal responsibility for nuclear safety at our station.

**THE CHAIRMAN:** So did you ever raise an issue up the line and say: I think we should do this better or we're worried about this and that?

**MS. AU:** Based on personal experience, I

really appreciate the company and my upper line managers because they really encourage us to always point out issues and always maintain a questioning attitude and use event-free tools and they're very open to -- to our suggestions.

**MS. CORKUM:** Lauren Corkum, for the record.

Just to add, as a system engineer, one of my core responsibilities is to be an advocate for issues or system issues.

So that is -- that is basically my responsibility and the idea that is communicated from line management that it's your responsibility to ensure that anything is properly communicated.

**THE CHAIRMAN:** Thank you.

Ms. Velshi?

**MEMBER VELSHI:** One of your objectives as an organization is community outreach as you presented.

Can you elaborate on that and exactly what have you done in that area as it pertains to Pickering operations and its re-licensing efforts?

**MS. SHAH:** Thank you for your question.

At this time, the president will answer your question.

**MR. ZHANG:** Edward Zhang, for the record.

Yes, we have some community outreach

programs and events in place. The most recent one was, a year ago, there's a science fair in Pickering High School, and my -- myself and the vice president at the time attended the fair and then we -- we introduced the technology we use in Pickering Station, the type of -- the type of safety devices and programs that we use in the station and many students and staff at the school were very interested in the type of specific technology.

And we tried to -- to relate what was -- what is taught in high school science and math programs to the -- to the similar technologies and the methods we use in the station for operation and maintenance.

**MEMBER VELSHI:** Thank you.

**THE CHAIRMAN:** Anybody else?

Dr. Barriault?

**MEMBER BARRIAULT:** Just a brief question.

On -- on the issue of Occupational Health and Safety, you have no lost time injuries.

What kind of programs do you have if you get injured, either on the job or off the job, so that you can go back to work?

**MS. SHAH:** Thanks for your questions.

In terms of Occupational Health and Safety, OPG has got established programs to take it up the line management if you do get injured and there are processes

to ensure that you can get back to work as soon as possible in case anything happens, of course.

The details are with the Occupational Health and Safety group.

**MEMBER BARRIAULT:** Do you have any specific incidents that you could relate to?

**MS. SHAH:** Okay, so Edward here can answer that question.

**MR. ZHANG:** Edward Zhang, for the -- for the record.

Yes, we have -- first of all, we have a station -- nurse station in our station and also I -- I come with operation background in the station and some time if you do have a minor injury, they report up the line, they were taken to the nurse station and we also have an emergency response team and they are -- they are all First Aid qualified staff.

We have some temporary measures on site such as we have oxygen bottles and we have some simple medical supplies on site. They can respond as emergency means and then we -- we are always in contact with the -- the Durham Region Emergency Response, Fire Department and the hospitals and if, we do need to send employees off site, then we will have other employees to accompany them to the hospital and the -- a prompt update will be

provided to the station management, senior management as well as the -- the local community governments.

**MEMBER BARRIAULT:** It begs the question really: How did you manage to have no lost time injuries for so long?

**MS. SHAH:** Lauren, please, can you address the question?

**MS. CORKUM:** Sure. For the record, Lauren Corkum.

I believe the reason why we have had no lost time injuries for so long is because we focus -- it is our responsibility as nuclear professionals, we focus on low-level reporting.

So if someone, you know, has a twinge in their elbow, that's reported. That's reported through a -- the station condition record process, which is available to everybody.

And by doing that, by focusing on the low-level items, I think you basically start to take away the higher, bigger priority items.

The other aspect is prior to any -- you know, any outage, I've always heard senior leaders say something that always resonates with me, and that's two things.

So it's the best performing stations in the



world, the best performing nuclear stations in the world are also the safest, and if we focus on safety and quality, everything else follows.

So these are things that I always keep in mind when I'm doing my work.

**MEMBER BARRIAULT:** Thank you.

Thank you, Mr. Chairman.

**THE CHAIRMAN:** Okay, thank you. Thank you very much.

I'd like to move to the next submission, which is an oral presentation from Ms. Buckingham, as outlined in CMD 13-H2.67.

And I understand that Ms. Buckingham is joining us via teleconference.

Can you hear us?

**MS. BUCKINGHAM:** Yes I can. Can you hear me clearly?

**THE CHAIRMAN:** I think you should come closer to the phone or to the mic.

And you're on, so please proceed.

**MS. BUCKINGHAM:** Okay. Can you hear me better now?

**THE CHAIRMAN:** Yes.

**Oral presentation by**

**Darlene Buckingham**

**MS. BUCKINGHAM:** Okay. Commissioners, CNSC, OPG, I cannot say anything that you have not already heard countless times before from the concerned public. My only question is why does the industry continue to obfuscate the reality about the true cost of nuclear energy and the dangers to public health and the environment?

The Commission hears over and over about the billions of dollars it costs for nuclear energy, from uranium mining to processing milling of uranium to nuclear fuel bundles, manufacturing, to nuclear plant construction, to nuclear plant decommissioning and destroying low, medium, high and level waste at a cost of \$30-plus billion with no net benefit to the people of Ontario.

David Fleming's book, "The Lean Guide to Nuclear Energy: A Life Cycle in Trouble", that is available on the internet as a free download, very succinctly and clearly does the analysis that when the nuclear energy cycle is considered from the beginning, starting with uranium mining to the end, the storage of nuclear waste, that nuclear energy uses more energy than

it provides the people.

The Commission knows there is not one functioning deep geological repository completed for the storage of high-level waste, but acts and talks as if this horrendous problem is solved.

The Commission knows about the fiasco of Yucca Mountain, but does not discuss this with the public.

At every intervention I have attended, the numbers are fudged, health dangers dismissed and the public talked down to about the very real concerns associated with continuing to consider nuclear energy as a viable mix for the powering of our province.

We know that this money squandered on storing nuclear waste that is toxic for hundreds of thousands of years and decommissioning toxic nuclear plants that have a safe lifespan of 40 to 50 years, not to mention the lack of consideration for people who will have to deal with this waste, could be used to fund research and implementation of far less expensive and dangerous means of powering Ontario; to harnessing the sun, the wind, the tides, the warmth of the earth.

We know that not enough time has been given to conclude that thyroid cancers have not increased in Fukushima, even though the CNSC insists that there was no increase. Please come back in 20 years and tell us that

this is still true.

We here in Ontario are okay for now, but what about the people of Fukushima and Chernobyl? We have a responsibility to all people of the world to speak up when we see harm being done.

Radiation doses were sought before DNA's role in heredity was confirmed in 1952 by Alfred Hershey and Martha Chase. Would it not be prudent to take a closer look at the case for no dose of radiation is safe given the impact of ionizing radiation on the integrity of our DNA, causing cancers, sterility and birth defects?

Nobody died in Fukushima, but what about the quality of life and living a long, healthy life? What about those that lost their homes? What about those that now have an increased risk of cancer?

Cancer is a horrible way to live and die and anything that increases the probability of dying from cancer even a little bit is unacceptable risk.

As for emergency planning, why was the 401 eastbound exit removed at Liverpool? Why are the emergency planners not asking for this to be corrected?

In Ontario, Pickering nuclear reactor construction began in 1966 and was finished in 1986, making the life of these reactors 47 years old. This is pushing the limit of the safe lifespan.

Continuing to renew the operating licence for ageing reactors is putting the people of Ontario at risk for a nuclear accident.

When a windmill goes down alarm systems are not triggered, evacuation is not necessary, milk does not have to be monitored, people do not have to be decontaminated and people do not have to take potassium iodide to protect themselves from thyroid cancer.

A windmill only has to be repaired. In a nuclear accident the repercussions are just beginning. The Fukushima accident is still an ongoing threat and will be for many decades to come.

Not to mention the billions of dollars spent for reactors that have such a short lifespan. We now have to look at new builds at an exorbitant cost. How is this cost efficient and too cheap to meter?

The people of Ontario are faced with rising energy bills due to the overpriced, unsafe use of nuclear energy that keeps on costing billions of dollars when it comes to the end of life by having to store radioactive and toxic waste that has to be managed for thousands of years. This is unacceptable to continue telling people that nuclear energy is necessary. It is not. This is holding us hostage.

There is now an international film festival

solely on uranium in Rio de Janeiro in its third year that has this year presented 150 films from 20 countries around the world about the dangers of uranium. Public awareness is growing from citizens that are doing their duty to inform people of the whole reality of nuclear energy.

The community I live in had to suffer through a known criminal drilling and exploring for uranium and scamming the public with a stock market scheme.

Paul Leslie Hammond, the owner and CEO of the now defunct Bancroft Uranium, was the accountant to attest Saxena, who was arrested by the RCMP for embezzling \$88 million from the Bank of Thailand. Mr. Hammond was only acquitted of all charges for testifying against Saxena.

Mr. Hammond unethically priced the stocks of his company for 1 cent and sold them for \$12 based on historic uranium mining in the area while contaminating the wells of local residents by drilling for uranium.

This is the seedy underbelly of uranium mining and the unethical people who are the ones that mine this very dangerous substance. Not caring that they are contaminating community wells, as long as they are making money.

All this information is available in the

public domain for any that care to really know the ugly truth about what goes on the drilling, exploring, and mining for uranium. Who is protecting communities that are severely impacted by the toxic waste of uranium mining?

In fact, when the industry discusses nuclear energy, it is as if uranium mining were not even part of the equation of what is involved in the nuclear energy cycle.

From the get-go, the nuclear industry creates problems for people that are unacceptable in a world that cares what happens to people and to the integrity of the environment, the place we call home.

As well, the military use of uranium is well known and cannot be ignored as part of the problem with mining uranium and making it available for terrible weapons of mass destruction and DU weapons. Stopping mining uranium would go a long way to preventing nuclear weapon proliferation.

Now it is time to no longer continue to hold Ontario back from progressing into better, renewable, ethical ways of turning on our lights and powering our world.

Please protect the public by safely decommissioning every single nuclear reactor in Ontario

and safely storing the already accumulated, deadly toxic waste. Please do not create any more toxic waste. Please promote renewable energy.

I can only hope that this will be done before one more accident like Chernobyl or Fukushima occurs. But logic tells us there will be a few more horrific accidents before the industry will be forced to stop.

Please do not continue to extend the licence for the ageing Pickering reactors. I understand from attending many interventions that OPG is simply obeying orders from the Ontario government that 50 percent of our power must be from nuclear and are receiving money from the government, also known as taxpayer dollars, to do so.

OPG and anyone working in the nuclear industry are going to defend their bread and butter. It is up to the CNSC to speak up and tell the Ontario government that nuclear energy has proven to be unworkable and disadvantageous to the people of Ontario and that the province has to find other ways to create electrical power and provide jobs and produce a true green clean energy.

Not producing CO<sub>2</sub> while fissioning uranium to boil water while creating hot radioactive toxic waste for only after more than 60 years with not one functioning



DRG -- DGR, leaving the waste on the shores of the Great Lakes in caskets for 100 years or nuclear waste is toxic for hundreds of thousands of years is not clean energy and is unacceptable. Nuclear is not carbon neutral when transportation and construction are taken into consideration.

How dare the industry continue to tell people that nuclear is clean. It is also a cop-out to tell intervenors to go speak to the government when the CNSC are our spokespeople and protectors. We are going to have to make a choice: Continue to do what makes corporations viable making money without regard to the health impacts to our lives, to the quality of our lives and the environment or choose life above all else and perhaps smaller local solutions to energy needs.

We have to rethink the way we produce energy and the provincial government has to be told the hard, cold fact that nuclear does not meet energy needs when considered from cradle to grave.

My community in the Haliburton Highlands certainly does not benefit from nuclear and still has to pay for it. Imagine if the billions of dollars spent on nuclear waste and nuclear regulation was used to support smaller companies to retrofit homes and to install small wind mills, solar panels and geo-thermals throughout

Ontario.

I will end with two quotes by Dr. Martin Luther King:

"Our lives begin to end the day we become silent about things that matter."

and:

"Never, never be afraid to do what's right especially if the wellbeing of a person or animal is at stake. Society's punishments are small compared to the wounds we inflict on our soul when we look the other way."

Thank you.

**THE CHAIRMAN:** Thank you.

Comments?

Mr. Tolgyesi?

**MEMBER TOLGYESI:** Mrs. Buckingham, what you are saying in the middle of your first page that, at every intervention I have attended, you have attended numbers were forged and Health dangers dismissed.

Could you give us an example?

**MRS. BUCKINGHAM:** Well, a lot of people have been concerned about the fact that thyroid cancers have increased since the accident in Fukushima and we are

being told that there is no danger.

But when the research is done, it takes at least three years or longer to determine whether the person was exposed to radioactive iodine. So I don't think that is dismissive of very real concern.

Also, I always hear there are no dangers, there are no cancers, there is no increase in leukemia, there is -- and I have friends who are doctors and other people who are telling me that: Yes, there is.

So I find that there is a real disconnect between people that are very concerned about the health impact and the information given by the CNSC that I very clearly hear there are no dangers, no dangers. Like it's said over and over, "There are no dangers." and I think that this is very misleading.

Also too, the fact that there is not a lot more follow-up and studies done is a little bit concerning too, so that is my concern. I've never heard yet that: Yes, radiation causes damage to DNA, it's well known. It's can damage our DNA so it can cause cancer, birth defects and sterility.

And this is not discussed in a way that I think that really tells people that there is a problem.

I hope that answers the question.

Hello?

**MEMBER TOLGYESI:** Could you -- yes, the staff will comment.

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I would like Patsy Thompson, the Director General of the Directorate of Environmental Radiation Protection Assessment, to respond to this question.

**DR. THOMPSON:** Patsy Thompson, for the record.

If I may I'll provide some background information and then I'll ask if Dr. Demeter has anything to add and so to address Ms. Buckingham's concerns.

In terms of the thyroid cancer, if you'll recall, during the December 2012 Darlington hearing, staff was reacting to comments being made by intervenors that there was some studies of children in Fukushima prefecture showing that thousands of children had thyroid cysts and this meant that they were developing thyroid cancer.

And so what we clarified at the time was that this is, this was a baseline study being done post-Fukushima and that the incidence of thyroid cysts in children in Fukushima prefecture was very similar to the incidents being seen in Tokyo which meant that at the time there was no difference. And this is very important because this is the baseline study that will be used by

the Japanese government and international organization to follow this population to determine if the Fukushima accident will be causing thyroid cancer.

On this basis -- and I do recognize the comment made by Ms. Buckingham that thyroid cancer will take some time before it develops and the experience from Chernobyl is that it takes about five years before thyroid cancer is observed.

And so we're not dismissing of that information, we were simply clarifying the information that was being brought forward by intervenors.

Staff ---

**MS. BUCKINGHAM:** I would like to make a comment.

I was at that intervention and it was the fact that it was dismissed and I think it's only because the public is calling the Commission on the information that they are disseminating for the public that the tone now has changed.

So if you go back to the tape at the time of the intervention, it was: "There was no thyroid cancer" and it was very clear and definitive. There was not a footnote that we have to wait and see.

So that's what I'm challenging and I'm very happy that there are so many people from the public now

challenging just blanket statements and really, you know, opening the book and checking, you know, the facts to see and just getting more information.

And that's -- too, like, when you open the book on a lot of the things that the industry tells us, it's not so. There's way more involved and it is not advantageous to the public when the book is opened and the whole -- as I've tried to emphasise when the whole process of the cradle to grave impacts of the nuclear energy are looked at.

**THE CHAIRMAN:** Okay, can -- excuse me ---

**MS. BUCKINGHAM:** And a lot of people don't realize that.

**THE CHAIRMAN:** Can you allow some other people to talk?

You are going to have the last word but let staff finish their conversation here.

**MS. BUCKINGHAM:** Yes.

**DR. THOMPSON:** Sorry, Patsy Thompson. So if I could continue?

So if Ms. Buckingham goes back to the transcript for that hearing, we gave references to Web sites where the intervenors had provided the information.

But to moving forward, in the staff supplemental CMD 13 H2.B, we have provided a summary of

the World Health Organization, a recent study, where the risk estimates for health effects of Fukushima are being presented and it's fairly clear from the early estimates that the, there is a small increase risk of thyroid cancer for some members of the population in Fukushima prefecture. But these rates, this increased rate would be very low.

I'd like to also to say that the United Nations Scientific Committee on the effects of the atomic radiation is finalizing a report on the health effects of the Fukushima accident, and there are a number of international experts writing that report and among them are some CNSC staff, who have been recognized and are leading the drafting of some sections of the report.

I don't know if Dr. Demeter would have something to add.

**DR. DEMETER:** Dr. Sandor Demeter, for the record. I'm a public health physician and also a nuclear medicine physician.

I just wanted to address a couple of points from the intervenor. I do agree that, especially for the young, external and internal radiation exposure may increase the risk of thyroid cancer.

My understanding from preliminary results is that the doses received in the Fukushima incident are

on a magnitude of one lower than might have been seen in Chernobyl.

But I think the baseline study to look at thyroid, and follow these citizens, is very good, because that will show the true effect of the exposure and whether or not we'll see any increased cancer rates in the thyroid, will be based on the baseline events.

And I think we have to understand that the screening modality, ultrasound, is used for -- that was used, has evolved over time and it's seeing things that were not really seen before, because we didn't have that sensitivity in thyroid ultrasound spatial resolution.

So they have done this screening. I have read that report. They've done the screening, both in and outside of that area, which show a similar picture and pattern of cysts, and now to follow, to actually find out the results.

I do have to comment on the DNA damage, because that's been brought up by a number of intervenors.

And I think people have to realize that, in a normal day, in a normal human, we can have hundreds of thousands of DNA damages, just by sunlight, chemical -- just by being -- our normal metabolism is that there are thousands of DNA breaks per day that are repaired normally. So a DNA break is something that we experience



as a biological entity and that we fix.

For some people who have trouble fixing their DNA breaks that might be an actual genetic predisposition to a number of illnesses, but it's normal to have DNA breaks from our day-to-day activities, irrespective of radiation exposure.

The other comment from a health effect was about the dangers of uranium, and I think it's important to understand that the toxicological effects of uranium, especially in an unenriched environment, are largely chemical. So in an emergency medicine point of view, if someone comes into to see me as a patient who has been exposed to internal uranium, I'm more worried about the chemical toxicity, and treating them to get it out of their body from a chemical point of view.

So the using of unenriched uranium, a lot of the occupation hazard is not radiation, but is run-of-the-mill toxicological effects, and largely on the kidney, with regards to uranium.

And I also have to comment, I've reviewed the literature on the effects of Three Mile Island, Chernobyl -- we'll see what happens with Fukushima -- and one of the biggest effects that I've seen, published in the literature, and cited, is the mental health effects of those that were exposed to levels of radiation that are

not considered harmful, from health, but are treated so differently than the other population that they have real mental health effects, deleterious effects.

Not -- nothing to do with the radiation, but for the understanding, or misunderstanding, of the health effects of radiation.

So I think we have to be very cognizant of the real effects of dealing with disaster and emergency management, and the mental health effects are real, and it has a lot to do with society's preparedness to understand how to manage these individuals who are not contaminated, or radioactive, but are treated as such.

And that, actually, has been the biggest issue that I've seen in the literature, that has had a much more profound effect than any other effect that I've seen.

**THE CHAIRMAN:** Thank you.

We've got to move on. So Ms. Buckingham, you have the final word here.

**MS. BUCKINGHAM:** Well, it's very difficult to summarize everything, but I ---

**THE CHAIRMAN:** You don't have to summarize, just give us the additional final word, please.

**MS. BUCKINGHAM:** Just please listen very carefully to what the public is telling you. That's all I

can say.

**THE CHAIRMAN:** Okay.

**MS. BUCKINGHAM:** Thank you.

**THE CHAIRMAN:** Thank you. Thank you very much.

We would like to move on now to the next submission by the Canadian Nuclear Association, as outlined in CMD H2.64, and I'll turn to Ms. Kleb for the presentation.

**13-H2.64**

**Oral presentation by the  
Canadian Nuclear Association**

**MS. KLEB:** Good morning, President Binder, Commission Members, and members of the public.

My name is Heather Kleb, and I am the Interim President and CEO of the Canadian Nuclear Association. Also here with me today is Malcolm Bernard, our Director of Communications.

We are here today to support Ontario Power Generation's application to renew the operating licences for Pickering Nuclear Generating Stations A and B, and to merge these licences.

We do so for three reasons: First, the

Pickering generating station has an excellent health and safety record. This is reflected in how the station, like our entire industry, responded to the events at Fukushima, Japan, by making its facilities even safer.

Second, the station provides significant socio-economic benefits to the surrounding communities, and the region.

Third, the station makes a material improvement in our environment.

I'll start with the health and safety record -- it's very strong. The Pickering generating station had operated for more than 40 years, all the while ensuring that workers and the public are safe. The performance numbers tell the story about safety.

Station employees have worked more than 9 million hours without a lost time injury. That's almost two years.

Clearly, the Pickering generating station takes health and safety very seriously, as does our entire industry. This is particularly apparent in the station's response to Fukushima. The station is located far away from any tectonic plate boundaries, so the threat of a major earthquake at the station is negligible.

And yet, even though the earthquake risk is low, OPG has reviewed its emergency plans and emergency

preparedness program, to determine whether there are potential lessons learned from Fukushima.

The Pickering generating station staff practice their response capabilities by responding to simulated emergencies. And now OPG is working with CNSC staff to demonstrate how the station's emergency plans are integrated with those of the federal, provincial, and municipal governments.

In other words, even when the risk of an accident is very low, the Pickering generating station takes it seriously and is prepared to respond effectively.

Now, in turning to my second point, I would flag for you the significant benefits the Pickering generating station provides to the socio-economic environment.

The nuclear industry creates and sustains highly skilled, well-paying jobs. In fact, Canada's nuclear sector is a \$6.6 billion per year industry. Every year we generate \$1.5 billion in federal and provincial taxes, and provide rewarding careers to about 60,000 Canadians. The Pickering generating station alone employs about 2,500 workers.

Beyond this, OPG's corporate citizenship program provides financial and in-kind support for community-based programs. The program supports over 225

not-for-profit initiatives, and 235 local youth amateur sports initiatives.

In recognition of this contribution, OPG was awarded the City of Pickering Civic Award, in both 2005 and 2009. Most importantly, OPG regularly and proactively engages with local communities to provide information on their ongoing facility activities, and to any events affecting the public, the environment, and the details of their transportation program.

In reading the written interventions for this Day Two hearing, there were numerous examples of groups who had benefitted from OPG's support. Time and again we heard various community groups describe how they were well-informed, and how willing the Pickering station staff, were to answer their questions.

That brings me to my third point: OPG is also committed to environmental stewardship. It has been recognized for its performance with several awards, including the prestigious Environmental Earth Angels, Environmental Achievement Award in 2011.

This award recognizes their many years of outstanding biodiversity education. When it comes to the environment our industry has developed a culture of going beyond compliance.

As an example, OPG has successfully worked

to reduce tritium emissions from the Pickering station by 24 percent between 2009 and 2012. The emissions now represent a mere 1 percent of the regulatory limit.

We would even go as far as to suggest that the Pickering generating station has improved our environment. That is because nuclear power produces very few carbon dioxide emissions compared to coal and natural gas.

Ontario has been able to reduce its reliance on coal because nuclear provides reliable base load power generation. And as coal has disappeared Ontario's air quality has improved.

In fact, a recent report from the provincial environment ministry pointed to a 10-year improvement in air quality thanks in part to the disappearance of pollutants from coal-fired generating stations.

The Pickering generating station contributed to this improvement. As the station noted in its 2011 Environmental Progress Report, Pickering had displaced about 161 million tonnes of carbon dioxide over 10 years.

In doing so, Pickering and all the other generating stations around the world have made a significant improvement to human health.

A recent study in environmental science and technology described how nuclear power as a substitute for natural gas and coal has improved the environment.

According to this study, between 1971 and 2009, the use of nuclear power world-wide eliminated the production of 64 gigatons of CO<sub>2</sub> equivalent greenhouse gases. According to the study, that saved 1.84 million lives. Some of those lives were saved by the Pickering generating station.

Just as a back of the envelope calculation, if the numbers work out to about 28 lives per megaton of CO<sub>2</sub>, the Pickering station has probably saved upward of 4,000 lives over the past 10 years.

Mr. Chairman, let me conclude. The Pickering Nuclear Generating Station has been powering our economy for more than 40 years while simultaneously sparing us tonnes of greenhouse gases and air pollutants that cause smog.

OPG nuclear was green long before green became a part of our energy policy. That environmental contribution, plus the benefits that Pickering station provides to its neighbouring communities, its strong health and safety record and post-Fukushima improvements, these are all good reasons to renew the operating licenses for Pickering.



With that, I will close my presentation. I thank you for the opportunity to appear before you today.

**THE CHAIRMAN:** Thank you.

Question? Anybody?

Okay, let me start then. I was interested in your Attachment A. There's a statement about side note -- the historical side note.

It's either item one -- just the paragraph before item two, that talks about -- that there's radioactivity actually produced by coal fire. Where is the data that everybody talking about that the radioactivity ---

**MS. KLEB:** In the fly ash?

**THE CHAIRMAN:** In the fly ash et cetera?

**MS. KLEB:** Yeah, we can provide that to you but that's -- well, it should be well known but I guess it's ---

**THE CHAIRMAN:** Does it have a comparison, kind of, year to year about where they are globally? You know, the IAEA in the next paragraph, the Canadian Energy Research Institute is talking about, again, their performance vis-à-vis emissions.

**MS. KLEB:** M'hm.

**THE CHAIRMAN:** And I also wondered whether when they compare -- do the comparison, the previous

intervenor implied, for example, that you never take the uranium cycle into the full cycle. Are those comparisons always include in the full cycle? Anybody knows?

**MS. KLEB:** Heather Kleb, for the record.

Yes they do -- they aim to include the entire lifecycle, including uranium extraction.

**THE CHAIRMAN:** So, when you use this saving of 90 million pounds of CO<sub>2</sub> or kilograms -- I can't remember the units ---

**MS. KLEB:** There are several numbers, 90 million tonnes or we usually ---

**THE CHAIRMAN:** Ninety (90) million tonnes. Does that include that full cycle calculation?

**MS. KLEB:** It varies from study to study. The Canadian Energy Research Institute study does not include construction or waste management but it does include uranium extraction.

The study we referred to from NASA does include uranium extraction and all the way through to waste management.

**THE CHAIRMAN:** So that will be and also decommissioning and all that?

**MS. KLEB:** I'd have to look at the details on that.

**THE CHAIRMAN:** Staff, anybody knows?

**MS. KLEB:** How they define waste management.

**DR. RZENTKOWSKI:** Dr. Patsy Thompson will respond to this question.

**DR. THOMPSON:** Patsy Thompson, for the record.

I just wanted to add that over the last, probably, two or three decades there's been a lot of studies done by the IAEA but also other international organization comparing the environmental footprint of various ways of producing electricity. And certainly radiological doses from coal, gas and nuclear have been compared.

And usually the methodologies and the data are made available to countries who are embarking in -- and to help guide energy policy, essentially for decision-making, but that data is -- and the methodologies are well known. They haven't been used often in terms of making energy policy decisions but certainly the methodologies exist.

**THE CHAIRMAN:** But if there -- but if there is radioactivity in coal burning ash who regulates it?

**DR. THOMPSON:** Patsy Thompson, for the record.

One example is the -- UNSCEAR has published

a number of reports updating that information.

The radioactivity from other ways of producing electricity is not regulated and it's certainly an issue we had raised, for example, a number of years ago when -- under the *Canadian Environmental Protection Act* there was a -- an assessment of releases of radionuclides from the nuclear cycle.

We had, at that time, raised the issue that other sources of electricity were -- were also needed to be managed from that point of view. This hasn't really been considered.

One of the things however, that we should mention is that provincially, naturally occurring radioactive material is regulated to some extent, and there's the federal territorial -- Federal/Provincial Territorial Radiation Protection Committee in Canada that has tried to harmonize how this is regulated.

And we have similar -- for example the 1 Millisieverts dose to the public is also used by the provinces to regulate norm. But in terms of emissions to the atmosphere and public doses, it's not regulated.

**THE CHAIRMAN:** Okay, anybody else?

Well, thank you, unless you want to say some final words?

**MS. KLEB:** Heather Kleb, for the record.

I would just like to say that it's with confidence that we recommend that you approve the application to review the Pickering Nuclear Generating Station license and this confidence comes from 40 years -- over 40 years of strong health safety and environmental performance.

**THE CHAIRMAN:** Thank you.

I'd like to move on to the next submission by the Mississaugas of the New Credit First Nation as outlined in CMD 13-H2.87. And I understand that Ms. King will make this presentation.

Ms. King, the floor is yours.

**13-H2.87**

**Oral presentation by the  
Mississaugas of the New  
Credit First Nation**

**MS. KING:** I just want to stand for a minute here, just to acknowledge the room. And I brought my medicines with me again to help me.

(Speaking in native language); meaning that my name Carolyn King and I live at the New Credit Indian Reserve No. 40a, which is about -- well it took me two hours to get here, so. It's south of Hamilton and about

170 kilometres I think it's at.

So thank you for the opportunity to be present here again today at this type of hearing. My regards to you, the other Commissioners, and all the people present.

Our Chief was to present today but he had an opportunity to meet in Ottawa regarding how Canada treats us and our status cards, recognition of who we are as the people, an equally important issue so I am taking his place today.

I'm here to reintroduce my community, the Mississaugas of the New Credit First Nation, and not to -- we sent a letter re the intervention funding, as suggested at the last time that I was here up in Courtice. And we did get that in and we were -- I'm here to, like I say, reintroduce who we are and to express my disappointment in the way that the Mississaugas of the New Credit have been treated in this process. And that's written up in my statement here issued by the Commission:

"I regret to inform you that the CNSC has not approved your participant funding application for the relicensing of the Pickering Nuclear Power Operating Licence. Based on a review of the Independent Funding

Review Committee and confirmed by CNSC, it was determined that the Mississaugas of the New Credit First Nation do not reside in the affected area nor did the funding application provide any evidence regarding the First Nation exercising their Aboriginal rights in the affected area, which they identify as their historic traditional territory."

We have taken exception to that statement in a strong way and, based on that, our Council is even seeking legal counsel. That it is in direct opposition to the duty to consult and accommodate and recognizing the First Nations people of this country and their rights and interests on lands that will be impacted by all the development that has been happening over our lands.

Increasingly, the growth continues to go forward without adequate concerns and suitable concerns to the First Nations who are impacted. And that we want to come forward, beside our letter, to reintroduce ourselves and to state some of our concerns.

It appears, based on the communications written, that your agency, as part of Canada, does not understand who we are as the Mississaugas of New Credit

and as part of the First Nations in this country. And you don't understand what our traditional territory means to us and that will go forward no matter what we say.

It was good to hear that the people who are working there are doing well over our lands.

I'm not here to go over every line in our written submission that we applied for funding. I'm present here to let you know that we are still very much alive, just not living in this area, and we do come to these areas.

The Mississaugas of the New Credit, for one, did not sign the Williams Treaty. There are other First Nations in this area that may be more directly affected. So we consider all of this land our traditional territory and, hopefully as time goes on, maybe we'll have to make -- to fit your understanding, maybe we'll have to make specific trips here and have them identified, so that you don't get to say to us: "You don't use this land and you're not going to be impacted."

Our hearts and our history and our spirit are impacted. So we are here to state that we are not supportive of this application to go forward without a better understanding by this Commission, by OPG, to understand what it means to our people to lose this land and how we might -- our interests may be addressed. And



that we would -- we are offering to work in a process to help you understand.

And with that, Migwetch.

**THE CHAIRMAN:** Thank you.

Anybody wants to start?

Staff, maybe you should explain what happened to the Application. Maybe we'll start with that.

**DR. RZENTKOWSKI:** We definitely owe an explanation here and I will try to ask Kim Mann, who is from Policy Aboriginal and International Relations Division. She is in the Head Office in Ottawa and she is connected right now.

**THE CHAIRMAN:** Can you hear ---

**MS. MANN:** Good afternoon.

**THE CHAIRMAN:** Go ahead.

**MS. MANN:** Hi, it's Kimberly Mann, Senior Advisor of Aboriginal Consultation at the CNSC.

Can you hear me?

**THE CHAIRMAN:** Yes, we can.

**MS. MANN:** Great.

Okay, I met with Ms. King back on April 24<sup>th</sup> and, at the time, I did express -- I did apologize for any insensitivity that was taken by the letter that was sent about the participant funding.

We certainly did not mean to be insulting

or insensitive in any way, and I explained at the time that the Participant Funding Program uses an independent funding review committee to review all applications and then make recommendations for funding.

The PFP was open for \$50,000. We received seven applications requesting almost \$200,000, which up to about \$68,000 was awarded to five applicants.

It was -- the independent funding review committee strictly looks at the content of the application and, based on the eligibility, made a recommendation that the application did not meet the criteria.

I also, at the time, wanted to point out to Ms. King, very important to us, that it does not mean the same thing that CNSC does not recognize the Mississaugas of New Credit First Nation's interest in this project and their known historic use and interest in the Pickering and Darlington area.

We've heard Ms. King speak at a number of hearings in the past and we definitely appreciate and respect this First Nation's connection to this land; hence, why we invited them to participate in this process.

So I wanted to point out that, outside of the PFP decision, CNSC still wishes to have a relationship and to learn more about the Mississaugas of New Credit First Nation and that we do build a positive relationship

and that we continue to work together on projects that CNSC regulates and is of interest to this First Nation.

**THE CHAIRMAN:** Okay. Thank you.

OPG, what is your relationship with this community?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask Kevin Powers to comment in a moment.

We're certainly open to dialogue with First Nations and our policies certainly direct us in that way. So I'll ask Kevin Powers to speak in detail how that works.

**MR. POWERS:** Kevin Powers, for the record.

We are committed to building long-term mutually beneficial working relationships with First Nations communities proximate to our operations. We have met a number of times with the Mississaugas of New Credit First Nations, and we have committed to continuing to meet and share information on our current and future operations as well as gaining a greater understanding and appreciation of their traditions, traditional territories and land use and discussing concerns.

**THE CHAIRMAN:** So if I understand what was said is that there are two separate processes here: one is the relationship and the other one is money

disposition.

And I don't think they are necessarily connected to each other because, if I understood staff, there's an independent committee that makes a decision on program criteria and, you know, they reached that conclusion.

It's interesting in the same decision, if I understand correctly, the Métis Nation of Ontario did get funding. So there was some, you know, kind of a different criteria came -- maybe you can share without disclosing any kind of state secret, why did the Métis get and they didn't?

No, I'm asking Ottawa, Kim?

**MS. CATTRYSSSE:** Actually, this is Clare Cattrysse, the Director of the Policy Aboriginal Policy, International Relations Division, and we manage the PFP Program.

Each application, they do tick off criteria and also then that criteria is vetted with the Funding Review Committee. The way in which the Métis application was submitted, they had been involved and had ticked off about the issues that they had taking place already in the vicinity. So it was just the way in which the application was filled in.

And in terms of what the application that

was received by the Mississaugas of New Credit, they did not tick off anything about being in the vicinity and it wasn't clear in terms of the application that there were traditional activities being linked to nuclear activities and the other group was able to do that.

So this is just some of the feedback we were able to get back from the Funding Review Committee but it was -- that was a determination.

Now, I do want to state that following the money being sent out in February, we did do a management review of the PFP program and right now we are looking at ways to make the program more flexible and looking again at how we respond to applications. So we are just going through that process right now.

Thank you.

**THE CHAIRMAN:** Ms. King?

**MS. KING:** I can't accept that response.

The Mississaugas are a First Nation with 10,000 years and more of this territory and the Métis are not, and that we have land rights. It's only recent that the Métis were recognized in certain areas. So I think that leads to maybe a lack of understanding about who should have a say here.

The funding is one thing but we outlined our positions and our opposition that we should not be

allowed to go forward without doing some more discussions about who has a rightful say here.

So we offer to do that. You should come and meet in our community and see how we have to live and what impacts us. That's all I have to say.

**THE CHAIRMAN:** Okay. Anybody else?

Okay. Well, thank you. Thank you for this intervention.

Okay. I'm told that right now we are supposed to break for lunch but if -- who is the next person?

If Ms. Whalley is available to make the presentation now, we'll accept it. Is Ms. Whalley here?

I guess not. So anybody who was due to speak this afternoon and wish to do it now, you've got a window of opportunity.

No. So we are breaking for lunch and we will reconvene at 1:10.

Thank you.

--- Upon recessing at 12:23 p.m.

L'audience est suspendue à 12h23

--- Upon resuming at 1:09 p.m.

L'audience est reprise à 13h09

**MR. LEBLANC:** We are ready to resume.

Please take your seats.

**THE CHAIRMAN:** I'd like to move to the next submission which is an oral presentation from Ms. Whalley, as outlined in CMD 13-H2.57 and 2.57A.

Ms. Whalley, the floor is yours.

**13-H2.57 / 13-H2.57A**

**Oral presentation by**

**Monica Whalley**

**MS. WHALLEY:** Okay. Good afternoon, Chair, Members of the Commission. Thank you for your time today. Sorry, I'm a little out of breath. I rushed from the lunch.

So my name is Monica Whalley and I live with my family in the Beaches in Toronto, near the 20-kilometre exclusion zone of Pickering nuclear plant.

I am here today because I feel strongly that we, along with close to 3 million other Torontonians and another few million more inhabitants of the GTA, are at increasing risk of suffering the consequences of a nuclear accident from Pickering generating station due to the fact that it has reached the end of its designed-for lifespan.

Pickering generating station, Canada's oldest nuclear plant, is situated up against the heart of our nation's largest developed urban city, Toronto. If only for reason of its proximity to millions of inhabitants, Pickering should be shut down as soon as possible.

We should all be thankful that it has reached the end of its designed-for lifespan of 40 years with relatively few mishaps other than thousand gallon leaks of tritiated water into Lake Ontario.

The nuclear industry is winding down globally. This irrefutable trend is due to factors that have little to do with one's position on the validity of the nuclear industry.

This industry is simply too expensive to maintain itself. New reactors are too expensive to build. Old reactors are too expensive to maintain and decommission, and the price tag of a large scale nuclear accident is more than all of these costs put together.

Nuclear systems are not competitive in this world. Pickering should not have its licence renewed due to the following problems for which no solutions have yet been found.

There is no solution for the proximity of Pickering generating station to Canada's largest urban



centre. As I said, close to 3 million live within 30 kilometres of Pickering and 6 million live within the GTA and close to 40 million people depend on Lake Ontario for drinking water.

And there is no solution to long-term storage of radioactive nuclear waste. For nuclear entombment to be even moderately successful, a storage facility must remain intact for at least 10,000 years. No man-made structure has ever survived for 10,000 years. Egypt's pyramids were built around 4,500 years ago.

There is no solution to the tremendous costs of building, maintaining and decommissioning nuclear reactors. Even after 50 years, the nuclear industry is still not viable without government subsidies. No nuclear plant has ever been completed on budget.

The nuclear industry is still unable to insure itself and ageing nuclear reactors are huge liability. Decommission costs run anywhere from 655 million to a billion per reactor.

There is no solution to the tremendous costs to the economy caused by a large-scale nuclear accident. To date, Chernobyl reactor has cost more than 500 billion to clean up and Fukushima is estimated to be 600 billion to 10 trillion to clean up, depending on who you ask.

There is no solution to the fact that there is no safe dose of radiation. According to the U.S. Department of Energy, no level of radiation is so low that it is without health risks. U.S. military commanders tell their personnel that low-level radiation does increase the risk of cancer. So any so-called safe levels are coming from within the nuclear establishment.

Nuclear power is no solution to global warming and greenhouse gas effects. Every aspect of the nuclear fuel cycle, mining, milling, shipping, processing, power generation, waste disposal and storage, releases greenhouse gases and radioactive particles and toxic materials that poison the air, water and land.

The reasons to shut down Pickering are too numerous and too weighty to be ignored. Yet, it seems likely that they will be ignored.

This leads me to ask myself why. Why are they going to be ignored? And it makes me wonder things like, how many public hearings in the last decade has the CNSC held? And how many times was the outcome not ultimately in favour of the nuclear industry?

I would like to know. I really would. Perhaps later, you could email me that statistic at some other point.

Correct me if I'm wrong, for I have not

been able to find exact numbers, but the CNSC has held many hearings over the past decade and it appears the results of most of these have come out in favour of the nuclear industry.

One exception I did find was that time the CNSC responded in a manner that did demonstrate responsibility towards all Canadians. The CNSC, then headed by Linda Keen, determined that the AECL's NRU reactor at Chalk River should be shut down and it was shut down. However the facility was restarted after 15 months and continues to be a danger and a financial liability to Canadians.

These are some recent statistics this month in the media: Near miss and AECL to cost \$236 million more than expected this year.

The CNSC's history of siding with the nuclear industry is reminiscent of that of TEPCO, the Japanese regulators and their government. This relationship was the cause of the Fukushima meltdowns.

So I have to ask myself, who benefits, who benefits by Canada's continued participation in an outdated and dangerous industry?

Who does it benefit to keep Pickering running and to refurbish Darlington and to furthermore build new reactors at Darlington? Is it Canadians, no,

not Canadians.

Canadians would benefit from developing a source of energy that's based on renewables such as wind and solar. And Canadians would benefit by saving billions in the cost and expense of running Pickering, refurbishing Darlington and new build projects. And Canadians would benefit to not have their environment, drinking waters or bodies contaminated with radioactive particles in the event of a nuclear accident.

So who benefits? The nuclear industry, SNC-Lavalin, General Electric, Westinghouse, Areva, Hitachi, Toshiba, to name a few. These companies have absolutely nothing to lose in continuing the nuclear industry, thanks to the *Nuclear Liability Act*.

I am here today to urge the CNSC to put the genuine interests of Canada and with it, of all Canadians, solidly and unwaveringly first before considering the interests of the only parties who stand to gain, those corporations affiliated with the nuclear industry and others I haven't identified.

Canada must get out of nuclear. Nuclear power is not only physically dangerous, it's also economically wasteful. To top it all off -- excuse me a minute.

To top it all off, in the face of all the

problems for which there are no solutions that I mentioned earlier, the OPG hasn't even in place remotely adequate procedures for evacuation should there be a nuclear emergency at one of its nuclear power plants.

To live in the shadow of the Pickering nuclear power plant with this degree of risk and this lack of foresight and planning is completely unacceptable.

We don't need electricity from old and dangerous reactors from Pickering Nuclear Generating Station, we need to put our energy dollars into finding solutions that are local, decentralized and use renewables.

We need to cease putting at risk the lives of millions of Ontarians and future generations. We need an end to the short-sightedness that has brought us to this present situation.

CNSC, please be that end. Deny the OPG any further extension of licence renewal and plan for accelerated decommissioning of Pickering generating stations today.

Thank you for your time and consideration.

**(APPLAUSE/APPLAUDISSEMENTS)**

**THE CHAIRMAN:** Thank you.

Who wants to start?

Monsieur Harvey?

**MEMBER HARVEY:** Merci, monsieur le président.

First question, I think we have discussed quite a bit of this, but I would like the staff to just briefly give the signification of the end of design life. I don't want to get into a deep discussion, but maybe in a few words.

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I will try to be very brief because we discussed this subject on at least a couple of occasions during this licensing hearings.

So first of all, it has to be understand that the design life or anticipated design life is purely an economical decision. From the return on investment standpoint, the reactor has to operate for a certain number of years. For a CANDU technology, this number of years was chosen to be 30 years, after this time expires, we -- we don't see a cliff-edge effect, meaning that the reactor is safe today, but it will be unsafe tomorrow.

And in addition, it has to be understood that many safety improvements are being put in place during normal operation of the plant, and those safety improvements include not only repairs or -- or replacement of the components, but include also new, additional

features which elevate the level of safety of reactors.

We would never licence the reactor if it was unsafe. As a matter of fact, our regulatory requirements do evolve and that's the reason the safety of operating facilities in Canada is increasing as well.

So this point has to be understood. Maybe to make an analogy which -- which could be easier to understand, let's imagine a car.

So if you -- if you inspect the car frequently, if you -- if you replace the parts as required, you can drive this car for a very long time.

However if you buy a car and you just drive and you just put gasoline into the car to keep driving -- sooner or later, this car will start falling apart.

So I can assure you that this is not the case with operating facilities in Canada. They are being constantly inspected and the safety level is not only maintained, but even increased.

**THE CHAIRMAN:** Anybody else?

**MEMBER HARVEY:** Thank you.

**THE CHAIRMAN:** Ms. Velshi?

**MS. WHALLEY:** I would have a question.

**THE CHAIRMAN:** Can you hold on -- on this particular ---

**MS. WHALLEY:** Yes, about that, yes.

I am under the impression, although I'm not a specialist, that there are parts of a CANDU nuclear reactor that cannot be accessed to be inspected, that these parts would be ageing along with the rest of the reactor, but there are buried pipes, there could be corroded wires.

There are inaccessible parts of the plant as well and then there are parts of the plant that cannot be changed, such as crumbling concrete and containment vessels and very big parts of the plant.

So whilst you can change a light bulb and change a fuse and you can -- I can see that you can upkeep certain parts of it, I'm not sure that that gives me much faith with regards to the integrity of the plant and its inspections.

**THE CHAIRMAN:** Were you here for some of the discussion about the concrete and the inspection?

**MS. WHALLEY:** I -- yes.

**THE CHAIRMAN:** And hidden wires and pipes?

**MS. WHALLEY:** Well, I wasn't here, I was watching some of it yesterday online.

**THE CHAIRMAN:** Okay. Well, many of those questions were discussed and you should take a look at where the webcast will be deposited.

But maybe a short reply again from staff



about some of those inaccessible parts and how do you deal with them, and maybe OPG.

**MR. DANIEL:** Yes, I'll ---

**THE CHAIRMAN:** Very quickly.

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

All major components are covered by an ageing management plan, so there's an inspection program in place to make sure that fitness for service is being maintained.

With respect to other parts which -- which could appear to be not accessible, I will ask Mr. Gerry Frappier to -- to elaborate.

**MR. FRAPPIER:** Thank you. Gerry Frappier, for the record.

A couple of points, a couple of the intervenors have talked about buried pipes and things like that and this is an issue that's come out of the United States where their designs do allow for -- for buried systems that are important to -- to nuclear safety and whatnot.

In Canada, we do not allow that, so there is no buried pipes of concern that way in Canada at all.

As Mr. -- Dr. Rzentkowski just mentioned, all of the -- the licensees are required to have an ageing

management program that covers all of the components in a systematic way. All the major components associated with safety significant things like structures, like pressure tubes, all have to have a -- what we call -- a lifecycle management program on them which details how they're going to ensure that they always meet the safety requirements, how they inspect for that, how they analyze for that and how they model that over the future.

So that, again, the -- we do not view the -  
- the design or the safety to be something that is determined by a set number of years. We determine the safety of the reactor by the fact that it meets all its design requirements and has safety margins for any of the events that could happen to it.

**THE CHAIRMAN:** OPG?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask our Chief Nuclear Engineer, Mark Elliott to comment.

**MR. ELLIOTT:** Mark Elliott, for the record.

The only thing I'll add is that we do go to considerable lengths to inspect even hard to access places.

The one example I'll give is on the Pickering 1 to 4 side, the Pickering A side, the Calandria vault is -- was previously thought to be inaccessible and

we had a need to go in and have a look at that.

So what we -- what we did is opened a penetration and developed really what was almost like the Canada arm. It was built by the same company -- this company is now called "MDA" -- and they -- we put inspection tooling through this one port in the side of the Calandria vault and did the inspection, found that the condition was good, hadn't changed since we had last been able to look at it and withdrew it and restarted the reactor.

So we do go to extreme lengths when we really need to inspect something. And that was a successful inspection a couple of years ago.

**THE CHAIRMAN:** Okay. Any?

Dr. McDill.

**MEMBER McDILL:** Thank you.

I think it might be helpful to the intervenor and to the community for the staff to briefly outline some of the events that -- some of the orders, for example, that CNSC has issued to stop a variety of things -- I'll let you give the examples -- so that the intervenor and the community know that the CNSC does stop things.

We know that you've stopped things but I'm not sure the community knows you stop things.

**DR. RZENTKOWSKI:** I would like Mr. Jammal to summarize the actions taken by the CNSC staff recently to maybe not necessarily stop operation but at least to make sure that the proper safety margins are maintained and protection of environment and people is also ensured.

**MEMBER McDILL:** I think you could go beyond the NPPs as well, the nuclear power plants.

**DR. RZENTKOWSKI:** This is the idea.

**MR. JAMMAL:** Ramzi Jammal, for the record.

The Commission and its staff have shut down operations and I'm going to cover the whole gamut, if you allow me, in one minute.

So we do shut down operations of radiography. We shut down hospitals. We shut down nuclear medicine radiation therapy equipment anytime there is no compliance with CNSC requirement there is a safety issue.

Inspectors in the field, they have the power to shut down the operations by issuing an order.

Now, the allegation being made that the Commission has never rendered a shutdown decision. The order when issued by a senior member what we call "designated officer", the order is heard by the Commission. To date, the Commission has never overturned an order. They have amended the condition of the order

and then every licensee met the conditions of the order in order to restart operation and we had to provide reports back to the Commission.

So the Commission did -- its staff and the Commission itself did shut down.

Now, a lot of the intervenors talk about G-2. Let me remind everybody that the Commission put a hold point on G-2 licence giving Hydro Quebec two options. The first option: shut down and do the inspection that's required to be done and update the safety case to allow them just -- for them to justify the operation. Number two: shut down for refurbishment.

So everybody's forgetting the fact that when the licence for G-2 was issued, a hold point was put in place by the Commission. Very two clear criteria: one, shut down to justify continued operation or shut down in order to do refurbishment.

And, of course, based on the operator's decision, economic decision, they did shut down for refurbishment.

So the Commission renders its decision based on scientific facts and recommendation, not emotions nor opinion. So we have to present to the Commission the scientific data that the Commission rendered its decision upon and the operations is actually -- the regulatory

oversight ensures that what the Commission issued is safe and our mandate is for the protection of the public and environment.

And we do have the powers to shut down. And we did shut down the operations and the Commission, to date, has not overturned one order issued by designated officer.

**THE CHAIRMAN:** Dr. McDill.

**MEMBER MCDILL:** Thank you.

I'd just like to go back to the intervenor.

**MS. WHALLEY:** Thank you.

Yes, I appreciate that there are standards in place and that these standards are adhered to.

I don't entirely feel reassured because -- especially since Fukushima -- regulatory commissions have decided that original safety standards were too conservative and they have been lowering the bar quite a bit in various areas; various safety margins are being eased.

So although many safety margins are being adhered to, I still question the ultimate safety of the, you know, the ageing plant because I question those safety margins, I guess.

**THE CHAIRMAN:** I don't understand the safety -- the standards are being increased in terms they

are elevated and make them even more conservative rather than easing them up.

So because of Fukushima, there's whole -- a whole set of investment to enhance the shutdown capability of the facility.

So I don't know if you were here for the discussion of -- about what would happen nowadays if there is a big accident here. The lesson of Fukushima was that, no matter what happened to the plant, you should be able to shut it down.

So what is it -- what are we easing up here?

**MS. WHALLEY:** Well, I'm referring to the standards that permit ageing nuclear reactors to have their licences renewed.

That, over time, over the past 10/15 years, many reactors especially south of the border and perhaps here get their licences renewed because the safety standards are being relaxed.

**THE CHAIRMAN:** Staff?

**MS. WHALLEY:** I have an article that I'm referring to.

**THE CHAIRMAN:** I know what you're referring to but I can tell you what the NRC Commission does -- this is the American regulator: For every plant, my

understanding is you got to go through a safety case again and they will not -- my understanding and staff please add to this -- is they would not allow for a plant to operate unless they are confident that it's safe.

**DR. RZENTKOWSKI:** Absolutely.

And here in Canada, our regulatory framework is -- is based on a continuous safety improvement principle.

That means that, with every iteration of the relicensing process, we introduce new, very modern regulatory standards into the licensing basis of the facility and the facility has to comply with those regulatory requirements. As a result, the safety of the plant is not only maintained but even enhanced.

But this is in Canada and I do understand the concern here because this continuous safety improvement it's not the cornerstone of every single regulatory framework internationally.

So the situation in Japan has been slightly different because the principle was to maintain the original design-basis of the plant. So the principle was to maintain the level of safety, not necessarily to enhance it.

**THE CHAIRMAN:** Okay.

Anybody else? Question?



Okay, you have the final words.

**MS. WHALLEY:** Thank you.

Well, in final comment, I would just like to point out that the regulators felt that Chernobyl was safe and the regulators who were running Fukushima Daiichi at the time felt that it was safe.

And the regulators that were running Three Mile Island at the time felt that it was up to standards as well. It had jumped through all the hoops and been approved.

And, essentially, what I'm trying to say is that just because the plant has a stamp of approval and everything appears to be above board that does not preclude an accident.

So I will end off by saying again that accidents are not planned for and Pickering is close to six million people in the GTA and 40 million people depend on Lake Ontario for their drinking water.

Thank you.

**THE CHAIRMAN:** Thank you.

I'd like to move on to a submission by the Power Workers' Union as outlined in CMD 13-H2.72 and H2.72A. And I understand that Mr. Walker will make this presentation?

13-H2.72 / 13-H2.72A

Oral presentation by

Power Worker's Union

**MR. WALKER:** Good afternoon, Mr. President and Members of the Commission. My name is Bob Walker. I am the Nuclear Vice President for the Power Worker's Union.

With me today are: Mr. David Trumble, he is one of our Health & Safety Staff Officers; and Mr. Martin Homan, who is our PWU Co-Chair of the Pickering Joint Health & Safety Committee.

Also present today are some of our PWU elected representatives from Pickering and PWU staff and we can call upon them, if we need to, to answer any questions.

We will have the following topics, which are detailed in our written submission: who is the Power Worker's Union; what's our involvement in the regulatory process; health and safety; lessons from Fukushima; effective relationships; OPG's licence renewal application; and then some conclusions.

The Power Worker's Union is representative of the majority of the skilled workers in Ontario's electrical generation, transmission, and distribution

systems in Ontario for more than 60 years. We represent the workers that operate and maintain Pickering, as well as all of Ontario's nuclear power plants, and we've done so since our inception.

The Power Worker's Union is affiliated with other labour organizations such as our parent union, the Canadian Union of Public Employees, the Ontario Federation of Labour, the Canadian Labour Congress, the Industrial Global Union, and we are a member of the Canadian Nuclear Workers Council, the International Nuclear Workers' Union Network, as well as several labour councils across Ontario, including Durham Regional Labour Council.

Our knowledge and experience and history qualify us as a vital and credible voice in the public nuclear discussion and specifically to these hearings.

Our union has a long history of involvement in the nuclear regulatory process and many other forums. We have been involved with previous hearings in regards to nuclear new build, nuclear plant refurbishments, waste management facilities, as well as power reactor operator licence renewal hearings such as this one.

Strong regulatory oversight and public scrutiny are good for workers' health and safety, good for public safety and good for the environment. Processes like this one are valuable tools in ensuring the best

interests of the public are assessed and acted upon appropriately.

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

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

If there is a risk to environmental safety or if there is a risk to the public, it's a risk to workers first, and we also live in the communities with our families. We will not do anything to harm the safety of our communities.

The views of the workers, we suggest, are very important in ensuring the public that our nuclear facilities are in fact the most highly regulated industrial workplaces in Canada, and the industry's safety record is exemplary.

There is an obvious convergence of safety interest between the industry's employees and the general public. The PWU believes that uncompromising approaches to workers' safety sets the table for public and

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

Over the years, we have worked with OPG to create mechanisms and forums to address and improve workplace safety issues and address our concerns.

There are a number of legislative requirements for health and safety in the workplace. We have negotiated additional rights for health and safety in our collective agreements.

PWU representatives participate fully on a number of local and corporate level committees that you can see on the slide overhead. We also have a number of other health and safety related agreements that we've negotiated.

Our written submission details outline the legal and negotiated forums that are currently in place. This is a very mature relationship and we are continuously looking to improve our joint approaches to health and safety because when OPG and the Power Workers work together with common purpose, we get results. We've proven that time and time again. We are all encouraged to report even minor incidents, so that we can learn from them.

There are several ways for workers to

address any concerns they may have regarding occupational safety, starting with direct communication with their supervisors. And that is always encouraged, first and foremost, is to communicate concerns with your supervisor.

Filing Station Condition Reports, or SCRs;  
access to joint health and safety committee members;  
access to stewards; access to chief stewards; the right to refuse unsafe work; and we have negotiated the unilateral right to shut down unsafe work.

We have a very active Joint Health and Safety Committee at Pickering and I thank them for that. I believe all PWU members at Pickering thank you for that.

The PWU has negotiated agreements that all of our Joint Health and Safety Committee representatives will receive certification training. The law in Ontario requires somebody to be certified. We require that they all be certified.

Further to that, we have developed our own three-level health and safety accreditation training. That's a program that we give to all Joint Health and Safety Committee members and to chief stewards. And we've also developed the module for stewards on health and safety.

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

Further to that, we invest our members' money in additional health and safety training that I just mentioned.

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

As I said before, we believe that if workers are safe on the workplace, then the community and the public are also safe.

I will now turn the presentation over to our Health & Safety Staff Officer, Dave Trumble.

**MR. TRUMBLE:** Dave Trumble, PWU Staff Officer, for the record.

I have been working with the Joint Health and Safety Committee at Pickering nuclear power plant in regards to the asbestos issue.

As you are aware, the Minister of Labour has also been involved and I believe that we have been making headway. There are some issues that still require attention.

The PWU believes that asbestos issues are likely to be an ongoing issue due to the age of the facility. OPG is working through these issues with the Joint Health and Safety Committee and this will assist

greatly in safe outcomes for plant personnel, if done in a collaborative manner.

The PWU is committed to working with OPG to ensure that the proper barriers and procedures are put in place to ensure that workers are not exposed to asbestos as we go forward.

I'll now turn the presentation back over to Bob.

**MR. WALKER:** With the end of Pickering's operating life currently scheduled for around 2020, we need to ensure there are sufficient qualified staff to safely operate and maintain the plant right through to the very last day to identify all the issues, and this is a very complicated process. Imagine keeping up six reactors fully staffed right to the very last day at the same time as maintaining four reactors down the road fully staffed throughout this whole thing is very complicated.

So to identify all of the issues, the Power Worker's Union and OPG have initiated discussions to look at a long-term staffing plan for OPG's nuclear fleet; in fact, rolling the staffing plan into the non-nuclear fleet as well. And we look forward to continuing this open and transparent dialogue.

On the presentation that we handed in and in our written submission, we had information about



Fukushima. On our first overhead, we said that we had a slide on Fukushima. We don't have one. We just realized that yesterday. So I'm going to read off what was going to be on our slide.

All the nuclear power plants in Canada have been assessed, as we've already heard, and that's everything from backup power systems to the ability of facilities to withstand credible events.

The Canadian Nuclear Safety Commission's Fukushima Task Force Report of October 2011 reported that all nuclear power plants in Canada are safe.

The International Atomic Energy Agency assessed Canada's response and the CNSC's response, and they said that it was prompt, robust, and comprehensive.

Industry preparations are well underway for beyond-design-basis events. So what happened in Japan was not foreseen. It was something that nobody really thought was going to happen. So it happens. We're not going to have a tidal wave in the Great Lakes but what if something happens that we haven't thought about?

So there's been a lot of work going into what happens if there is some event we have not foreseen.

A number of upgrades have been done just in case of that, and there's ongoing upgrades that are being implemented in outages right now: severe accident

management guides, procurement of equipment, equipment that's been stored offsite, training of personnel and drills. So that's all happening.

Not only do we feel confident that what OPG and Bruce Power are doing in Ontario is best for ourselves and the public. We believe that a response of the Canadian Nuclear Power Plant operators has been the best.

Effective and successful labour relations between Ontario Power Generation and the Power Workers' Union has been the track record for more than 60 years. The parties have developed unique processes to resolve issues. This is a very mature relationship.

OPG is a good corporate citizen, continues dialogue with the workplace parties as well as public leaders at the community, provincial and federal levels have proven successful, and we have every reason to believe this dialogue will continue to be as open and thoughtful into the future.

The economic benefits for the region are great. There are thousands of highly skilled, good paying jobs for the continued operation and maintenance of Pickering. It will help minimize our reliance on greenhouse gas emitting fossil fuels that generate electricity.

We, in the Power Workers' Union, base our

support for the Pickering Nuclear Power Plant operating licence renewals on the history of good operation of Pickering, and all the current nuclear power plants in Ontario. They have operated safely for over 40 years.

This is an excellent technology that has continuously improved without causing any significant detrimental effects to workers, the public or the environment. Safe, clean, reliable, affordable CO<sub>2</sub> emission-free electricity.

Pickering Nuclear Power Plant is owned by the people of Ontario, and I think that's very important for us to stress. We talk about the -- who benefits from this? The nuclear industry? Well, the nuclear industry in this case is Ontario Power Generation which is owned by the people of Ontario. Pickering is something the people of Ontario can be proud to own, in my opinion.

In conclusion, the PWU is in full support of the Ontario Power Generation/Pickering Nuclear Power Plant operating licences. We encourage the Commission to renew these licences.

We will be pleased to answer any questions that you may have. Thank you.

**THE CHAIRMAN:** Thank you.

Questions?

Dr. Barriault.

**MEMBER BARRIAULT:** You mention that -- in your presentation, that you wanted to maintain the plant fully staffed up to the last day of operation.

I guess it begs the question that: How will you make sure that you keep your best qualified people to that date?

Because I could visualize, over the last year, that some of these people may want to look at other opportunities.

Have you got a mechanism in place to look after this?

**MR. WALKER:** At this point, we started discussions with OPG in the last round of bargaining about a long-term staffing plan.

We haven't actually seen any movement. Some people have raised concerns about, you know, Pickering's going to cease its operating life in 2020, and there will be some jobs after that until 2021-22 but, you know, people see the writing on the wall, and some people have started to express interest in moving to Darlington sooner rather than later.

But, except for the little bit of rumblings, there's been no movement of staff. Everything is stable, the same as it's always been. The training programs are all there, the minimum complements all there,

the staffing numbers are all there.

There is a business transformation process going on right now where the staffing numbers across Ontario Power Generation are being reviewed but, other than that, everything is the same as it always was.

We did talk to OPG about making sure that things stay that way, right up to 2020 and beyond. OPG's benchmarking has shown that we need to start this discussion about five years out. Our opinion was five years out is much too close, five years is not long enough to manage a change this big so we've started that now. We've started preliminary discussions at the corporate level.

At the nuclear specific level, there's already been some workforce planning, looking at how many mechanics, control techs, operators do they have; the demographics, what does attrition look like? So that's all going on right now.

As of today, there are sufficient qualified staff, the training programs remain in place, everything is status quo. We're just worried about between now and 2020, making sure it stays that way.

**MEMBER BARRIAULT:** Does the CNSC care to comment on the management of the manpower at the plant?

**DR. RZENKOWSKI:** Yes, absolutely.

We would like to express a comment because, up to this point in time, we focussed predominately on fitness for service of systems, structure and components. This is, of course, absolutely necessary.

But on the top of that, we need human and organizational performance to be up to par to make sure that those components will be managed and operated safely.

I would ask Miguel Santini to describe the measures we put in place.

**MR. SANTINI:** Miguel Santini, for the record.

For the approaching end of life, as you know, we have a licence condition that tackles the organizational tightness towards that date, through the Sustainable Operation Plan.

So, of course, our goal is to ensure that OPG has adequate number of trained staff. These qualified staff -- the training of these qualified staff really takes quite a bit of time, especially the positions that require certification by CNSC staff.

So the plants have to be prepared in advance, have to be prepared in detail and those are the submissions that we are expecting from OPG with respect to the Sustainable Operation Plan.

To give more details on this area, I would

like Ms. Kathleen Heppell-Masys to expand.

**THE CHAIRMAN:** But can we -- I would like a little more precision in this rather than generality.

Getting to the end of life is a real concern because, with all good will, I don't know how you keep people until the last day, last minute, unless you promise them something good so they stick around.

So I want to understand what's -- whether staff has a red line that if you go below that in terms of staffing and competency we'll shut you down.

So, please, that's the kind of answer I would -- the kind of metrics I would like to hear about.

**DR. RZENKOWSKI:** There are two elements to -- we have to describe in response to this question.

The first one is a Sustainable Operation Plan which we put in place precisely to make sure that, between today and the end of commercial operation, all measures will be in place including an adequate staffing level of qualified staff.

The second element which is very important is, of course, the minimum shift complement and minimum shift complement not only in the main control room, but minimum shift complement required to operate all equipment which is present at the site.

So this is being in development as a part

of the Sustainable Operation Plan and, once again, I would ask Mr. Miguel Santini to describe the progress.

**MR. SANTINI:** Miguel Santini, for the record.

Perhaps OPG could explain this more in detail but OPG has experience already with power plants being shut down and there has been negotiations to keep the organization tied up until the end date with the unions in the past.

But, again, I would like to refer to -- because one of our concerns is to keep the sufficient number of qualified staff, I would like to refer the answer to Ms. Heppel-Masys, please.

**MS. HEPPELL-MASYS:** Kathleen Heppell-Masys, for the record.

So, in a nut-shell, CNSC staff is monitoring the organizational changes at OPG through regular meetings and updates from OPG. We're also monitoring the changes through the OPG charter. That's in their Management System Manual.

We're also monitoring the organizational changes through an annual report submitted by OPG that shows an updated organization chart including staffing numbers, all organizational changes -- in this case, for the past twelve months - and we continue with our



regulatory activities in that regard.

For example, we look at the hours of work violation. We look at the minimum staff complement, maintenance backlog, work schedule adjustments and so on.

Recently, the company also went through doing days-based maintenance -- they moved towards that model -- and we were very involved in monitoring those exercises -- the analysis and the validations -- from the minimum staff complement perspective.

And Dr. Rzenkowski spoke about how it does not only involve staff in the control room but also staff that are deployed elsewhere in the organization.

The directorate also is involved in the oversight of the training programs, so we make sure that those training have a systematic approach to training and, again, it's not only about staff that are involved in the control room, but across the organization.

So we are monitoring those things.

**THE CHAIRMAN:** Mr. Jammal?

**MR. JAMMAL:** Ramzi Jammal, for the record.

Just to summarize the discussion of my colleagues, two points: Number one is the safety will be maintained at that site at all times regardless of what phase they are in and, of course, staff will be evaluating to make sure that the critical operation elements of the

safety -- to maintain safety of that site is always maintained at all levels because, if it is not, it will be shut down in an orderly fashion.

Now, we had the experience with G-2, the shutdown of G-2, and then the plan. With respect to Pickering, has the time in order to put that plan in place.

But there is always a maintenance of safety, as you know at Day 0 or Day 1, will be maintained at all levels. So there will be no compromise to any critical position, depending on the type of operations or licenced activity that's being done.

**THE CHAIRMAN:** OPG?

**MR. JAGER:** Glenn Jager, for the record.

CNSC staff is correct. The plans that outline how we are to develop our plans to end of life for staffing are contained in our Sustainable Operations Plan.

It requires the development of detailed staffing plans out to 2020. They are, in turn, required to be provided to the CNSC, and I would expect they'd be very interested in seeing that.

I would ask Martin Tulett to describe in more detail how we're developing those plans and what that entails.

**MR. TULETT:** Martin Tulett, Deputy Vice-

President, for the record.

In addition to the discussion from the staff and CNSC and from the PWU, what I would add is that we do have experience with coal plant closure, and I think what we've learned there is that it's not important -- it's not enough just to have the right numbers, you need to have the staff engaged, right through to the very end. So you need the staff engaged, and you need to keep them engaged and doing useful work.

A lot of the things we've talked about in the last two days, with operating standby generators, putting ECI screens in, EM equipment, all those enhancements to the plant, all those things that make it run better, the staff know the importance of that, and that keeps them engaged in doing useful work.

So we will need to continue that, right through to 2020, and our intention is that the plant performance will get better towards 2020.

The other piece of keeping staff engaged is that they need to know exactly what their fate is.

So Mr. Walker referred to the genesis of engagement now, in talking with the PWU, where actually, as part of the sustainable operation plan, it calls for this year to start a 10-year staffing plan so that, looking beyond 2020, what are the projected staffing

numbers.

And as you can appreciate, it's not a Pickering issue, it's a fleet issue because, while the need in Pickering is going down, the need at Darlington refurbishment is going up.

So our intent this year is -- obviously, we started these discussions with our unions -- what we think the first right step is, is to look at the licence staff. It's a smaller population of staff, they're -- they need to be maintained to full complement, right until the end of 2020.

And so what we need to do with licence staff is develop 10-year plans for them, and so every single licence staff understands exactly what they are going to be doing in 2020: Are they retiring in role in Pickering? Are they staying on through the safe storage state? Are they going to Darlington refurbishment? Are they going into other areas of management?

So our goal is to start with the licence staff, get them understanding, you know, exactly what their fate is, because they're longer term in terms of producing licence staff -- it's at least eight years to produce them -- and then we'll work through all the other trades, to make sure that -- that all the trades have the same -- the same kind of future for them, in terms of

defining what their future role is.

**THE CHAIRMAN:** Okay, thanks.

Last word for you guys.

**MR. WALKER:** On the staffing, you're sure that's exactly what this is about.

The benchmarking might have showed five years was soon enough, but our biggest concern was making sure the people were engaged.

People are asking questions right now, so the big part of the discussions we're having with OPG is about when can we start telling people: How long is your job going to be at Pickering? How many people in 2020, '21, '22? Using Darlington refurbishment as a buffer, how many opportunities will be there, and when?

So what we're trying to do first is get the information that can be shared with OPG's employees, so that they can get a better sense of where their futures are going to be.

**MEMBER BARRIAULT:** What's the timeline for starting this process, if I can ask OPG?

**MR. TULETT:** Martin Tulett, for the record.

So it is in its early genesis now, but the intention is, by the end of this year, we'll have 10-year staffing plans in place.

**MEMBER BARRIAULT:** Thank you.

Thank you, Mr. Chair.

**THE CHAIRMAN:** Okay. Thank you.

Thank you very much.

I'd like to move to the next submission by the Canadian Nuclear Workers Council, as outlined in CMD 13-H2.86, and 2.86A, and I understand that Mr. Phorson will make the presentation?

**13-H2.86 / 13-H2.86A**

**Oral presentation by**

**Howard Phorson**

**MR. PHORSON:** Well, my notes say, "Good morning," but I guess we're late. Good afternoon, Mr. President and Members of the Commission.

My name's Howard Phorson. I'm an executive member of the Canadian Nuclear Workers Council. I'm also an elected representative of the Power Workers' Union, and have been employed in the nuclear industry for 35 years. I'm currently authorized as an ANO at Bruce Power.

Accompanying me today is Joanne Usher. Joanne is also an executive member of the Canadian Nuclear Workers Council, and she will further introduce herself during her portion of our presentation today.

Our president, David Shier, sends his

regrets.

Who we are. We're a council of unions involved in Canada's nuclear industry. Our member unions are spread across five of the provinces. Our main goal is to ensure that the voice of unionized nuclear workers is heard in the on-going nuclear debate and, in particular, at these hearings. We represent approximately 20,000 unionized nuclear workers under the Canadian Nuclear Workers Council umbrella. We're going to talk about the Canadian Nuclear Workers Council member unions' support on this issue.

Our executive members' perspective, a general union perspective, and the social-economic effects we'll finish up with.

Have I missed a few? There we go.

All of our member unions are in full support of the Pickering licence renewal. The Canadian Nuclear Workers Council believes that the continued safe operation of this facility is good for the environment, good for the local economy, good for Ontario and good for Canada.

I'm going to turn this over to Joanne Usher.

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

My name is Joanne Usher. I am an executive member of the Canadian Nuclear Workers Council, a member of Women in Nuclear, and executive member of Durham Region Labour Council, and a steward for the Power Workers' Union.

I currently work at OPG at Pickering, NGS. I have been employed by OPG for close to 25 years, and have worked at several of its locations in Durham Region through the years, starting at Darlington and, since 1996, I've been employed at Pickering in the plant.

I'm an active shop floor steward for the Power Workers' Union at the Pickering site. As a steward, on a day-to-day basis, I relate to and work with many of OPG's employees. I'm very proud of what our Union, along with my employer, has accomplished in promoting a safe workplace and, consequently, a safe, clean environment for our neighbours.

All workers at the Pickering Nuclear Power Plant site have access to our joint health and safety committee members and unionized representatives to have any of their concerns addressed.

The legal and bargained rights for health and safety ensures that I and my fellow workers have an excellent safety culture.

I have a vested interest in the region as



my family, including children and grandchildren, live and work in close proximity between Pickering and Darlington. I also have a daughter who's a highly-trained and experienced woman, who works at Pickering Nuclear Generating Station as well. She fully supports this application.

As a younger person, she sees the future potential that the nuclear industry offers in social and economic benefits to the community. She recognizes first-hand the high quality, safe and high-paying, full-time jobs that brings money into the local economy.

As an executive member of Durham Region Labour Council, I promote OPG initiatives in the area of safety, job and energy production. As a labour activist for many years in this community, I've gotten to know many people, both inside and outside of the nuclear industry, and I have had many conversations about the safe operation of the plants and how imperative it is for the workers, the safety of all residents, and the overall health of Ontario residents.

I personally believe that the nuclear industry is one of the safest, if not the safest industry in the world to work in.

I became involved with the Canadian Nuclear Workers Council to communicate and inform the public from

a worker's perspective, my thoughts about working in the nuclear industry and its benefits.

Being a member of Durham Region Labour Council is a resource I use as a unionized worker to communicate and provide information to facilitate and better inform public about nuclear safety.

On a regular basis, I'm asked questions by community members about nuclear power, what it is like to work in the industry and how safe I feel as a worker. From my experience, once people are more aware of the facts in regards to a nuclear facility, they get answers to their questions then they become supporters.

I suggest that as well as my family and neighbours, that a high majority of local residents are in full support of OPG and this submission. Speaking on behalf of the CNWC, I therefore fully support these submissions for the relicensing of Pickering NGS.

Howard?

**MR. PHORSON:** Okay, so labour councils are organizations that consist of representatives from unions in a geographical area. Labour councils are community activists and are active on a wide variety of local issues in their communities and across the region. Labour councils, in a variety of host communities, have affiliated with our Canadian Nuclear Workers Council.

The Durham Region Labour Council is the host labour council for Pickering. They have reviewed our submission and are in full support. And I'll read you quickly their letter:

"The Durham Region Labour Council serves as a forum to advocate workers' rights and to better quality for life of workers in their communities. The Power Workers' Union, the union that represents the workers at the OPG's Pickering Nuclear Generating Station, is an active member of the labour council in Durham.

The PW representatives keep our executive and membership informed of this use regarding the current facility as well as on the Canadian Nuclear Workers Council and the Power Workers' Union's submissions in support of the CNSC hearings on the above issues.

Several of our labour council executive members have toured the Pickering and Darlington Nuclear Generating Stations and were impressed

by the facility with the safety standards and professionalism displayed by the workers.

We, the Durham Region Labour Council, support the above issues as it will continue to provide high-quality employment, additional employment and support the economic prosperity in Pickering-Durham region. We strongly support the PWU and Canadian Nuclear Workers Council position that this proposed project will have no significant adverse effects on the environment of Durham Region and beyond.

And that's in solidarity, Jim Freeman, President, Durham Region Labour Council."

This one -- wrong button is bad for me.

Several of our member unions are affiliated with the industrial global union based in Geneva, Switzerland.

And in conclusion, we are in support of the renewal of the operating licence of Pickering for the following reasons: It has minimal environmental impact,

many respected environmentalists are now in support of nuclear power, it emits no appreciable greenhouse gases and the continued safe operation of the plant is great for the local and Ontario economy, and this is good for Canada.

Thank you. And questions.

**THE CHAIRMAN:** Thank you.

Question?

Monsieur Tolgyesi?

**MEMBER TOLGYESI:** Yes. Could you tell us what was union's representatives' involvement in post-Fukushima site evaluation and eventual improvements?

**MR. PHORSON:** I'd have to ask somebody from Pickering that question, but I know at Bruce, certified staff were involved in both the procedural aspects and similar aspects, post-Fukushima.

**MR. JAGER:** Glenn Jager, for the record.

Many of our staff right across the nuclear line of business has been involved in the development of the Fukushima Action Plan and certainly the details of the response.

I'll ask Mr. Mark Elliott to comment on development of all those actions.

**MR. ELLIOTT:** Mark Elliott, for the record.

When we turn the techniques into actual

procedures, we needed the frontline people that execute these procedures to be not only involved, but actually they write them.

So authorized nuclear operators, such as Mr. Phorson, in our plant, are the ones that actually write the procedures that we use. And so that's -- their involvement is critical.

**MR. JAGER:** Glenn Jager, for the record.

And just one -- I'd just like to ask Mr. Jim Coles to perhaps elaborate on the emergency response personnel involvement in the EME equipment that has been brought on site and now deployed.

**MR. COLES:** Good afternoon, Jim Cole; Director of Emergency Management and Fire Protection.

With regards to the deployment of emergency mitigating equipment, we have at the Pickering station approximately 50 field staff spread over five crews that are participating in training and drills and exercises and developing the plans to effectively deploy this equipment in the most time-effective manner possible.

We exercise those plans, test them and make adjustments to the plans as necessary based on the lessons learned from those drills and practices.

We're using those very plans later in August at -- sorry, in October -- sorry, September, at

Pickering this year and August at Darlington, to again validate that our equipment can be deployed in a timely manner to restore cooling to the boilers in an extended loss of power scenario like Fukushima.

**THE CHAIRMAN:** Mr. Tolgyesi? Anybody else?

I have a question, Ms. Usher, you mentioned that you were sort of an activist in the community. I think we heard -- I don't remember when, was it yesterday -- from the Women of Ontario with a very different view.

How would you explain -- what would you say to the Women of Ontario? I don't know if you heard the presentation.

**MS. USHER:** Unfortunately -- sorry, Joanne Usher, for the record.

Unfortunately no, I did not hear it. My comment to them would be to educate their selves because I don't know of this group in particular that you're speaking with, but -- or speaking that were here, but I would think that -- I know there's been a few women's groups that are negative, but I think it's all about learning.

A lot of people have fear until they're educated about nuclear power. So that's my advice.

**THE CHAIRMAN:** Okay, thank you.

Any last comment? Thank you.

I'd like to move on to the next submission, which is an oral presentation for Ms. Gasser, as outlined in CMD 13-H2.73.

Ms. Gasser, the floor is yours.

**13-H2.73**

**Oral presentation by**

**Linda Gasser**

**MS. GASSER:** Good afternoon, Chair Binder, Commissioners, ladies and gentlemen.

My name is Linda Gasser, I live in Whitby. I'm not an expert on nuclear power generation or safety issues or emergency planning issues, I'm addressing you as a concerned resident of Whitby who lives within 20 kilometres of two nuclear plants.

I wish to focus on two aspects of my written submission. And the first is on some of the economics of extending the operation of Pickering beyond its design life. And the second is are emergency planners at all levels charged with responding to nuclear emergencies ready to respond in the event of a catastrophic nuclear event requiring evacuation.

So on the economics issues, and this is very brief by necessity.



Ontario has had an electricity surplus since before the 2008 recession. And this continues, though Ontarians are energy hogs, using 27 percent more power per capita than people in New York State, which is a comparable jurisdiction.

This surplus has driven down the market price of power to rock bottom prices. Right now, it's +/- 2.5 cents per kilowatt hour, with Ontario sometimes paying other jurisdictions to take surplus power at times.

Ratepayers pay by means of a global adjustment. And this is driven mostly by the cost of nuclear and natural gas generation.

Ontario's current and projected median term surplus would allow for an orderly transition from expensive, inflexible and risky nuclear power generation to more flexible and safer options that would also incent energy conservation measures. If we run short it would still be far cheaper and less risky to import power from Quebec.

According to the Ontario Clean Air Alliance, the cost of nuclear generation for the Darlington refurb will be in the range of 19 cents to 37 cents per kilowatt hour. How much more expensive will this be at Pickering if OPG devotes resources with all the excessive risk associated with keeping a decrepit facility

operating beyond its design life, and all this at a time when the power is not needed.

The Ontario Clean Air Alliance estimates that Ontario could save \$850 million per year or approximately 5 percent of power costs on electricity bills by shutting down Pickering A.

With power bills in Ontario projected to increase by 50 percent within five years, this is important to ratepayers and industry and our entire economy.

In my opinion, now would be a really good time for OPG to prove that they would be capable of safely decommissioning and dismantling a nuclear generating station. OPG could benefit from the concurrent outside assistance from Hydro Quebec who has wisely decided to decommission the facility at Gentilly-2 for reasons that I believe would more than apply to Pickering.

The huge investments/subsidy that Ontarians have made and high cost OPG operations must be made to pay off in a way that benefits the greater good.

Pickering staff could be transitioned to accelerated decommissioning activities thus lessening the potential negative economic impacts to that community. And here it's the topic of job losses that is of most concern to the OPG workers and to many of the politicians

in Durham Region.

Conversely, there could be much upside as the community and the associated stigma of being a nuclear community is removed.

The Canadian Coalition for Nuclear Responsibility, in a paper dated January 2013, discusses the jobs and business opportunities associated with dismantling Gentilly-2. And I provide the link in my submission.

We have to keep in mind that by current standards it's highly unlikely that nuclear plant would be approved where Pickering is sited today because of its proximity to a large population centre.

A September 2011 study by the Centre for Spatial Economics which was commissioned by Greenpeace, provides an analysis of the staggering economic losses that an accident requiring evacuation for periods of a year or more would cause, and these dwarf the measly 75 million cap under current nuclear liability legislation.

To cite just one statistic; a nuclear accident requiring a one-year evacuation from the 20 kilometre zone of Pickering would affect approximately 1.3 million people who earn a combined income of approximately \$44 billion whose property values total approximately \$178 billion and such an incident would prevent \$56 billion of

annual economic production. So that's just within the 20 kilometre zone.

These costs exclude the potential impacts to water supplies. Now, consider that those directly impacted would also not be in a position to pay income taxes or property taxes or purchase a whole lot of anything, imagine the impacts on regional and even national trade; impacts on tourism. All of this will affect a lot more people than those who would be directly impacted by an accident at Pickering.

So which governments currently have the ability to absorb the enormous costs associated with this level of nuclear emergency?

I believe the onus is on OPG to provide relevant empirical evidence that OPG could operate safely beyond its design life. The CNSC Commissioners must deny any licence in absence of such evidence and that should be independent evidence. I also believe the *Nuclear Liability Act* must be revised with all nuclear owner/operators, including OPG, to be financially liable before any further licence is granted by the CNSC, and that includes these licences that Pickering is seeking.

On the topic of emergency planning, when I addressed the Commissioners last December at the hearings on the Darlington refurb, among my many concerns was the

state of nuclear emergency planning at all levels of government, including Durham Region and local municipal nuclear emergency plans. We have two nuclear host communities in Durham.

I have since raised these concerns at the January 2013 meeting of Durham's Nuclear Health Committee, at which members of the CNSC, Emergency Management Ontario, OPG and Durham's Emergency Management Organizations spoke.

They spoke about their various emergency plans and I circulated my comments to Pickering and Clarington councils as well. I have to say that little of what I heard at that meeting or since provide the assurance to someone like me who lives within 20 kilometres of two nuclear plants in terms of what I hoped to hear about the state of preparedness of these various governments and their organizations.

There are plenty of forward-looking statements but few assurances that the reviews of the emergency plans at all levels of government that would be involved in a nuclear emergency have been revised to address a full-scale emergency requiring an evacuation such as one beyond the 10 kilometre zone.

Now, in the meantime, I just learned today about a letter that Canadian Environmental Law

Association, Durham Nuclear Awareness and Greenpeace have written to the Ministry of Community Safety at the Ontario government. And if I may, I'll just read you a very short paragraph.

"Ontario Power Generation recently released a revised risk assessment for the Pickering B Nuclear Generating Station that shows it is highly vulnerable to large accidental radiation releases. These are accidents that could require the long-term abandonment of land. Added to this new understanding of the station's risk, the Emergency Management, Ontario's current outdated 2009 Emergency Preparedness Requirements have yet to be implemented -- sorry, have yet to be fully implemented in the case of the Pickering nuclear generating station."

I mean it's unbelievable that we're sitting here talking about a licence for a plant where this situation exists and where the plans are not yet updated.

I urge the Commissioners to review the January 18, 2013 Durham Nuclear Health Committee minutes,

as well as those of April 19<sup>th</sup>. I could not attend the April meeting but after reading the minutes and the presentation from the head of the Co-ordination and Operations Preparedness Section Nuclear Emergency Preparedness and Response Division, and comparing that with what I heard from CNSC staff in terms of federal emergency plans, I have to say I'm a little more confused as to who does what.

Durham's Emergency Response Organization has a new director. I haven't met him. I don't know who it is.

**THE CHAIRMAN:** Excuse me, where you not around for the full presentation by EMO and the Durham that we dealt with the last two days?

**MS. GASSER:** I haven't. I just showed up this afternoon, I haven't been at the hearings.

**THE CHAIRMAN:** I suggest that you maybe review the webcast. We discuss it at length. And EMO tabled their plan as of now so I don't want to restart discussing the same thing over and over and over again.

**MS. GASSER:** Okay I would have, of course, no way of knowing that.

**THE CHAIRMAN:** So please wind up.

**MS. GASSER:** I will review that.

So let me just make a few comments

about what -- I don't know if anything has changed since January, but at that time there was a comment that struck me.

Durham, the DEMO organization has five staff in total maybe that's changed now. But in January they said that they have one person that's on call 24/7, one person. What happens if a nuclear emergency happens outside business hours? Is this a sufficiently robust plan that you have one person on call. If that's changed I'll find that out by reviewing those transcripts.

There are huge costs associated with emergency planning and preparedness that must be recognized as being part of the high cost of nuclear power generation and the regulator must ensure that there are sufficient emergency plans at all levels and that those must be made public and, in fact, the public must be able to comment on these.

The Canadian Environmental Law Association and others have repeatedly highlighted the shortcomings with nuclear emergency planning in Ontario. They have provided the CNSC with details and they have appeared at the Durham Nuclear Health Committee as well.

In closing, the economics of Pickering don't justify continued operation and, until such time as there is independent verifiable information that would



prove that it's safe to operate Pickering, no licence should be granted.

Furthermore, until all levels of government update emergency plans to address a large scale nuclear accident requiring mass evacuation, you must deny any licence to any nuclear facility.

Thank you.

**THE CHAIRMAN:** Thank you.

Anybody? Question? Any questions?

Monsieur Harvey?

**MEMBER HARVEY:** Merci, monsieur le president.

Mrs. Gasser was giving some -- gave us some figure in the case of a large evacuation should that happen. And for sure if such event happens that there will be costs and maybe could even be catastrophic.

So the answer to that is that must not occur. I mean the occurrence is not acceptable. So I would ask the staff what is the nature of the guarantee that it will not happen?

**DR. RZENTKOWSKI:** Greg Rzentkoski, for the record.

On one hand, we are trying to lower the probability of any radiological releases to as low as practicable. And I think at this point we estimated the

large release frequency for the Pickering station to be between 1 in 100 thousand years and 1 in 1 million years.

But you see we don't stop there because the main lesson learned from Fukushima is that no matter how low the probability of an accident is, we have to be prepared for an accident. We have to be prepared to mitigate the consequences of this accident.

So mitigation includes actions at the sites because those actions can help to halt the progression an accident and mitigate releases.

Another aspect of course is off-site emergency preparedness. And we also put a lot of emphasis on making sure that roles and responsibilities are very well understood and that we have a very cohesive plan, almost seamless transition from the actions at the site to the actions off site. We discussed this yesterday and we can repeat the key points if you wish.

**MEMBER HARVEY:** With the same details, I mean, we have the details of the discussion we had on that subject but I just wanted to have a -- but I think your answer is okay for me.

**DR. RZENTKOWSKI:** Thank you, and I just want -- in one sentence I would like to summarize.

It's not only about the prevention anymore; it's about prevention and mitigation. A lot of effort

goes in this direction.

**THE CHAIRMAN:** Anybody else question? Dr. McDill?

**MEMBER McDILL:** Thank you.

I wonder if I could ask -- we received the agenda. Did you not look to the agenda to see if there might be a response on Day Two to emergency management?

**MS. GASSER:** I looked at the agenda but I wasn't able to view the proceedings.

**MEMBER McDILL:** You mean the items in the agenda or the contents of the items?

**MS. GASSER:** I wasn't able to view the proceedings over the last day and a half. I just am attending this afternoon.

**THE CHAIRMAN:** Okay. Thank you.

Anything else you want to say? Final words?

**MS. GASSER:** My final words are, there are limits to our scientific knowledge. I think precaution must prevail and I think that the Commissioners must keep in mind that safety -- public safety must be their priority.

Thank you.

**THE CHAIRMAN:** Thank you.

I'd like to move on to the next submission

by the Ontario Chapter of Voice of Women for Peace, as outlined in CMD 13-H2.74, and I understand that Ms. Adamson will make the presentation?

Please go head.

**13-H2.74**

**Oral presentation by the  
Ontario Chapter - Voice  
of Women for Peace**

**MS. ADAMSON:** Thank you.

I am speaking today on behalf of the Canadian Voice of Women for Peace. I am the Co-Chair of the national board and I am on the provincial chapter as well, and we have worked since 1960 on behalf of peace and environment sustainability.

And this is about the future for our communities, for our children, and so we have a lot of concerns about the Pickering Nuclear Plant and the plan to extend -- extend its operation.

We have concerns about the routine operation of the plant, the effect that tritium has in our drinking water and the impact on fish and wildlife in the lake due to the water intake, the volume of the water intake, the speed of the intake and the impact that has.

So that's just the routine operation as having a negative impact we see on the environment that we live in and that we depend on for our health.

We are very concerned about the lack of safe storage for nuclear wastes being created by the operation of the nuclear plant. We just don't understand how we can go on operating nuclear plants when we have no safe place to store these for the millennia that they need to be kept away from the environment.

And the cost of this is being passed on to our children, both the environmental and the economic costs, because we can't take care of that. And if you were to factor in that cost, I think you would find that nuclear plants are extremely uneconomic.

We are very concerned about the potential for extreme harm from a nuclear accident, which we have seen these in Three Mile Island, Chernobyl and Fukushima, and these do happen.

Despite the low risks that you're projecting and the high confidence level that you were speaking of this morning, there still is a risk. You cannot get rid of that risk that exists.

And the impacts that have been outlined by previous speakers, I don't need to go into them in detail, would be quite considerable on our population.

I myself live right in the centre of the city and I know there's no way that if there was an accident that I'd be able to get evacuation from the city. That just wouldn't be possible and apparently I can't also go to my local drugstore and get potassium iodide pills either.

So in the event that something did happen, which none of us want, and I know you're all doing your best to make sure that that would never happen.

However, the thing is that we don't need the nuclear. We don't need to take that risk. We know that renewable energy can meet the needs of -- of our energy needs, renewable energy and conservation, and we're not doing those sufficiently.

In my submission, I referenced the work of Mark Jacobson who has -- he's at Stanford University and has developed the plan to power 100 percent of the planetary needs with renewable energy within 20-40 years.

We really need to be phasing out nuclear and we, of course, don't want to replace it with fossil fuels. We are very concerned about greenhouse gases as well. That's not the way to go.

But we don't need to take the risk with nuclear because we can be investing our public dollars into renewables and moving forward that way.

Mark Jacobson has just recently done a complete plan for New York State which -- of renewables. So we know that that planning can be done. And my vision would be that you would say we don't need to extend the operation of the Pickering nuclear plant because we know that there are alternatives.

And there are jobs in alternatives. People are concerned about jobs but there are jobs in that. They just don't have a lobby for those jobs because we haven't developed very many of those jobs yet, but there's great potential for work in renewables.

And that's the kind of work we'd like to see our children and grandchildren being able to work in, something that's going to be safe for the future and sustainable. And so we need to plan for the long term and that's some of our considerations.

You have seen the decommissioning decision taken in Quebec with Gentilly-2 and we'd like to see that taken with the Pickering plant.

We don't see the reason to take the risks with, as people have called it, a geriatric plant. There's never been a plant that's operated that long with those components. So why would we take the risk when there are alternatives and the alternatives are much safer for everyone.

**THE CHAIRMAN:** Is that it? Are you finished? Just give us a hint.

**MS. ADAMSON:** Yes, I'm finished. Thank you.

**THE CHAIRMAN:** Okay. Thank you.

**MS. ADAMSON:** Thank you.

**THE CHAIRMAN:** Question? Question, anybody?

Okay, thank you. Thank you very much.

**MS. ADAMSON:** My personal question would be, when you figure in all the costs of nuclear waste disposal, of all the safety and all the precautions, and that we should be taking that aren't even taken in terms of emergency planning, how economic can nuclear power be? We're spending \$850 million a year that we don't need to spend.

So I'll just make that for my final word.

Thank you.

**THE CHAIRMAN:** Thank you.

**(SHORT PAUSE/COURTE PAUSE)**

**THE CHAIRMAN:** Okay, we'll move to the next submission by the Canadian Environmental Law Association, as outlined in CMD 13-H2.132 and 132A. And I understand Ms. McClenaghan will make the presentation. Please proceed.



13-H2.132 / 13-H2.132A

Oral presentation by  
Canadian Environmental  
Law Association

**MS. McCLENAGHAN:** I'll just provide highlights of my presentation, which is lengthy, as was the report.

The first thing that I'll just pause to mention is that what we did for this hearing is build on the work that we had done in the Darlington hearing around emergency planning, and we specifically applied to the Participant Funding Panel for funding to systematically research and compile the international, national, provincial, municipal standards on emergency planning, and the planning documents.

We have compiled them, indexed them. They'll be catalogued in our resource library available to the public, and they're both electronically and physically, which I think will provide a service, because it was actually very difficult to find all of the documents, and we're still in the process of pulling some of them together, for a variety of reason, but we have, by and large, almost all of them.

In terms of the decision that we urge you to make in this application, we think that the CNSC should deny the requested licence to operate the plants beyond 2014.

The reasons include the lack of sufficiency in emergency preparedness, the focus of my presentation today, the incomplete information base for this decision, and, as I will say, that you should not defer the decision to staff, the hold points, and so on, the increased risks from the ageing station, and the unacceptability of those risks in the population base we have at Pickering at this point.

First, I want to pause on the question of your authority over emergency planning and, to echo recommendations that you've heard before by the Fukushima task force that you convened, and by the IRRS report.

And what I would say is that -- I'll review those further, but even now, without further regulatory amendment, in terms of emergency planning you do have authority under your Act today to impose terms and conditions in respect of emergency planning and preparedness as a condition of licensing this nuclear plant, and I have some specific suggestions on that.

So I won't go through those statutory sections in the interest of time, but I will talk about

the Fukushima task force report and the IRRS report. They did say that they found there was a lack of specific regulatory oversight, called it a "gap". I would agree.

I looked at the current documents and they were too high-level for me to provide any kind of a baseline to evaluate the existing plans against. They said things like, "You should have a plan", basically.

In terms of the next point, why does emergency planning matter. This is outlined in one of the international documents, the International Commission on Radiological Protection, Publication 109 -- a very useful outline of what matters, why do we worry about emergency planning following a nuclear accident; and the reason is because of the types of emissions following an accident.

So initially they said:

"...relatively high dose rate with inhalation of short-lived beta gamma emitters, followed by days or weeks when Iodine 131 dominates the exposure."

Of course, we also know that's important early.

"...and then external irradiation from contamination deposited in the environment and ingestion from food

and milk."

So these are -- and further details are provided in our submission as well, summarizing the authorities on this point.

So these are the reasons we worry about emergency planning. If the unthinkable happened, and we had a very severe accident, catastrophic-level accident, we want to be able to reduce these kinds of exposures and avoid the health effects that would result.

Now, how are we situated here in Ontario today is one of the things I was evaluating, specifically with respect to Pickering and the fact that we're looking at licensing a plant that, according to the documentation, is at the end of its design -- expected design life.

I've heard the arguments that it was a business case. That's the first time I've heard that. Prior to today it was described in the CMDs as "the original anticipated design life of the station".

It's an ageing station. I have very serious concerns about that, despite everything I've heard at this hearing.

So how are we prepared today? With respect to alerting, you've heard much about that at different hearings and presentations.

I'm highly concerned that it's taken until

just now for the 3 kilometre zone to be in place, and that the 10 kilometre zone is only just becoming established and being tested, as I heard the testimony yesterday.

This plant has been operating for 40 years. It's not new news that we need to do alerting, and there were provisions, both in the U.S. standards in the 1980s, and in Ontario safety reviews in the 1980s, that we needed to have robust alerting around the plants.

In terms of potassium iodide, the concern there, as you've heard and as was confirmed by the health witness yesterday, and is confirmed in Health Canada's documents, is that it must be ingested early, preferably before an accident.

It still is effective right at the onset of an accident; it reduces its effectiveness very rapidly after the onset of an emission.

So we are calling on the Commission to require OPG, as a condition of licence, so long as the Pickering plants are operating, to work with the municipalities to ensure 100 percent predistribution of potassium iodide to residents, all residents, in the 10 kilometre zone around Pickering, both within the Region of Durham and within the City of Toronto.

Now, I have further detail in my presentation and my report about -- the plan in Toronto is

more vague, it's not as clear, in my opinion, to the residents of Toronto, that they can go to those pharmacies and get the potassium iodide. We've heard from some residents that they've had contradictory information.

All that being said, you may remember, Mr. Chairman, that in Ottawa, at the IAEA Regulators Conference, the representative from France indicated that they had initially tried a similar approach where they issued coupons, and there was very little uptake. They did a survey; they found out that there was very little uptake. So they actually took the step of mailing potassium iodide to all households who had not obtained it, to ensure 100 percent coverage.

The fact that potassium iodide has not be predistributed is also unique to Ontario, and the earlier reports, the Fukushima task force report noted that the current approach of stocking at the pharmacies, in terms of predistribution, "has not been confirmed". I assume they mean in terms of effectiveness.

Another protective measure that's mentioned is sheltering. I have a significant concern about the communications with respect to sheltering, because when I was reviewing the documents -- I had questions, you might remember, at the Darlington hearing about whether sheltering was effective. It was one of the things that I

suggested in my comments that the CNSC should inquire into. It wasn't something that was discussed or explored there.

It turns out that it is actually discussed in the international guidance materials, and it's discussed unequivocally.

Sheltering, in the normal type of house that North Americans and Europeans occupy, is not effective. The only point of sheltering in that kind of a residence is to go inside and listen to the radio about what to do next.

So I think it's quite important that this type of communication be issued, because what it means is that evacuation is the necessary step to take if we do have a large-release emission, either happening or imminent.

I should add, there are some kinds of shelter that are effective, according to the documents; you have to have concrete structures; go in the middle of the building where there are no windows. There is guidance in one of the emergency plans to go to a basement -- you know, turn off air conditioning, that's all well and good, but it says that the metal and wood structures that we typically have -- North Americans and Europeans occupying are not effective. And, in any event, nothing's

effective if it's not airtight.

Medical treatment and availability is something that I was unable to evaluate in terms of our state of readiness. Obviously this would be an extremely high concern. However it would appear that the province's radiation health response plan which is one of the implementing plans under the province's 2009 emergency plan is not yet ready. I'm advised that it should be ready -- well, actually, we were advised it was supposed to be early this year, but it hasn't been ready yet and so I haven't been able to be provided with it by the authorities.

However this is a significant concern because that means that today, if the question is what is our state of readiness, I would submit to you that if the plan is not ready, then we're not very ready in that respect.

In terms of size of emergency planning zones, we have a recommendation that, given the experience for example at Fukushima, where the authorities extended the evacuation zone to 30 kilometres five days after the onset, that we should be revisiting, what are the sizes of our protective zones in Ontario.

We're suggesting that we should be looking at the 10 kilometre primary zone extending to 30



kilometres and the 50 kilometre secondary zone extending to 100 kilometres.

So evacuation, as I indicated, is one of the most critical things to be able to do. It has to be able to be done well. It has to be able to be done quickly to actually avoid the exposures that happen early in an accident if there's a release occurring.

This is supported by all of the guidance materials in terms of why do you evacuate. If there's a release occurring, this is not just a precautionary measure, this is a real health averting measure to take.

So the Pickering A safety report noted that within 50 kilometres of Pickering, we have almost all of Metro Toronto, York, Durham, and 10 years ago, within 40 kilometres we had 3.2 million people. Within the 10 kilometre primary zone, we have -- presently, we have over 250,000 people.

So what I'll talk about there is that there are a few discrepancies in the evidence before you. The evacuation time set out in the Durham Region Nuclear Emergency Evacuation Plan, Annex B, which is 2008, is the most thorough that I've seen. It has the various sectors mapped. It talks about all of the different types of residents, institutions, schools, childcare facilities in each of those sectors.

It -- it covers the various scenarios at different times of the year, different weather conditions, different times of day, and in the worst case scenarios, you can have maximums, depending on the scenario between 4.77 hours and up to almost 37 hours in one scenario and many scenarios exceed 20 hours.

Now, OPG talked today or yesterday rather, about their 2008 report done for the Pickering B refurbishment and I was quite disappointed that they did not mention, as the CNSC staff mentioned in their CMD for this hearing, that the CNSC obtained a peer review of that report because there's such a big discrepancy between their numbers and the Durham numbers that I just gave you.

The CNSC peer review revised the OPG estimates to what's on this screen, conservative estimate to evacuate in less than 13.5 hours.

Now, I'm not clear from quite closely evaluating these various evaluations of evacuation times, to what degree non-car owning residents were included in the OPG or CNSC peer review calculations. I'm not saying they weren't, it's just it's not transparent in those documents whether they were or not.

So the ability of people without cars to evacuate is a very significant concern. It's an explicit requirement in the U.S. NRC outline of how to do

transportation evacuation time estimates and they're very clear about things like, look at the number of unsupervised latch key children, look at the families with one vehicle at work that might not be able to return, look at those who have limitations on driving and so on.

They talk about the number of bus runs necessary for people with no transportation and what I'd like to see is -- is clear evidence that that kind of calculation has been done here for the residents of Durham and the residents of Toronto.

It's also apparent -- I shouldn't say apparent, but unclear whether the evacuation logistics have been fully worked out. I think I heard yesterday that they're expected at the end of the year.

I was provided yesterday with a 2008 plan from Durham, that's still titled as draft for their part.

So this issue of evacuation, it's central to an emergency plan and it still has a lot of question marks about whether the evaluation has been thorough enough and whether the planning for people without vehicles is actually sufficiently in place yet.

The other thing that -- oh, I just dealt with that, okay.

The other thing I wanted to mention is that I haven't seen clear communication that the public is, for

the most part, expected to make their own arrangements in the event of evacuation and for those who cannot, then it's -- what is expected to be provided by the municipalities. The plans do say explicitly that they expect most people to stay with family and friends.

I have a concern about that. That might be what would routinely happen in other kinds of emergencies, but in a case where you have an entire community essentially evacuating, then the family and friends may also all be evacuating too and I don't think that's been contemplated in terms of the arrangements that have been put in place for accommodating people.

In terms of early release and evacuations, I have to say, as someone who's now attended these hearings a few times, I was quite alarmed to hear yesterday a definitive statement that there would be 18 hours before a release.

The premise for emergency planning has to be that maybe we don't have that time. Maybe we'll have an early release where containment has failed. Maybe we'll have some kind of an accident scenario where we can't wait and hold back the radionuclides and vent them in a controlled manner.

In terms of companion issue is this topic of shadow evacuation which has been mentioned in the plans

and it's received some recent attention by the U.S. Nuclear Regulatory Commission which had its general accounting office review the extent to which shadow evacuation had actually been explored and whether people were aware of what they would have to do beyond the zones that were specified for evacuation.

So in other words, people voluntarily leaving because there's a nuclear accident happening.

And what I would say about that is that if you think about the context here and the population density around Pickering, when you go 5 kilometres further from the 10 kilometre primary zone, you're about Brimley Avenue into Scarborough and 5 more kilometres, you're at Toronto's Woodbine Avenue and the Don Valley Parkway.

And I think it would be quite reasonable to assume that people will be voluntarily evacuating in even greater distances throughout at least the eastern side of the City of Toronto if there were a general emergency at Pickering.

And, even though there's a line in the plan that there's been some evacuation -- shadow evacuation calculated, I think it's far too limited in terms of what the communities would really be faced with in terms of people trying to leave.

So I have a recommendation there, which I

won't read out about doing better shadow evacuation and what that would mean for location of worker centres and reception centres and so on.

Family reunification receives extremely brief mention, as in a line that says "families would want to reunify" is what the plans say.

I think it's one of the most significant things families would be worried about. If school children need to be reunited with their parents, if people have to be reunited with residents who are in hospitals or long-term care facilities, there needs to be specific information exchanged with the community about how that is going to be enabled.

There are provisions for decontamination and what I'll pause on there is that we would suggest that the CNSC should include in the conditions, requests that OPG work with the City of Toronto, as well as Durham, although the City of Toronto plan is a little less explanatory about what self-contamination -- decontamination means, how to do this, a statement as to its effectiveness and in the outreach and education plans.

The Toronto plan specifically says because of the population numbers in Toronto, people on the whole would be expected to self-decontaminate.

Agricultural products is an extremely

important mechanism, of course, and what the IAEA safety guide says on this is that following the Chernobyl accident, radiation-induced thyroid cancers after that accident occurred mainly at distances more than 50 kilometres from the plant, and that was because of the fact that apparently there had been ineffective restriction on consumption of contaminated food and milk.

So I have several slides on this, but in terms of the recommendation here, we recommend that the CNSC request that the provincial plan expand its monitoring and ingestion-control zones to 100 kilometres - - right now it's at 50 kilometres, but I just read you the international guidance that said that Chernobyl exposure was mostly beyond 50 -- to ensure that the monitoring will be sufficient and that the appropriate directives can be provided, as appropriate, if they are contaminated.

**THE CHAIRMAN:** You know, we've been very lenient here, so you promised to actually do it in 10 minutes. We did read both the presentation and the report, so we would like to engage in some discussion.

**MS. McCLENAGHAN:** Yes, I'll quickly finish a couple of things I'd like to highlight.

Worker safety is one of the issues I had a concern about because of the fact that the Durham plan talks about volunteer emergency workers being able to

exceed the maximum exposure limits.

And so, as indicated, I had a concern about whether there's a procedure for explaining that to workers in advance and obtaining consent in advance. And I would reiterate to you the recommendations you received from the Fukushima task force and the IRRS with respect to review of your regulations in terms of worker exposure.

In terms of the drills, that's been mentioned a few times today, that there's a drill coming up in 2014. I have a concern that it's apparently been many years since there was a large-scale drill. This apparently will be the first one that's on the level of multi-unit, as I understand it, and it's still two and a half years after the Fukushima accident.

Finally, the last thing I'll speak about is community engagement and what I want to say about this is that these should not be decisions being made by the officials and then the community advised what's been decided in their best interests.

The community needs to be involved in making the decisions and the judgements about everything that has to do with emergency planning; from the size of the protection zones, how evacuation will work; all of the things I've just outlined.

And this needs to be done in advance of an



accident for the very good reasons outlined in the international guidance, in that if you don't have that advance discussion, then if there were to be a catastrophic accident, you spend a lot of time trying to justify your decisions with the community instead of getting on with responding to the emergency.

The end of the presentation has the decision that I previously indicated.

The CNSC should not allow further operation. In my opinion, the emergency readiness is not sufficient. In any event, it's especially not sufficient for an ageing plant going beyond its design life and we would suggest that you require a plan for an orderly closure and decommissioning instead.

Thank you.

**THE CHAIRMAN:** Okay, thank you.

**(APPLAUSE/APPLAUDISSEMENTS)**

**THE CHAIRMAN:** What I think I would -- what I think I'll -- what I think I'd like to do is break for about 15 minutes.

I would -- really would like the people from EMO and the Durham Emergency maybe to join the -- after the break, the question period and we can get into some of those discussion.

Thank you.

--- Upon recessing at 2:59 p.m./

L'audience est suspendue à 14h59

--- Upon resuming at 3:16 p.m./

L'audience est reprise à 15h16

**MR. LEBLANC:** So we will resume right now.  
So if you can get back to your seats please.

Thank you.

**THE CHAIRMAN:** Okay, we left after the presentation from CELA and I'd like to start the question with Ms. Velhsi.

**MEMBER VELSHI:** Thank you, Mr. President.

I'd like to start off by complimenting CELA for the work that you have done. I found this very comprehensive and a great resource for all the other folks to work with, so thank you for that.

And perhaps I'll start by asking each of the EMO and the Durham Emergency Management Organization first and then staff, and then third, OPG to tell us what have you done with this report and have you looked through the recommendations and what process do you have in mind to review and decide on what you want to do with the recommendations?

So we'll start off with EMO and Durham

Emergency Management, first, please.

**MR. KONTRA:** Thank you very much, Mr. Chair, for having us again. It's our pleasure to speak as we did yesterday.

Emergency Management Ontario, Tom Kontra, for the record.

We're going to lead off with a general statement and then we'll be prepared to follow on with details as necessary.

First of all, I'd like to echo Ms. Velshi. That presentation -- and it's not the first time we've seen it from CELA, we reviewed it beforehand. It is a comprehensive review, such as we would like to, and have done ourselves.

We continue to have a robust plan in place with the procedure to not only respond to events, but to continue to review anything that comes to our information that we may need to amend and update as time goes by.

The plans that we have are not only for specific incidences. They are for any event, large or small; whatever the cause, and it allows us the mechanism to make informed decisions to protect the public, as necessary, for the appropriate event.

I'd like to point out that while some discussions are easily saddled by things like the

Provincial Nuclear Emergency Response Plan as dated 2009 and, therefore, it's out of date.

We do not sit on the cumbersome mechanism of approvals for plans, we have continual committee work, continual exercises, events of various sizes that help us. We have excellent studies like the CELA one that help us review the plans in between the cumbersome method of producing a new official plan.

The people who respond in our emergency operation centres are going to respond with the benefit of those advices that we have been able to draw from events and studies and committee discussions amongst the various stakeholders and partners.

So I would like to assure all of us that these plans are living documents, that our continued concern to provide the best possible decision making for the safety of the people surrounding nuclear facilities continues.

And I think that's what we would like to start with and we are prepared to go into specific areas that you would like.

**MEMBER VELSHI:** I didn't want to get into the specifics now. I wanted to get a handle of your process and get some reassurance that you would -- you will actually be going through this systematically and

prioritizing them or saying these aren't relevant or we disagree or, you know, this is really good and necessary and need to do so now.

But give me some sense of what is your process for reviewing and assessing this report.

**MR. KONTRA:** Our process specifically now is to provide this report, as we've already done. I'm sorry, I'm not about to provide it. My nuclear planners have already had this report as soon as we received it from the Commission, and we are going to continue to review those reports.

And in our periodic discussions with our stakeholders, like Durham Region, the City of Toronto, Ontario Power Generation, we will be reviewing each one of them to see how we can adjust our plans to make sure that we have filled what we also identified as gaps.

**MEMBER VELSHI:** Okay. Let me hear from the other parties and I may come back to you.

So Durham Emergency Management, please.

**MR. LEONARD:** For the record, Warren Leonard.

We too reviewed the document once we received it in preparation for these hearings, but that was a fairly short period of time.

So on a go-forward basis, I'm sure we've

already had discussions and those discussions will continue about -- about the content of the report, try and look at it from a point of view of what sections in there are specific to Durham Region, what areas in there are our responsibility, what the perceptions are, are they correct or incorrect, and what can we do.

We've already had some sidebar conversations with the intervenor.

And in the various working groups and committees that we sit on with the province and with Emergency Management Ontario and the City of Toronto, I'm sure the elements of this report will be discussed.

**MEMBER VELSHI:** And is there a timeline that we could ask you to say, you know, by such and such a date we'll probably have a report that will say here's how we're handling all these recommendations?

**MR. LEONARD:** Warren Leonard, for the record.

I'm not sure of when our next Emergency Management Nuclear -- our Nuclear Emergency Management Coordinating Committee is going to sit, but certainly in our office it's a subject that we'll be discussing with our staff and dealing with it at the regional level.

**THE CHAIRMAN:** Can I just ask a delicate question? Can we help you by making it a licence

condition?

**MR. LEONARD:** I think everyone that's in -- it's Warren Leonard, for the record.

I think everyone that's in emergency management is in the business of public safety, and we take that job very seriously and we take these kinds of reports as our inputs.

There's a whole variety of them. We have legislative requirements. We have local regional requirements. We have input from the public. The groups that we sit on, the formal committees that we sit on, all of that informs what we do and the program that we have.

We have certain requirements that we have to meet under our legislation and we use that as the basis of our overall program, including the details associated with the nuclear planning.

So I don't see ---

**THE CHAIRMAN:** I understand your dilemma but our dilemma is that we don't have a wide range of scope. We have only nuclear. And, therefore, we've got to make sure that it's a nuclear concern that we have and we have an obligation also to make sure that there is an emergency plan in place.

So I don't know if EMO wanted also to raise that. And many times we can help you by making this a

requirement that needs to be satisfied for the particular nuclear operation.

So I don't know. I'm going to hear from staff for their view on CELA concern that -- oh, not concern but finding, legal finding that we have the legal obligation if you like to do something about this.

But I was interrupting. I don't know if EMO wants to talk and, Ms. Velshi, the floor is yours.

**MR. KONTRA:** Tom Kontra from EMO, for the record.

One of the things that is going to help us do a comprehensive review of all our plans is a new document that is about to be released, which is the CSA N1600 which will be provide standards for nuclear emergency planning certainly for Canada. And that document from the Canadian Standards Association. as it has helped us with the non-nuclear, in other words CSA Z1600 helped us with emergency planning, this one will particularly help us with looking at our nuclear plans.

**MEMBER VELSHI:** What's the timing of that CSA standard?

**MR. COLES:** Jim Coles, for the record.

We're anticipating having that draft standard available for public review mid-August of this year with the goal of issuing that document by June of



next year.

**MEMBER VELSHI:** And based on your -- and I don't know how familiar you are with any earlier draft of this CSA standard, is material in this CELA report consistent with what may be in the CSA standard?

**MR. COLES:** Jim Coles, for the record.

Many of the items in the CELA report would be captured in the new standard. There are basic requirements in emergency plans around notifications and protective actions and response and recovery even.

So these elements are consistent with the RD document that's being drafted by CNSC and our intention is to ensure that the CSA standard is aligned with that RD document in structure and requirements, and that we actually go farther wherever possible to cover off all aspects.

**MEMBER VELSHI:** So do you see an opportunity for the CELA report informing the CSA standard?

**MR. COLES:** Jim Coles, for the record.

Most certainly; this report is very thorough. It speaks to a lot of issues that emergency plans need to address. And certainly we can take that into consideration as we continue to work on the draft and make sure that we're touching on the appropriate areas as

identified in this report.

**MEMBER VELSHI:** I'll turn to staff and see what comments they have on this, please.

**MR. JAMMAL:** Ramzi Jammal, for the record.

The discussion is going around the emergency preparedness and the program itself. And the existing proposed licence for this renewal, in Day One we proposed in the licence and there is a clear licence condition and I will read it word for word:

"That the licensee shall implement and maintain an emergency preparedness program and conduct exercises in accordance with the CNSC Regulatory Document RD 353 titled 'Testing and Implementation of Emergency Measures'."

Now to answer the President's question with respect to how can they help EMO and to put in place, we have the Licence Condition Handbook that clearly states our expectation from planning, preparing to limit the effects, notifications. I'm just not going to go word by word but I'll give you the reference, page 94 of the Day One CMD.

So in the LCH, we can be much more precise with respect to the implementation and the dates by which

that OPG will have to put in place -- when I say OPG, the Integrated Emergency Plan, and let me qualify it much more precisely -- to include the updated CSA.

So the tools are in place for -- to have in place an Integrated Emergency plan and the CNSC expectations because we currently make reference to CSA standard N286-5 which provides details to address emergency preparedness.

So, all the things are being updated as arose from the Fukushima review, and updating for the emergency preparedness.

So we have the tools in place. It will be a matter of putting the CNSC requirements and the implementation.

Now, it becomes an issue with respect to the offsite and then how the integration of the offsite will take place and E will report back to the Commission. But the tools do exist in place so that the Licence Condition Handbook would address the Commission's direction, which can be provided to us to put in place what is required.

**MEMBER VELSHI:** Mr. Jammal, help me with the CSA standard development process. Would CELA be a party that would get an opportunity to provide input to that or have an opportunity to review the draft?

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

I would have to pass it on to my colleagues on the CSA process. I believe there will be -- okay, I'll pass it on to Mr. Jamieson but I believe there'll be a public consultation but I'm not precise yet.

**MR. JAMIESON:** Terry Jamieson, for the record, Vice-President of the Technical Support Branch.

Mr. Jammal is entirely correct. The CSA has a public review process, they call for public input. CNSC actually goes to the extent of publishing this on our Web site and also pushing it out to our 2,800 subscribers on our email list suggesting that they give us any input that they might have. And that applies to all CSA documents.

**MEMBER VELSHI:** Thank you.

That's it for now.

**THE CHAIRMAN:** Okay can I get a little more precision? CNSC staff actually work on the group that -- developing this emergency standard; is that correct?

**MR. JAMIESON:** Yes, you are correct, Dr. Binder.

**THE CHAIRMAN:** Okay, so now that you've seen the CELA report, is that going to be something that CNSC and the industry can bring to the table?

**MR. JAMIESON:** Absolutely. And many of the recommendations in the CELA report actually flow directly out of our Fukushima task force. So in fact have already been worked on and are at the table in the CSA process as we speak.

**THE CHAIRMAN:** So if I got it correct, so in August there will be a draft, they will be publicly consulted on. August is around the corner, right, so looking forward, I guess, to seeing that.

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

I fully agree, yes, everything is being expedited so we're putting interim measures in place. For example, the licence condition as an interim measure in order to amend the regulations because that's how we operate.

So it's a lot easier to have a licence condition in place than to go through the process of regulatory amendment. So there is no regulatory gap. I want to reemphasize the fact there is no regulatory gap in place with respect to the oversight.

As the documents being amended, just as the whole world is reviewing the safety standards, we are reviewing the regulatory documents, we're updating -- we is collective, the CSA standard being updated, and as the

progression with respect to the drafts coming out, those will be reflected in the LCH in order to ensure enhancement does take place.

So what you have before you here is we agree on the fact that updates are required. Updates and the efforts to make the updates are already started and then we're working on timelines with -- as expeditious as possible in order to update everything in place.

So that's why we have the flexibility. August is one indicator, we can report back to the commission on the progress or the implementation.

**THE CHAIRMAN:** Okay.

Anybody -- Dr. Barriault?

**MEMBER BARRIAULT:** Just briefly. Is this something OPG can live with? Would this make your life easier, more difficult? What happens here?

**MR. JAGER:** Glenn Jager, for the record.

I think where I'd like to begin is we do have an emergency plan as you know it's in place and we meet the requirements of all licence.

We would obviously have to input and work with DEMO and EMO for our part of it to make sure that it integrates well with whatever plans or standards are put in place.

I'd ask either Jim Coles or Laurie Swami to

comment further on that process.

**MR. COLES:** Jim Coles, for the record.

I just want to clarify just for the Commission that Durham Region and Emergency Management Ontario, CNSC as well, as the utilities, the industry and government agencies are sitting on the Development Technical Committee for this standard.

So the goal is ultimately that our plans are integrated, so the collaborative effort in the development of a new CSA standard just makes sense.

**MEMBER BARRIAULT:** Okay. And I think this is all or...

**MS. SWAMI:** Laurie Swami, for the record.

I agree with Mr. Jammal, who stated that there is no regulatory gap, that we have in place the licence condition that's in this draft that demonstrates what we need to do for emergency planning and process.

We also have in place the requirements to fulfill the Fukushima Action Plan action items for which this is one of them.

So I think we are very well placed to be able to comply with the licence and this will, of course, assist us.

**MEMBER BARRIAULT:** Thank you.

Thank you, Mr. Chairman.

**THE CHAIRMAN:** Anybody else?

Dr. McDill?

**MEMBER MCDILL:** Thank you.

What will be the position of sheltering in place in the new standard? Has that been drafted yet?

**MR. COLES:** Jim Coles, for the record.

Just for perspective, the committee's been meeting approximately four times since January and we've just completed the most recent meeting just two weeks ago.

So we have at this point, still a draft that's -- I would approximately characterize it as about 70 percent completed at this point.

The sheltering component is, you know, recognized as protective actions, certainly.

I suspect that the reason you identify sheltering in particular here is given the limited use of that protective action. And it's intended for situations where dose limits are -- or release levels are anticipated to be lower or that the sheltering requirement would be no longer than two days. It's a short term solution but it is only one of the protective actions.

The intent here is that the standard would provide guidance to both utilities, as well as offsite agencies, including host communities on how to respond in an emergency, and including things like the protective



actions, include sheltering that you just referred to.

**THE CHAIRMAN:** Mr. Jammal?

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

I understand your question, Dr. McDill, with respect to the sheltering and the comment that was presented by CELA and what the IAEA is calling for the -- not to use the home or it's not appropriate to use a typical home in Europe or in North America for sheltering.

However, if you read the guide, safety guide, in completion, it does not rule out that in case of a storm or in any other situation if no other options available, that sheltering is adequate.

So we have to put the whole thing in perspective. I'm not denying the fact sheltering should be looked at, should be re-evaluated but let's present the whole picture where there are other alternatives or no other alternative, alternatives other than sheltering in a house is one of the tools to be used.

And I would like to clarify this as a fact. I'm not disputing the fact we should review sheltering but let's put the intent of the guide from the IAEA is what it means.

**MEMBER McDILL:** I don't know if OPG wants to add anything to that? No, okay.

Thank you, Mr. Chair.

**THE CHAIRMAN:** I guess I can't wait until August; give me a little clue about the proposal for pre-distribution of KI.

We heard a lot about availability and non-availability, difficulty, Etc., and I remember that the French came to give us a presentation. They tried the can methodology, it didn't work, and they decide to go for pre-distribution.

There's a downside to that also but what's your view about pre-distribution?

**MR. COLES:** Jim Coles, for the record.

If your question is what does the draft standard currently say with regards to the pre-distribution, it does not detail that out yet. It still has to be discussed by the Technical Committee so we haven't tackled that issue as of yet.

**THE CHAIRMAN:** And when you do tackle it, you will also take a look about the requirement beyond the 10 kilometre, just in case of, you know, release and wind that do get into Toronto or any other community?

**MR. COLES:** Jim Coles, for the record.

Certainly the use of KI -- its application needs to be considered on a broad scale. The intention is that you're going to remove people from the hazard; you're

going to evacuate them from the area before KI is even required. That's the idea. You take KI before a release.

So with that in mind, the availability of KI, certainly we already have plans in place to ensure that it's available at reception centre where people are going to go so we can have supplies there. That's part of their current practice.

But certainly concerns from communities and as well as feedback from industry and best practices from around the world, we're going to consider those when we determine what the best approaches are for this standard.

**THE CHAIRMAN:** Anybody else?

Ms. Velshi.

**MEMBER VELSHI:** For OPG, I'm not sure if your current emergency plan is based on this or whether it will be a new requirement, but yesterday you had mentioned that the emergency planning is based on a beyond design basis incident.

Is that beyond design basis the same as what the President refers to as the doomsday scenario?

**MR. COLES:** Jim Coles, for the record.

We've had a fair bit of discussion about design basis accidents and there's the LOCA plus contaminated casualties is the design basis accident.

And as my colleague, Mr. Kontra, with DMO

identified, our plans give us a foundation to respond.

Not every emergency can be thought out and written and have a detailed plan scripted for. You have to write a plan that gives you the capability to respond effectively to any type of scenario and that's what our plans do.

Our plans are written to accommodate the fact that the unexpected is going to happen or may happen. Otherwise, it would be expected.

But you have to plan for things to go wrong that you didn't write into your plan when it was drafted a couple of years earlier.

So our plan accommodates beyond design basis accidents. It currently makes reference to our severe accident management guidelines. So when the plan was written originally, back in 1999, when the provincial nuclear emergency plan was written, they were dovetailed and we perhaps didn't have the reference to severe accidents in our plans.

We reviewed our governance and our emergency plans and last year updated them to make reference specifically to severe accidents and give us the guidance that we need to respond to a beyond design basis scenario. So we have that capability in place now.

And, as mentioned earlier, these last two

days, we have the equipment and we've done the training and we've done the drills to validate those plans are effective.

**THE CHAIRMAN:** Monsieur Harvey?

**MEMBER HARVEY:** Yes. We heard yesterday about the 18 hours release and that has been brought today on the table, so I would like the staff comment on that.

Would that 18 hours be the base of the evacuation planning? Is this something important in the determination of that planning? Maybe the staff could ---

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

Thank you very much for this question. And I understand the concern raised.

The regulator shouldn't be using absolute terms if certainty is not there. So I wanted to ensure the Commission and the public that the number presented, the number of 18 hours, is not a best estimate number, which is subjected to a high degree of uncertainty.

As a matter of fact, this is the extremely conservative estimate, which can be used with a high degree of confidence as planning assumptions for preparation of evacuation strategy.

And what I suggested yesterday is that this progression of event, the doomsday scenario, can be

probably overlapped over the evacuations actions to see if the times are properly aligned.

This is possible because once again, it's a very conservative assumption, so if something goes wrong, it would be rather more time than less time available for the evacuation.

**THE CHAIRMAN:** Mr. Jammal?

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

Just to clarify what my colleague, Dr. Rzentkowski, mentioned, is your question Mr. Harvey is, is 18 hours sufficient? As we heard or ---

**MEMBER HARVEY:** My question is, will that 18 hours be used to determine the planning? I mean that'll be the base.

**MR. JAMMAL:** Correct.

**MEMBER HARVEY:** Because you ask -- give us the time and we'll do it.

**MR. JAMMAL:** Sorry, let me clarify, it's just what Dr. Rzentkowski said, this is the most conservative.

So in other words, we're talking about doomsday scenario language. So at 18 hours, no intervention, nothing is being done.

However, as we saw yesterday, and the

guidelines and the practices, in the matter of maximum two to four hours, a decision will be made at that point to determine evacuation, the type of sheltering.

So to answer your question directly, yes, correct.

So in a matter of two to four hours, even the guidelines, IAEA guidelines talks about the decisions to be made within a few hours, two to four to six hours, in order to determine evacuations or not.

**THE CHAIRMAN:** EMO, you wanted to say something about that?

**MR. KONTRA:** Yes, thank you, Mr. Chair.

Our plans specifically do not say things like you have to wait for 18 hours. They may suggest that 18 hours is an expected time before which there may not be, but our plans cater to immediate action so that if the command advice is to activate evacuation within an hour or two, then that's what we will do.

We will not wait for 18 hours; we will react to the existing situation with appropriate decisions, coordinated with our partners.

The decision will be based on information gathered by Ontario Power, by the provincial monitoring, by Health Canada, by whoever is participating in responding to the event, and it will include the

community.

We will not, although we say we direct, we will not direct in isolation, we will direct in consultation. And that consultation mechanism is immediate.

Somebody earlier raised the concern about one person on call. One person on call today means that within 15 minutes I can have a command decision from the Provincial Emergency Operations Centre about what to direct or about what to do and so on. The same thing happens in Durham or Toronto or wherever.

**THE CHAIRMAN:** Let me try something. I think there's a confusion here about how much time there will be in case of a disaster -- let me use really extreme words -- to react.

And there's a whole bunch of people who believe that the plant will blow up, in other words you've got zero time to react and therefore you're not going to be able to do evacuation. Everybody going have release, et cetera.

And I think what I'm hearing is the nature of this plant is such that that scenario is not going to happen. There's going to be some escalation, it's going to be within the plant first and there will be some time to do a reaction.



And I guess what staff is trying to calculate -- or is -- what is the minimum time that you're going to have in any scenario? I think that's what -- if I understood, that was the 18 hours. Sound like a long time, but it's -- you know, so I don't know -- so it must be somewhere between zero and 18, where the number is and that will depend on the reaction of the whole system. Did I get this right?

**MR. KONTRA:** Tom Kontra, for the record.

Yes, you did, but I think it's important to realize that as we've heard before in our mutual presentation, when OPG categorizes the event and notifies EMO what's in 15 minutes, the province has that 15-minute window that they must determine an off-site response.

And if the notification is sufficiently serious to warrant a default evacuation of the three-kilometre zone, then that's what we'll do within 15 minutes.

If the notification allows me or the commander of the PEOC an hour or three hours to gather more information and make an informed decision, then that's what we'll do, but we have the mechanism to do an instant default response.

**THE CHAIRMAN:** Monsieur Harvey?

**MEMBER HARVEY:** My point was that if you present a plan and in the plan you mention that it would take 24 hours before evacuating all those people, would the staff accept such plan?

**DR. RZENTKOWSKI:** It's not an easy question to answer at this point in time because we are speculating. The plan doesn't exist to -- or at least, we don't have the exact timing for evacuation; what time it would be required to complete an evacuation.

Eighteen (18) hours has been identified as a planning assumption to largely complete the evacuation of the population around the plant. Of course, the evacuation has to start as early as possible, 15 minutes into the event or two hours into the event, but has to be largely complete when we approach 18 hours mark.

Ideally, it would be, if everyone who is supposed to be evacuated would be evacuated by then. But if, let's say, 80 or 90 percent of the population would be evacuated, we can probably call it a success as well.

**THE CHAIRMAN:** Dr. McDill?

**MEMBER McDILL:** Thank you.

I can appreciate some of the frustration that we are sensing up here from the community about getting information.

One of the comments I wanted to make was in the intervenor's submission on page 11, they were trying to get working group number 3 reported. It doesn't really matter what it was. And it says that EMO suggested they use Freedom of Information.

Is that correct, if indeed it is referenced in the current nuclear emergency plan?

**MR. KONTRA:** Tom Kontra, for the record.

The normal procedure in normal times is to follow accepted procedures. So we've advised that for that particular request that it go through Freedom of Information, so that the other partners who were party to that discussion, that working group report, have an equal opportunity in considering what parts or what parts not to release, as the mechanism allows.

So what we're discussing here obviously are responses to a natural event, which require immediate action, and what we're discussing there is normal procedure.

**MEMBER McDILL:** Back to CELA on that one.

**MS. McCLENAGHAN:** Yes, thank you, Dr. McDill.

It was a frustrating moment. That particular working group report was about the basis of emergency planning in Ontario, which is something we were

trying to understand to prepare our overview.

The report is not only of historical interest, it's explicitly referred to in the current Provincial Nuclear Emergency Response Plan 2009 as being the basis for the current protective action levels.

So I can't conceive of why it would be withheld and of course I meant it was not available on time for today.

**THE CHAIRMAN:** Okay. I think we need to move on and you heard a lot of comments. You have the final words.

**MS. McCLENAGHAN:** Thank you. I'll go backwards.

In terms of the discussion about timing, one of the things to stress there is that, if there was an early release, we don't contend that we want to see such a thing happen, but we would like to see the planners admit that such a thing could happen, and it's disconcerting when it's denied. That's point number one.

Secondly, all the time that goes by, whatever it might be, until evacuation is completed, it means that people who are not yet evacuated are being exposed in some way, shape or form.

So it's important to understand those numbers, try to reduce obviously the evacuation time, yes,

try to take all the steps we can to increase the likelihood and the strength of the planning such that we do have time to plan, but we need to be able to respond quickly in evacuation.

And if we can't evacuate fast enough -- we, collectively, as a community -- then should we be operating this plant in this community with these population levels, which is why I come to the recommendation not to license the plant?

In my view, it wouldn't be licensed today. You wouldn't put a new plant here.

The question about the amount of detail beyond design basis is an extremely important question. The answer was that we have a foundation to respond. The Provincial Nuclear Emergency Response Plan does have a line saying that there could be, for example, a 20-kilometre evacuation.

But when you ask the question how realistic would that be, you have to start asking questions about, well, what would be the evacuation routes? What kinds of numbers would we be talking about? Where would those people be going? The very same kinds of questions you have to ask about the 10-kilometre zone.

So in my opinion, it's not sufficient, given the experience we've seen in other accidents, to

rest on the 10-kilometre detailed planning.

In terms of the CSA process, my point earlier was that this is not a subject that should be left for the officials to develop all the answers and then tell the community what's right.

A lot of these decisions are very site-specific and have to do with how the community will be expected to respond, as well as what kind of risks the community is expected to assume.

So things like pre-distribution of potassium iodide, we've made a recommendation that you should, today, require that. Ontario is the only province who has made a decision not to require that. That's within your purview.

You could make a decision specific to this plant today because of the fact that it's an ageing plant, because of the fact that it's in a highly populated area, because of the fact that it will take x-hours to evacuate, and it's one of the proven methodologies to reduce a certain kind of exposure while evacuating. I think it's a highly important issue to move on today.

In any event, consultation on the draft, I have no idea how good it is, effective in June. Now, we're halfway through this licence period. The Pickering-specific issues that we recommended in our report, I would

urge you to consider as conditions of this approval should you not agree with my recommendation not to grant the licence extension.

And I think leaving it to the CSA process would amount to an implicit delegation of your authority, and I've already urged you not to delegate your authority on some of these issues even to staff, because I think they're of such import that you have to make the decision.

Someone earlier today made another suggestion, which is a one-year licence while you gather a lot of this material that's stated, and I put a list in my report of the very significant pieces of information that are still being awaited. Gather all of those and come back in a year but don't delegate your authority.

**THE CHAIRMAN:** Okay. Thank you. Thank you very much.

**(APPLAUSE/APPLAUDISSEMENTS)**

**THE CHAIRMAN:** I would like to move to the next submission which is an oral presentation from Ms. Lennox, as outlined in CMD 13-H2.78.

**13-H2.78**

**Oral presentation by**

**Jill Lennox**

**MS. LENNOX:** Thank you very much. Thank you, Dr. Binder and CNSC, for letting me speak today.

Thank you also to the Ontario Power Generating Commission.

I am very nervous to begin with, but very daunted about having to speak after the CELA report. It was a fabulous report.

I stayed up most of the night reading it and found myself very upset because of looking at these details so closely. It brought it all home to me on another level; something that has been an upsetting thing for me from as long as I can remember in my life, the whole nuclear power situation.

I also just want to thank you for making it possible, actually, for the very things that daunt me also really impress me, and were it not for this whole process, I wouldn't have gotten to read the incredible reports that I have read and probably watched the interventions that I watched all day yesterday and I'm so impressed with the level of my colleagues. It's one of the reasons I'm very nervous to speak myself.

However, I believe those who support me and who say every voice counts and I actually believe that and I tell my students that and I do believe every voice counts, so here goes.



I am -- this was written -- I was writing to request that the CNSC not extend the OPG's application permit for the refurbishment of the Pickering nuclear power plant for another five years. My reasons I wrote are purely logical and there are only two.

The first is that in five years, five more years of nuclear waste will accumulate. You may remember me from the Darlington things. I think my biggest nightmare about the whole nuclear power industry is the inability to find a solution for the waste.

So in five more years of their operating, five more years of waste will accumulate. As Gordon Edwards recently put it:

"Certain individuals and corporations have no intention of stopping the production of every large -- ever larger inventories of nuclear waste for which there is no assured method of safe containment or -- for -- of periods of time that dwarf the entire span of human civilization."

I was at a talk of his where he explained - - like he went back into the various ages and -- you know, before dinosaurs and so on and so forth and said this is how many years we have to look into the future before this

waste will not be toxic and dangerous.

So a person with much better math than myself can easily calculate how many tonnes more would be created in that five-year span. But even it were one pound more, I insist that's enough reason not to extend the life of this white elephant.

The second reason is economic. The cost of granting the extension of the permit for four to six years will, according to the Clean Air Alliance, be \$18 million.

This would be our money of course, we the citizens. Our hydro bills will go up 5 percent.

We -- only to look at similar attempts all over the world to renovate these ageing nuclear power stations to see that the cost is formidable for over the -- far over the estimates and the results are in no way guaranteed. The example is our own Point Lepreau.

And when the inevitable happens, and the plant will have to be decommissioned, the cost will be even higher.

A recent example was in New Brunswick, my father's home province, and as it happens, I was in Moncton when I received your reminder that I hadn't yet submitted my intervention. No, actually it was that I had actually asked for an extension and I received the refusal to give the extension.

I was late because -- for personal reasons. I had used the month of April, a relatively free month in academia, to help in a family crisis in Nova Scotia and my plea for an extension was refused, just at the time I was about to hit the road; I was in Moncton.

I was in a restaurant, at the time, and I had just listened to a cousin of mine, who I hadn't seen in a long time, speak out about the Point Lepreau. And she is a part of my family I always considered a very conservative, very typical of New Brunswickers in my opinion, they're very conservative and very, very good, simple people.

And however, I didn't expect her not to think there was anything wrong with the Point Lepreau thing, but she was absolutely livid with anger and she said that first they justified renovating the thing; that it was clearly on its last legs, then gave them an estimate that was far over what it finally cost.

And I understand it was three times more than what they had estimated, and then -- and she almost shouted it out, "And the stupid thing doesn't even work".

And so she was horrified and everybody in the restaurant looked at her and I thought my goodness; I mean I had never heard anybody in my family speak out like that.

And I think it was that anger that I knew it wasn't just her, but probably the whole province or it felt like it to me that made me decide well, I'm going to write this thing, whether I'm moved out of the hotel or not, I'm going to sit down and get it in. So please excuse all the typos and the plagiarism and everything else, but it was thrown together very quickly.

But I realized this was terribly important. For me, it's very important, and for my family it was very important.

I've also -- I wanted to add that I've also often asked myself why governments don't just shut these nuclear power stations down when they come to the end of their lives. Why put those millions into something that inevitably will be decommissioned.

And the only answer I've ever come up with is the cost. But given that we take on a lot of the cost, even that doesn't make too much sense to me.

But yes, the cost of decommissioning will be high and why pass it -- but why pass it on to a future date, it will only get higher and the waste deeper by postponement.

According to a recent report, the cost of decommissioning nuclear power in the U.K. increased from 16 billion pounds to 53 billion, between 2007 and 2011.

In his article, "How to Close the U.S. Nuclear Power Industry: Do Nothing" by the ex NCR Minister, Peter Bradford, in the Bulletin of Atomic Scientists, he addresses the decline of the nuclear power industry in the United States, and I quote:

"The United States is on a course to all but exit the commercial nuclear power industry even as the country awakens to the dangers of climate change and adopts measures to favour low-carbon energy resources. The nuclear power had been in economic decline for more than three decades when the Bush administration launched a program that aimed to spark a nuclear power renaissance through subsidies and a reformed reactor licensing process, but Wall Street was already leery of the historically high cost of nuclear power. Without additional and significant governmental preferences for new nuclear construction, market forces will but phase out the U.S. nuclear fleet by mid-century."

That was all a quote of Peter Bradford.

In my words I say that mid-century is just too long to wait.

Harvey Wasserman's report in the Progressive on the San Onofre nuclear power crisis gives a summary, not only of other pending nuclear disasters in the U.S. other than San Onofre plant in California, but the varying states of certain closure in other countries beyond the U.S. boundaries.

He points out that "Even France, once the atomic" -- this is a quote:

"...Once the atomic poster child, is now exploring joining Germany in phasing out its expensive decaying nuclear fleet for a massive new commitment to renewables."

In the last couple of days, I read two reports that impressed me very much with both their scientific and legal research to come up with conclusions that I've only felt intuitively since my earliest years.

There were the submissions of CELA, which I've already referred to, and the report of Arnie Gundersen, Chief Engineer for Fairewinds Associates, which who I know addressed this Committee this morning. I listened to his address online before coming here.

I found interesting discrepancies between his report, given that he was a person that had worked in the industry for so long, particularly with his view of the CANDU reactor in the report.

It was so almost opposite of what the -- Mr. Bereznai I think his name was, talked about the CANDU reactor yesterday in his talk and he talked about how they use it as his college to teach and train future nuclear scientists and so on.

But according to the -- as you know, according to the Gundersen report, it's definitely sort of being phased out. It's ---

**THE CHAIRMAN:** Can you please finish?  
You're running way over time.

**MS. LENNOX:** Am I? Thank you.

**THE CHAIRMAN:** Yes.

**MS. LENNOX:** Okay. So I'll just read these last two quotes that I have.

"After reviewing the OPG and CNSC analysis of lessons learned from the Fukushima Daiichi accident..."

This is Arnie Gundersen:

"...I conclude that the Canadian response to the accident and proposed improvements are inadequate,

incomplete, especially for the Pickering site. The nearness to Toronto to the Pickering site and the emergency evacuation it might necessitate should, in and of itself, be reason to deny a licence renewal. Simply put, in a serious accident at Pickering, the Ontario government would find it impossible to evacuate Toronto."

I will actually not even do my second quote which is from the Canadian Environmental Law Association because we just heard it. The last sentence being:

"Pickering should be closed because the province's nuclear emergency plans are wholly inadequate to protect Torontonians from a major accident."

Okay. I want to conclude. I just want to say that in the whole CELA report and the -- all the discussion and details, one of the things that really has got to me is that we all use the word "evacuation". But if you -- I think evacuation is usually used when you forecast something is about to happen, like in a hurricane or a tornado or something, and people are evacuated.

In this case, people aren't just evacuated.



If we look at Chernobyl and Fukushima, they're leaving their homes forever. I mean this is not usual evacuation. This is like -- it's forever.

So I trust that these voices, plus the voice of common sense, will win out for all of us here and that the Ontario government will not make New Brunswick's mistake, and that we will all, here in Canada, wake up to the realities that the horrific examples of history have given us through Chernobyl and Fukushima.

May we think of our children and grandchildren in the way that First Nations people think of the future and think minimally seven generations ahead, and why just seven? Let's close -- can I just finish my last sentence?

**THE CHAIRMAN:** Please.

**MS. LENNOX:** Let's close down Pickering now, along with Darlington, and give them a permit to extend their plans to decommission and not throw good money after bad, or bad money after bad, and destroy this beautiful gift of a planet.

May we be seen not extending the permit as a -- see not extending the permit as a positive move and applaud the CNSC and the OPG for being progressive and forward looking -- giving a progressive and forward-looking image to the country of Canada.

**THE CHAIRMAN:** Thank you.

**MS. LENNOX:** Thank you very much.

**THE CHAIRMAN:** Thank you very much.

Anybody? Any questions?

Okay. Thank you very much.

**MR. LEBLANC:** The next presentation is supposed to be by Ms. Karen Loch but we have not been able to identify her. If you are in the room, please identify yourself.

If you are not here, we will treat your presentation as a written submission.

**MR. LEBLANC:** So, Mr. President, if you want to go to the next intervention?

**THE CHAIRMAN:** Okay.

We'll move to the next submission which is an oral presentation from Ms. D'Valar-Alba, as outlined in CMD 13-H2.84.

Please proceed.

**13-H2.84**

**Oral presentation by  
Ysabeault D'Valar-Alba**

**MS. D'VALAR-ALBA:** Thank you.

My name is Ysabeault D'Valar-Alba and I

live in Toronto. I live up by York University and my blind daughter, who is an adult and just finishing up at York, a master's, lives down at Bloor and Ossington.

So you can imagine when I was listening to CELA and the talk about evacuation, I was really quite distressed thinking how I would get to her if I had to walk down there to get her and somehow get her out.

I should also say that I have a BA, an MA and most of a Doctorate in Cultural Anthropology, and I just finished a BA Honour in Religious Studies to roll the doctorate from anthropology into religious studies. And that bears on what I'm going to talk about today.

I am here not as a representative but certainly as a member of two faith communities. One is the Unitarian Universalist denomination and the other is the Pagan community, and I am wearing -- somewhere here if it's still there -- a pagan emblem which is a rose and a pentacle.

And the reason I bring that up is that my specific pagan tradition asks us to look at our relationship to earth, and it's a mutual relationship. What we do to earth and how earth sustains us, and very specifically for Pickering, is Pickering part of what sustains us or is it what is dangerous?

And I have to tell you that in listening

today, I heard nothing that allayed my fears at all that Pickering is a very dangerous situation.

So in my written presentation, I was concerned with five things -- six things actually. The first is the probability of risk in relation to the magnitude of consequences. That goes for operation.

The probability of risk in relationship to magnitude of consequences, that goes for the storage of radioactive material.

The next is the cost involved. I heard a lot of talk today about cost and about jobs, and none of those things are -- can justify the danger because they can all be dealt with in a different way.

And then we go to green jobs, the kind of green economy and the jobs that could actually be sustaining us into a sustainable future.

And then finally the relationship -- sorry, two more -- the relationship between Pickering and the greatest, most dense population center in Canada, and I live just on the edge of that evacuation zone. So, yes, it is definitely of interest to me.

And then a point that has not been raised, except maybe tangentially, which is this: does nuclear power help us be democratic or not? Does it take us farther from a democratic society, or does it take us more

towards a society in which decisions about risks are made for the people who are going to be taking that risk but not by the people who taking that risk? And that is such an essential part of what's going on here.

It's good to have consultation but will that consultation actually result in a change in direction? I was listening earlier; it doesn't appear that any nuclear facility has been shut down, regardless of the fact that it's actually not a necessary thing. We could do all the things that nuclear does in different and more sustainable ways.

So those were the six issues that I -- concerns that I brought up, but I want to deal just with that first one about risk because it works its way through the entire chain.

So we have a very low probability of risk but you can't say it's 100 percent. You can say it's 99.44 percent. You can say it's a whisker from Schrödinger's cat, but you cannot say that there is 100 percent no possibility that those accidents will happen.

So I have to -- it's sort of surreal to be sitting here listening to evacuation plans for something that does not have to happen.

It might happen for a tornado -- excuse me I have a very dry mouth problem right now. It might

happen for hurricanes and tornadoes and tsunamis and floods but why do we consider it for something which is a choice?

Do we have the right to say no? Do we have the right to say this is a technology which we -- it's magnificent and it's exciting and it's powerful. But is wisdom here walking away from it?

So I came across a line that I think is so important. It's called "*The Intoxication of Technocracy*". The intoxication of technocracy. Can we walk away from a technology which is too damn dangerous?

Because what about those three and a half million people who are going to be jammed on roads if that very slim possibility comes down? And since it happened at Fukushima and it happened at Chernobyl, nobody can say that it won't.

So I rest my -- I'm going to be very short and I'm not going to take up the entire ten minutes, unless I already have -- but I'm going to say that that really rests it. Where is democracy here? Why wouldn't we have a referendum saying: "Do you want to take on this risk?" And while we're having this referendum, could we limit the advertising to those who could least afford to pay for big advertising so that we equalize the playing field and ask every person in Pickering and in Durham and

in Toronto: Would you like to take on the risk of trying to get out?

Because I wouldn't.

And so I'm going to ask you to turn down this licence and to turn down every nuclear licence to start working toward a green Ontario, a green Canada, because we're not a resource nation only, we don't just extract, we build for future in a different way.

That's it.

**(APPLAUSE/APPLAUDISSEMENTS)**

**THE CHAIRMAN:** Question?

Anybody?

Dr. Barriault?

**MEMBER BARRIAULT:** Just a brief statement, really.

What you are asking us is to make a political decision and, I'm sorry, but we can't do that.

If you're going to shut down the nuclear industry, it would have to be a political decision that would have to be made.

**MS. D'VALAR-ALBA:** But isn't it a safety issue and isn't the politics personal?

So if you're going to tell me it's a political decision, it's also a personal decision affecting millions of lives.

Isn't your mandate, isn't your purview to look at the relationship between that probability of a disaster and the magnitude of consequence?

**MEMBER BARRIAULT:** That's correct.

**MS. D'VALAR-ALBA:** And to come to a decision and then even to think about how you would actually ask the people whose risk you're asking them to take on, feel about that.

That seems to me either very undemocratic or the potential for being very democratic. There isn't anything here that isn't political, sir. Thank you.

**MEMBER BARRIAULT:** Thank you.

Thank you, Mr. Chairman.

**THE CHAIRMAN:** Okay. Thank you.

Thank you very much.

I'd like to move on now to the next submission by Greenpeace Canada as outlined in CMD 13-H2.119 and 2.119A.

And I understand that Mr. Stensil will make this presentation. The floor is yours.

**13-H2.119 / 13-H2.119A**

**Oral presentation by**

**Greenpeace Canada**



**MR. STENSIL:** Good afternoon. Bonjour.

Thank you for this opportunity to express Greenpeace's view and recommendations on OPG's request to renew its licence for the Pickering Nuclear Station.

Mr. President and Commissioners, as you know, you have been given an important responsibility under the *Nuclear Safety and Control Act* by Canada's Parliament. You have a mandate to prevent quote "unreasonable risk" unquote, to Canadian society for nuclear stations. You are tasked with limiting risk from these facilities to a quote "reasonable level". This means setting risk limits and enforcing them.

After listening to the statements from OPG and CNSC staff over the past two days, I think the question that is framing your deliberations has caused you to stray from your legislative mandate.

This question has not been explicitly stated but implied. I would summarize this question as follows: Should the Commission renew OPG's operating licence for the Pickering nuclear station for five years and allow Pickering to operate beyond its design life despite OPG's failure to provide a full safety case to these hearings?

It's basically what we've been talked about.

Ask the wrong question and you'll get the wrong answer, of course. In my presentation today, I wish to bring the focus back to your legislative mandate. To protect Canadians, you need to ask the right questions.

And based on your responsibility under the *Nuclear Safety and Control Act*, here's the question I think should be asked: Based on the evidence, do the six operating Pickering reactors pose an unreasonable risk to Canadian society?

To answer this question, the CNSC must establish a limit on risk to define what is reasonable and unreasonable under the *Nuclear Safety and Control Act* for decision-making purposes. Once this limit is clarified, the CNSC must then judge the evidence provided to determine whether the risk posed by the station is reasonable before it can make a decision under the *Nuclear Safety and Control Act*.

If this question is asked, Greenpeace concludes the CNSC has a responsibility under the NSCA to deny OPG a licence renewal for Pickering based on the evidence available, as well as some significant omissions from OPG's submission to this hearing. The Commission should direct OPG to close the station.

This may be surprising coming from the guy from Greenpeace but I don't think I've ever asked the

Commission to abruptly shut down a station before. And I don't do so lightly. But I've never seen an industry study portraying a reactor as this risky before.

Pickering exceeds regulatory limits. You thus have a responsibility under the *Nuclear Safety and Control Act* to direct OPG to reduce or eliminate risk.

So, first, let's talk about what we know we don't know. Commissioner Harvey, you stated yesterday that public concern about ageing was a legitimate given Pickering is one of the oldest nuclear stations in the world. Thank you for that fair comment.

As an engineer, you know Pickering is in the wear-out phase of what's known as the "bathtub curve". In any engineered system, you'll see more component failures or accidents when it's new, the break-in stage, and when it's at the end of its design life, the wear-out stage. Pickering is in the wear-out stage.

Despite three or four years of study, OPG hasn't provided a full safety case for operating for Pickering B reactors beyond their design life to this hearing. I've heard some rumours from some fairly well placed sources that OPG has even thought about running some of the Pickering B reactors just in the summer because they don't think they'll actually make it to 2020.

That's a rumour, of course, but I think it

highlights the lack of evidence provided by OPG in regard to ageing. This lack of safety analysis is important because it's also been ignored in the probabilistic risk assessments.

And despite this omission, OPG's most recent probabilistic risk assessment for Pickering B shows the station is much more dangerous than previously thought.

On screen, you'll see the regulatory limits set for core damage frequency and large radioactive releases comparing OPG's 2007 and 2012 risk reviews for the Pickering B Station. It shows that the station's potential for large radioactive releases -- or at least the understanding of it -- is just below the risk limit. Right now, that line setting out -- right now, that's the line setting out the CNSC's conception of reasonable risk.

Large radioactive releases are characterized as requiring the long-term abandonment of land. Think Chernobyl or Fukushima. I've never seen a number that high at a Canadian nuclear station.

Under the *Nuclear Safety and Control Act*, this should compel the Commission to require OPG to act to reduce or eliminate risk. This number is, however, a significant underestimate. So Pickering exceeds regulatory limits.

On the screen, you'll now find a table summarizing OPG's own risk study. It also shows the contribution of external events to the risk of large radioactive releases from Pickering. This highlights some significant vulnerabilities of Pickering -- of the Pickering Station to external events. We may not get a tsunami on Lake Ontario, but Pickering's potential to meltdown due to high wind events, doesn't leave me feeling reassured.

These numbers also highlight a significant weakness in Pickering's design. In the last column, I have calculated the probability of a large radioactive release once a core damage event has occurred. While OPG and CNSC repeat ad nauseam that Pickering's defence-in-depth will prevent radioactive releases -- radioactivity from escaping into the environment, OPG's risk summary provides evidence to the contrary.

Note that core damage and large radioactive release frequencies are almost the same. Put it this way, if you have a Three Mile Island, you're pretty much going to have a Fukushima at Pickering.

Pickering's shared containment provides almost no additional defense in depth to protect the public once a core damage event has occurred. Your job is to protect the public and as Mr. Rzentkowski said this

morning, core damage doesn't matter to the public, it's OPG's problem.

Large radioactive releases do. Large radiation releases are what you are supposed to prevent under the *Nuclear Safety and Control Act*.

Now, note that despite the relatively high core damage frequencies for high wind and flooding, OPG decided not to go to the next step and calculate the large release frequency. I think this could be called "data trimming", excluding data to bias your conclusion.

This is speculation but I'd say the intent in ignoring these accident scenarios was to keep Pickering's large release frequency just below that regulatory limit.

In your record of proceeding, I urge you to acknowledge and address the risk posed by the station when all risk contributors, including ageing, are included.

And a reality check. While Pickering exceeds regulatory limits, if you consider all external events in ageing, these numbers are still significant under-estimates when you take into account international experience and OPG's own insurers' assessment of the potential for off-site.

OPG's breach of this regulatory limit, or frankly being anywhere near it for off-site damage, should

trigger your responsibility as Commissioners under the *Nuclear Safety and Control Act*.

So your deliberations and the decision after these hearings should not address whether you simply accept OPG's licence renewal request but how you will direct OPG and CNSC staff to reduce risk at Pickering.

The high probability of large radioactive releases at Pickering also highlights how insufficient Pickering's last layer of defence-in-depth is. As discussed by Theresa McClenaghan from the Canadian Environment Law Association earlier, detailed emergency preparedness plans have been developed only to address small-scale accidents with little or no off-site consequences.

These are known as "design-basis accidents" which is, as you see on the slide, of a probability of more than  $1E-05$ . What I have shown you today is that Pickering has a risk of large radioactive releases more than  $1E-05$ .

Current emergency plans aren't designed to deal with these large accidents. This puts people at risk. And as I point out in my submission, OPG found it had no explicit standard or rationale for current on-site emergency plans. It called its current assumptions an "artifact". And that's a quote.

Claims that these emergency plans are adequate have been made so often over the decades by OPG and CNSC staff they have become dogma. This is an example of the echo chamber effect that caused the Fukushima disaster. The best way to stop this is to get emergency planning out in public for a full public review. Let's review all of the assumptions.

Finally, I'd like state for the record that Greenpeace believes the risk limits set by OPG are inadequate. As I discuss in my written submission, these regulatory limits were originally established by OPG. Look at Pickering. You have six reactors sitting closer than any other nuclear station in the world to a major population centre and, yet, the accident frequency limits are set based on individual reactors. Not the entire site.

This creates a loophole that makes it acceptable to impose more nuclear risk on Canadians in Ontario than in New Brunswick. That's unacceptable.

And then, there's the other side of the risk equation. Consequence. There are still 150,000 people in Japan displaced because of Fukushima. It's a small number relatively because it was a rural area part of Japan.

At Pickering, the impact of an equivalent



accident, which OPG's risk studies show are realistic events, would be significantly worse. Otherwise put, Pickering's location makes the continued operation of Pickering a high risk.

In light of Fukushima, I would suggest to the Commission we need a more holistic and integrated approach to assessing the risk posed by nuclear sites and not single reactors.

To conclude, in spite of all these loopholes I've mentioned, OPG's new understanding of Pickering's accident risks shows the station should be closed. Based on the evidence available, it is Greenpeace's view that the Commission has an obligation in making its decision to require CNSC staff to reduce the risk posed by Pickering.

In the event that you renew the licence, risk reduction should also occur -- could occur by requiring upgrades to engineered safety systems and emergency preparedness plans.

Thank you for your attention and I look forward to your questions.

**THE CHAIRMAN:** Thank you.

Who wants to go?

Monsieur Tolgyesi?

**MEMBER TOLGYESI:** In this presentation, the

intervenor was talking about high winds and there are no estimates from Ontario Power Generation.

What's -- first of all, how do you define "high wind", "high winds"? What's the speed? Or consequence? Or how do you define that?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask our Chief Nuclear Engineer, Mark Elliott, to respond to that.

**MR. ELLIOTT:** Mark Elliott, for the record.

There's two ways to define the high winds. One is the design basis of the plant; so the design basis of the plant to handle a certain wind speed. And what we have taken in this probabilistic risk assessment is a wind that would occur one in ten thousand years. So that's a different high wind value and that's how we assess the plant.

**MEMBER TOLGYESI:** So when you're looking, you are looking which one?

Based on design or based on the ---

**MR. ELLIOTT:** Well, what we found is that, even though we were designed for one level of wind, we were actually -- the plant was safe up to that one in ten thousand year level of wind.

**MEMBER TOLGYESI:** And why did you not estimate the large release frequency?

**MR. ELLIOTT:** I'll ask my Director of Nuclear Safety, Carlos Lorencez, to talk about this but just a couple of things on wind.

For internal events, the ones like loss of coolant accident, loss of feed water, things that we've studied for years and years, we know the exact sequence of events that happen with those and we know the probabilities of those very well because we have experience with those components.

For external events, the uncertainty on the numbers is different. It's quite -- it is higher.

I'll give you an example. The exact level of wind that is one in ten thousand years, that's not as precise as some of the other numbers that we deal with. And then the damage that that wind causes to the plant, again, it's not as precisely understood.

So what we do is we keep trying to understand it, investigating, doing analysis so that we understand it well enough to know that it meets our safety goals. And then we stopped.

So that's what we've done here and I'll ask Dr. Lorencez to tell us more about that.

**DR. LORENCEZ:** Good afternoon, for the record, I am Carlos Lorencez. I'm Director of Nuclear Safety for Ontario Power Generation.

The high wind PRA was the very first one produced in Canada for a Canadian station. It's a first in many senses.

As our CNE indicated, we are using data of the past 150 years to address issues of winds for one in ten thousand years. So the uncertainty is right there.

So what we have done we have done is go through the methodology, a proposed methodology accepted by the CNSC, to analyze how the response of the plant would be when exposed to this sort of range of winds.

We have found that, when considering certain improvements to the procedures, certain improvements to the equipment, we can target, we can achieve better than our target, the safety hold target.

Once we are under safety hold target -- because that is the bounding number -- we do not proceed towards the Phase 2 days, the large release frequencies. This is bounded by this. We wouldn't find significantly higher number or no higher at all than the large release, than the severe core damage frequency number.

Now, this was the first study. We have many lessons to learn from this study. We are right now conducting the same analysis for the Pickering A, Units 1 - 4 which is going to be concluded by the end of this year.

We are going to apply the lessons we learned in Pickering B to Pickering A and we know that if we were to redo the analysis of Pickering B -- and we are considering that right now -- we are going to have a -- we are going to diminish the risk by a factor between 2 and 5, just because of the lessons learned.

**THE CHAIRMAN:** Can you -- I'm not sure I understand what is a wind in one in ten thousand.

Are we talking about tornados and hurricanes?

So you got the biggest tornado ever, I thought that you have pretty good weather forecast and if you know about tornado possibility you shut down the plant. Is that not normal procedure?

And then what are we talking about; can a tornado in a shutdown plant cause damage? Is that what you're talking about?

**MR. LORENCEZ:** Carlos Lorencez, for the record.

You are close. In this case, we are talking of a quick formation of tornado kind of winds for a power station in operation.

But I will ask my manager of the PRA project for Ontario Power Generation, Paul Lawrence, to elaborate on the details of this.

**MR. LAWRENCE:** For the record, I am Paul Lawrence, Manager of the PRA Department at OPG.

In preparing the high wind PRA for Pickering, we started by developing a high wind hazard curve and that looks at the probability of various wind speeds that will be seen on site.

We looked at both tornadoes and thunderstorms which can result in very high downdrafts, plus straight line winds from the tail end of hurricanes.

In some of the cases, such as a tornado or a thunderstorm, there may not be a significant warning, so the PRA was done based upon the fact that the wind hazard occurred. It struck all four units simultaneously, without sufficient warning to be able to shut the plants down.

The high wind hazard curve was produced using information produced by Environment Canada. It was put together by a recognized expert from the United States and independently reviewed by the wind energy -- the Wind Engineering Department of the University of Western Ontario. And that's what we used in our PRA.

**MR. ELLIOTT:** Just make a couple of comments just to close that out. The -- the limits that we've talked about, you know, have not been exceeded.

So when we did the -- we did this PRA for

the -- for the high wind, we found that that 1 in 10,000 year wind -- it's about 220 kilometres an hour, by the way, that 1 in 10,000 year wind, the damage to the plant, the severe core damage frequency of that was -- met our actual target, not just our limit, our safety target. So that's why we stopped.

If you -- that -- if you assume no credit for containment at all, that would still meet the limit for large release frequency. So we stopped when we met our target and we -- we didn't carry on.

**THE CHAIRMAN:** So does that -- does that mean there is no, then, large release? Is that your conclusion?

**MR. ELLIOTT:** The conclusion is the large release frequency -- the possibility of a large release, the probability meets our safety goals.

**MR. STENSIL:** I think this is going to get rather confusing.

I'll first of all just highlight for the Commission. I -- in my requests for the licensing decision, if the Commission goes ahead with the renewal of the licence, I actually recommend that there be a study -- direction that a study take place about Pickering's vulnerability to external events because we're learning a lot more information that we didn't know about in 2008,

for example, when we did an environmental review on the site.

I think the point that I was making though is there seems to be a bit of a disjoint between -- with high winds, it's just below the large release frequency.

Yes, it's met their core melt target, but what I pointed out is once you get core melt at the station, you see in other situations, it leads to large releases, so we should also be looking at those scenarios to get a full cumulative view on the total risk of the station.

**THE CHAIRMAN:** Monsieur Tolgyesi?

**MEMBER TOLGYESI:** Just -- you know, Pickering is not the only one nuclear station in Canada and in the world. Do you have, staff, any data, any information on other places where -- because we are talking about high wind, we are talking about 220 kilometres.

Last time -- last tornado was about 400 and some odd kilometres. I'm not talking about that one necessarily, but I think that there's some other power stations -- nuclear power stations are exposed to those high winds also.

So how do they compare? We have no estimates here because of some reasons. It's a standard



practice in other ones that also they don't have enough information about?

**DR. RZENTKOWSKI:** Thank you for the question, but in my response, I would like to link it to the previous discussion.

So I would like to highlight two points. First of all, in the case of extreme weather, the station will be put on the alert first, so that means in a quiet mode of operation. No power manoeuvres, very quiet mode.

If the extreme weather is confirmed, the station will be shut down, so that the President was right, the station will be shut down.

The second point is that the results of this assessment of external hazard associated with -- with winds actually points that our regulatory system works because safety goals are intended to identify potential areas of improvement, and here you have one.

For external hazards, there is definitely some deficiency in the design which needs to be retrofitted, under Fukushima Action Plan, we first ask the licensees to assess external hazard. This has been done. Those are the results which we are discussing here today.

The next step is to decide on engineering features to improve the design of the site. So the engineering features have to be presented to us by the end

of this year. It's work in progress, but we are moving very quickly with the Fukushima Action Plan nevertheless.

Now, with regard to international experience and extreme weather, I will ask Mr. Gerry Frappier to provide more information.

**MR. FRAPPIER:** Thank you. Gerry Frappier, Director General of Assessment and Analysis.

First of all, I'd like to point out that we do not in fact solely base our safety assessment on a PSA or a PRA as it's called here, and that in fact, our assessment of the safety of the -- of the nuclear power plant is based on a whole suite of different approaches, different tools, in particular, deterministic analysis to establish the various safety margins.

We also have key engineering design standards as we've been talking about over the past couple of days that must be met that ensure that we have safety margins against -- against incidents or against different failure modes.

These are all based on solid metallurgical, thermohydraulics, different physics codes and whatnot so we are in fact sure that design requirements are being met.

Also there is strict requirements for various inspections and ongoing engineering model, and all

of these are the prime fashion by which we determine the safety of the reactor.

In support of this and as a -- as a different view of things, we have, over the past couple of years, introduced the requirement to have a probabilistic safety assessment or PRA as being talked.

We're one of the few jurisdictions in the world that actually require this. And this is to provide a whole different viewpoint, not so much of getting to the last number which has been presented here by Greenpeace, but all the detailed modelling of how the different failure mechanisms interact in that so that we can find areas that we can improve safety.

So the safety requirements of the -- of the licensee is meeting the safety requirements as laid out by the law. And with the PSA, we can -- we can push to see what sort of things could be done to actually improve safety beyond those -- those requirements.

And as Dr. Rzentkowski has said, it is proving to be very valuable. This is one of the things the international community is very interested in with respect to how we're doing things here because we are identifying things that, hey, if you look at it from this perspective, maybe we should be augmenting this area or that area. And this is the sort of things that these --

the PSA is -- is showing up.

So this is to provide avenues for improving the safety beyond the original design, beyond the design requirements that we currently have in place.

For the details on -- on wind itself, if we want to continue pursuing that, then I would ask Yolande Akl to -- to provide us with some additional details.

**MS. AKL:** Thank you, Gerry. This is Yolande Akl, Director of the Probabilistic Safety Assessment and Reliability Division.

To answer the question about international use of PSA for wind, to our knowledge, the U.S. NRC did a very limited PSA Level 1 for wind.

So in Canada, we are really -- we had our full scope Level 1 PSA that was done by OPG. And this is really a new methodology that it is not very mature yet.

And as per our S294, which is our regulatory document for PSA, we allow for alternative methods to do external event analysis, so not only with PSA. So that's -- and they did the analysis and we accepted the level 1, and level 1 was -- showed us that the core damage frequency met the safety goals.

So the approach was iterative approach, so once they met the safety goal with level 1, we accepted that they don't do level 2.

**THE CHAIRMAN:** Can I again -- I'm trying to put some of this statement into something I can understand.

There was a PSA done in the past. What Fukushima taught us is that you need to do some enhancement on dealing with external events beyond design. You put in a whole set of requirements on the operator to enhance the facilities.

Are you doing now the update of this public safety analysis, use -- calculating what this new enhancement will do to the probability? Did I understand that right?

**MR. RZENTKOWSKI:** I think that this was a very correct understanding. But let me rephrase this a little bit to also reflect what we are currently doing.

The development of PSA methodologies is evolving. Initially, those methodologies were focused only on internal events. Later on were common cause internal events like flooding, fire.

Under Fukushima, we push the industry to develop also methodologies for external hazard. That means seismic, fire, flooding, winds.

So this analysis is being completed and for Pickering B has been done by the end of 2012, and the results have been discussed a moment ago.

For Pickering A, those new methodologies will be applied and we will receive the results by the end of 2014, I believe, because it's really a long time to conduct assessments like that.

But the most -- more importantly, what we are doing with -- it's what we are doing with the results. As I mentioned before, PSA is a very important element in deciding what are the potential safety improvements and what really has an impact on safety.

And through this analysis, we are identifying those potential safety improvements, and this is also done right now under the Fukushima project. Engineering improvements would be proposed to us by the end of 2013 for those external hazard assessments which have been already completed.

So -- and also, I would like to finalize by saying what is PSA. PSA is a mechanism which transfers hazard into risk. For example, let's take seismicity of the site, seismicity at a certain level expressed as the peak ground acceleration.

It doesn't mean that it will have an impact on safe operation of the plant. We have to calculate the risk to know what is the impact of hazard on safe operation of the plant. And so PSA is this mechanism which allows to translate the external hazard into

external risk.

**THE CHAIRMAN:** Yes, you wanted to say something.

**MR. STENSIL:** Yes, there's two strands I want to pick up on.

First, it's -- from a public intervenor point of view, it's a little disconcerting that in these hearings over and over again, we're told the probability of an accident is low, therefore, the station is safe, over and over again. And that is used all the time to dismiss the public's concerns about different hazards.

However, when we find a study that starts to show that that hazard is actually at the limits that have been traditionally recognized as a limit on reasonable risk, staff begin to talk about other issues. Suddenly, PSA use is being minimized and we're talking about other types of safety requirements.

That worries me a little bit because this is -- once we start getting -- I made a speculative statement that there's data trimming going on here. But what worries me most about this PSA is in other PSAs that I've looked at, usually OPG is able to, the engineering term, sharpen the pencil. When you don't get the result that you want, you sharpen the pencil and you change the results.

And I raised that issue with the Commission during the Darlington refurbishment hearings. They reduced the large release frequency just through modelling down to, I think, one E to the minus seven, then went on to do other enhancements.

So no one -- so first of all, I think we need to keep eye on the ball. No one on the staff has denied, or OPG, that this station in the new assessment is right on the limit of large radioactive release frequency. And that's what's supposed to trigger your job under the *Nuclear Safety and Control Act*.

Core damages are relevant. OPG will have to deal with that through its insurance. This is where we're putting the public at unreasonable risk. And there's some questionable data trimming going on that I think we need to scrutinize.

The second piece is I completely agree with Mr. Rzentkowski that we should be looking at engineered safety systems to upgrade this. That's part of my request. But I think we're portraying the current PSA as a response to Fukushima wrongly.

Five years ago, we got another PRA for Pickering B and some of you were on the Commission at the time for the Pickering B environmental assessment review. And even though, at that time, OPG knew it was an



expectation that external events should be included, they didn't do it. And what was the result? I called them on it at a hearing and we included another accident scenario and environmental assessment.

So since that time, they have been directed to include external events. Fukushima's happened in the meantime, but this is still them catching up after 40 years of operation to get a better understanding of the risk.

So I think we need to direct the conversation that yes, this is at the limit of risk, no one's denying that. What do we do about it? Do we shut the plant down or do we reduce the risk? And would OPG be willing to spend the money to reduce the risk if it's just going to operate for five years?

**THE CHAIRMAN:** OPG.

**MR. ELLIOTT:** Mark Elliott, for the record.

One of the things I want to mention is that we haven't -- in this PRA, we haven't taken any credit for the Fukushima equipment. And we did that on purpose, actually, at my direction.

And what I wanted to make sure is that the engineered features of the plant were assessed and that we -- did we meet our safety goals or not with the plant, the way it's designed, and the answer was yes. So the plant

is safe the way it's designed now, meets our safety goals.

Leaving the Fukushima equipment aside -- and the reason for that is that the lesson at Fukushima was it could be worse, it could be different than you're expecting. And so we've kept that Fukushima equipment aside. It's an added layer of safety.

Yes, it's been estimated as a tenfold reduction, but we agree with that because there's time -- we talked about times today. There's time to implement, so that's why we believe there will be a significant impact on safety.

But I didn't want to put it into the numbers because we don't know exactly what the event is that will cause us to use that equipment. We don't know the exact sequence. I wanted to keep it separate.

So bottom line, we meet the safety goals as is and we have the Fukushima equipment separate.

**THE CHAIRMAN:** Okay. Other line of question? Ms. Velshi.

**MEMBER VELSHI:** So this is the highly complex issue for me and trying to understand these tables.

If I look at Table 4 -- and I know OPG says that for large release frequency, you're meeting your goal, but your total is higher than your target; correct?

At 8.03, higher than one to the E to the minus 6.

And you say there are a couple that haven't been included, and yes, you haven't taken credit for some of your post-Fukushima intervention. But you are higher than your target.

So some of it is just language when you say goals and targets and limits. I mean, clearly the limit is what you don't want to exceed, which the CNSC has it as its goal. But your target is what you're really trying to strive towards. Is that correct?

**MR. ELLIOTT:** I'm sorry; I'm trying to catch up with you in terms of the numbers. And I'm using -- by the way, I'm using the report that's on the Web.

We talked about freedom of information earlier; a 109-page report on this on the OPG public Web site, so that's what I'm using. I can't verify the numbers that other people are showing.

So the number that's being shown, I'm trying to find it in ---

**MEMBER VELSHI:** Yes, if we can have Slide 4 of Greenpeace's presentation?

**MR. ELLIOTT:** I'm trying to show.

**MEMBER VELSHI:** I'm just trying to understand what these numbers are really saying, and then getting down to what staff has said is -- so what exactly

is it that you're going to be striving towards and what is it that we, as the Commission, would like to see for the station?

So your safety target for large release frequency, according to this table, is  $1E$  to the minus 6?

And I see some nodding, so that's correct.

**MR. ELLIOTT:** That's correct.

**MEMBER VELSHI:** And your total based on your PRA is  $8.03 E$  to the minus 6, so higher than your target?

**MR. ELLIOTT:** Yes, the numbers in the OPG web site are 3.9 times  $10$  to the 6, still higher than the target, correct.

**MEMBER VELSHI:** Oh, no, but your 3.9 is for your internal events; correct?

**MR. ELLIOTT:** Correct. Yes.

**MEMBE VELSHI:** So if you include some of the external -- you haven't got all of them there, it's higher than your target, so even internal events was higher than your OPG safety target?

**MR. ELLIOTT:** Correct.

**MEMBER VELSHI:** So the question ---

**MR. ELLIOTT:** But less than our limit.

**MEMBER VELSHI:** Less than the limit, less than what the CNSC goal is.

So the question is, just as, you know, we have goals and limits and targets and whatever, what is it that you're striving towards?

Because I think your earlier comment was because you were less than your goal, you said, okay, no further analysis is required. But you are higher than your target. And is your goal, as we understand goal, is to try to get below that target.

And as a Commission, I mean, and I'll ask staff that, is that what we should be expecting of the licensee that they really have that -- and I hate to use the word "margin", the margin between the CNSC goals and where they are at?

First, I'll ask OPG to just confirm that, indeed, their assessment currently is higher than your internal target that's been set.

**MR. ELLIOTT:** The assessment is higher than the target and lower than the limit. And in that case, what our policy is, is to look at ways we can reduce it. And that's what we're doing right now. We're doing it kind of through the Pickering A process right now. We have to do the Pickering A PRA, most of it this year, some of it next year. Most of it will be done this year.

That's where we're working right now. We're finding -- finding improvements that we can make and

we can apply, and we'll apply those.

So I'll ask Dr. Carlos Lorencez to give us a little bit more on that.

**DR. LORENCEZ:** For the record, Carlos Lorencez.

The number you are referring to is after all the large release frequencies have been added and come up with that single number. You may perform many arithmetical operations with the results. The problem is the interpretation of the result.

In this case, I don't think I know or Paul knows or the industry knows what would that mean. What we are looking at this is that the nature of the events happening, internal events, or fire or flood or seismic or external hazards like straight winds, all of them have a different methodology, different assumptions, different conservatisms, different uncertainties.

And if you were to add them all up, it would be a -- it's an indicator. I preach to anybody who can hear me that these are numbers; you should not base your decision on numbers. This is just a guide, an indicator to guide you in the right direction.

As Mr. Frappier already indicated, the safety case is much more complex than one single number.

**MEMBER VELSHI:** If you look at just

internal events, and I think I'm understanding that it's very simplistic to add it up and thinking all these things are going to be happening.

If you looked at the last time you did your PRA, and just for the internal events, because I gather that's what you had done it for, the 3.9 E to the minus 6 has that gone up since the last time? And if it has gone up, is that as a result of ageing primarily?

**DR. LORENCEZ:** Carlos Lorencez, for the record.

The last version that we had for the Pickering B PRA was 2007 -- 2007. That is six years ago and six years in the PRA area, which is a fast evolving area, is a long time.

The new methods -- the new methodology accepted by the CNSC, the new computed codes that we use for this have indicated different results. We include all that in the PRA, and the fault tree entries and all that.

The ageing part that you are referring to is already considered there in the failure rates of the components.

**MR. STENSIL:** Just to follow-up on that. I point out in my submission that according to the CNSC's Web site, the CNSC has recently commissioned a study entitled "Incorporating Ageing Effects in the

Probabilistic Safety Assessment Applications". This study is not available but it tells me that the CNSC is actually still catching up with how to incorporate ageing effects into these PRAs.

And one of the things that I note in my submission is we should assume that this is an underestimation of risks that we're not dealing with as well. We're projecting a middle-aged plant onto an old-aged plant.

**THE CHAIRMAN:** Go ahead.

**MR. ELLIOTT:** Could I respond to that I comment on that?

The PRA that we did for this S-294 takes into account the current performance of the plant, the current condition of the plant. It's not an estimate from original design. It's the current failure modes, failure rates that we're seeing in the plant and specific to this plant. So it takes into account the plant as we run it today.

**MEMBER VELSHI:** Thank you.

And to staff, and I know that this is a tool and it's evolving, but tell me what these numbers mean to you.

**DR. RZENTKOWSKI:** Thank you very much for this question. Greg Rzentkowski, for the record.



If a calculated safety goal is higher than the limit, the licensees have to implement identified safety improvements. If the safety goal is between the limit and the target, the safety improvements have to be implemented if they are practicable. So that means we look at the cost benefit analysis. If the safety goals are lower than the target, then safety improvements are expected when practicable.

However, I would like to bring this discussion a little bit down to earth because we are looking at a safety goal as an absolute statement of safety of the plant. This is not the case; this is not what the safety goals are for.

And there is even something else I noticed in this discussion; that it reveals a certain nuclear safety paradox because the probable, the safety goals, ranks higher than the actual, and the probable is believed to bring us as close to the reality as the modern science allows. But this is not the case yet because the quality of the PSA is not very good.

The actual, however, very stringent design rules that allow effective implementation of safety functions and the supporting defence in-depth principle to keep the risk as low as practicable and form the solid foundation for the current safety case is largely ignored

in this discussion.

So it has to be remembered that the reactor would be safely shut down and maintained in the shutdown state because of the existing design features and the effective implementation of the defence in-depth.

**THE CHAIRMAN:** You want to ---

**MR. JAMMAL:** It's Ramzi Jammal.

I just would like to echo Dr. Rzentkowski. It's -- again, put in perspective reality, talking about the number, talking about the safety case. Don't forget that the reactor will shut down safely; otherwise, we will not authorize it to operate, and that's the key element.

Now, taking PSA, PRAs are indicators, no more, no less. They are indicators, and even though OPG is insisting of not taking the Fukushima enhancement as part of their methodology because of some complexity, but according to the Fukushima Action Plan, they must put them in place.

They will put them in place, hence, if you take the numbers, recalculations, however the methodology that is going to be done, it will be one order of magnitude lower.

So I know my staff is not going to like the fact that the number will be 10 the minus 8, 10 to the minus 9, but that's what the goal is going to be. So the

Fukushima enhancement will be put in place and then the improvement will be recalculated.

What it means -- but the key point here is if the operation is threatened, the system will shut down safely and the reactor will be in shutdown state.

**THE CHAIRMAN:** It's still very unfortunate that we're not using that. If you're telling me that there are -- already some Fukushima mitigation already were put in place, for them not to be reflected in the numbers is not helpful.

It's because we're talking about hypothetical recalculation, et cetera, et cetera.

I don't know why you didn't come up with an updated number, at least an estimate of what each of the Fukushima implemented mitigation actually done to the probability. That would have been useful.

**MR. JAMMAL:** I'm not the specialist, so I refer to the experts.

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I'm not an expert in PSA, but nevertheless, I know that the Fukushima-related improvements, which are already in place, allow us to reduce the safety goals by at least a factor of 10, and for some accidents scenarios, like for example a station blackout, even a factor of 100.

**THE CHAIRMAN:** Greenpeace.

**MR. STENSIL:** Again, I find it very disconcerting that as soon as we approach a limit on what risk should be to the Canadian public, as soon as we've reached that limit, we start talking about everything else instead of addressing the problem. That really worries me.

What I've heard the past two days out of staff and OPG, which I think was the implied response to my submission, in regard to PSA goals, all of a sudden it is they're not a limit, they're an expectation. So it's not a rule any more.

Two, PSAs aren't good anyway. They're very uncertain. I was interested to hear that because I raised a lot of these uncertainty issues in December with the Commission regarding how these are used to exclude large accidents and environmental assessments. So maybe I should take that as acknowledgement that I was correct.

And third, it is the Fukushima Action Plan will reduce all these numbers by an order of magnitude anyways. So don't worry about it. The third one especially, we've seen no evidence of that.

If we could supply the napkin that it's provided on to the Commission, that may give us some basis for discussion on that, but that hasn't been provided to

this decision.

You have to make a decision based on the information available. And the information available that we've gotten from OPG shows this station is right at the limit of being an unreasonable risk to Canadian society. And that triggers your obligations to reduce that risk.

I cite in my submission past examples with Pickering. During the Pickering A restart in the late 1990s, the core damage frequency came out. It hit the limit. And the CNSC required OPG to carry out upgrades to reduce that towards the goal. So we have precedent for doing that.

The question is, will you do it in this context when the station only has five more years to operate? If you renew the licence, I think you should.

**THE CHAIRMAN:** Dr. McDill.

**MEMBER MCDILL:** Thank you. I'm going to change the topic just a little bit. The next intervenor has the same point, so it's maybe good to do it here.

On page -- unnumbered page. In the intervenor's submission under Section 4, there is a comment with respect -- we've already talked about this once today. But I would like to do it again, please.

Concerning the -- I'll read the quote:

"This containment assessment is

designed to handle 530 gigajoules of thermal energy from one reactor during a one-hour period after shutdown, thus Pickering's containment system can only deal with an accident at one reactor."

I'd like that to be addressed by staff and OPG, please.

**MR. RZENTKOWSKI:** Yes, I think this comment -- Greg Rzentkowski, for the record.

This comment is made in relation to the vacuum building and not the containment. The vacuum building is an additional design feature which provide defence in depth because it allows to reduce the pressure in individual containments under accident conditions.

And that's true, it can handle only one, maybe maximum two volumes of air from containments; no more. So yes, the comment is correct. But as I mentioned, this is an additional design feature.

**MEMBER McDILL:** OPG, please.

**MR. ELLIOTT:** Mark Elliott, for the record.

The vacuum building was really put in place for design basis events such as a loss of coolant accident. Incredible to think a loss of coolant accident would happen on more than one unit, so that's why it was

sized for one unit and it will handle one unit.

The multi-unit events, the station blackout that we've been talking about earlier and coming up with that 18 hours, that involved the vacuum building as well. But the vacuum building was used up fairly quickly because there was more than one reactor going through that.

So for design basis, loss of coolant, accident, it's one unit and it handles it -- it's capable of handling that one unit. For multi-unit events like station blackout, there's some benefit from the vacuum building, not complete benefit. That's why there's releases at 18 hours.

**THE CHAIRMAN:** Greenpeace.

**MR. STENSIL:** I'd like to use one of my slides again, if you could put that back up on the screen.

And I think this is where it's important we -- the phrase defence and depth gets thrown around a lot. And the way defence and depth is supposed to be quantified is actually you see it in how the safety goals and limits are placed.

You have core damage, and then one magnitude of probability lower, you're supposed to have large release frequency. And what's meant by that is if you get core damage, the containment will provide a lot of redundancy to prevent radioactive releases.

What the slide on the screen shows is that, in the event of core damage, there's a high probability that you go to a large radioactive release. And that's because of this flaw in design.

And so I think what staff just said, you know, in response to the Fukushima Action Plan, you know, in the event of an accident, the reactor will safely shut down and most likely release a large amount of radiation if core melt takes place. And that's what's important for the public.

And this is what we're seeing. This is -- it's not just throw defence and depth around as just kind of a slogan. This is where we're seeing proof that there's not a lot of defence and depth in this station.

**MEMBER McDILL:** Back to staff because we started hopping up and down there.

**MR. RZENTKOWSKI:** Thank you very much. Greg Rzentkowski, for the record.

That's a very good observation, but the wrong interpretation because an order of magnitude difference between the core damage frequency and large release frequency is required to reduce over reliance on containment.

Over reliance on containment; so we are looking in the other direction to make sure that the



safety features are effective in halting the progression of the accidents inside the reactor before the reactor core is being fully melted. So there's a different objective.

We would like to go back for a moment to the question about Fukushima and how much we get in terms of the benefits, in terms of the safety goals. Mr. Gerry Frappier will provide the numbers.

Oh, Yolande Akl will provide the numbers.

**MS. AKL:** Yolande Akl, for the record.

I just want first to say that OPG, when they did the wind PSA, they used very conservative assumptions. And the results of the eight to 10 to the minus six meet both the core damage frequency and large release safety goals.

They also did a sensitivity analysis demonstrating what will happen if we credit the emergency management equipment, mitigating equipment. And it shows that it would reduce the core damage frequency by 14 percent. So that was in their own document, OPG document. I would ask specialist Smain Yalaoui to add anything.

**MR. YALAOUI:** Yes, for the record, my name is Smain Yalaoui, PSA specialist.

Yeah, I just would like to stress the fact that when wind PSA was done, this is the first time it was

done so the -- our regulatory requirements document is unique in terms that it asks for the methodology acceptance before. So we accepted the methodology.

And because for the wind, the methodology is not mature, the primary focus for us is on the major contributors to the risk. So the reference to the number is not the thing that matters, though we look at it to show that it meets its safety goal.

So once OPG, they did the wind PSA, they did it with a phased approach, so long as they meet the safety goals and we know what are the vulnerabilities. They meet not only the core damage frequency, but the large release frequency. So we accept that they don't do the large release frequency, the LRF, because this is bounded by the core damage frequency.

And for the question related to the improvements, because of these conservative assumptions, if we do some improvements like refuelling of the emergency power generators, the daily task, the CDF will also go down by the 22 percent. This is in OPG report.

So we would see at the end if we take care of the emergency mitigating equipment, if there are some procedures which are put in place as refuelling the EPG tanks, this will reduce further the CDF.

**THE CHAIRMAN:** Mr. Jamieson?

**MR. JAMIESON:** Terry Jamieson.

And I would just like to point out that the last column, conditional probability, is a meaningless column. All it says is that if there's severe core damage, there will be a large release. The important number there is the large release. Numbers approaching one, while they are certainly sensational, are meaningless.

**THE CHAIRMAN:** Sorry, you'll have to do a little bit more elaboration here.

**MR. JAMIESON:** Or perhaps we could ask Greenpeace to explain the significance of their last column.

**MR. STENSIL:** So the point I'm trying to make here is we hear a lot from staff and OPG that defence in depth, the barriers put in place, will prevent large radioactive releases to the environment.

You know, one of the things you hear in the Canadian nuclear industry, the difference between CANDUs and Chernobyl, is like, well, our reactors have containment.

What you see here is because of the shared design, the shared containment design, this station shows an inability in the event of core damage to contain radiation effectively. You're not getting a lot of

redundancy there. That's worrisome.

I'm really shocked that we're kind of minimizing that. You see it in the numbers. From someone in the public, you see a core damage frequency and a large release frequency that are basically the same and you can make the observation, well, if you had core damage, you're going to have a large radioactive release.

So I don't really get the point actually.

**THE CHAIRMAN:** Okay, you guys. Want to try one more time?

**MR. RZENTKOWSKI:** Let me give a try. Greg Rzentkowski.

Actually, what it means is that for certain accident conditions like, for example, seismic, the reactor safety functions are not capable of arresting the progression of the events before the core meltdown happens.

So that means, in this particular case, the cooling function is probably not fully effective but the containment function is very effective and this is reflected by the probability of large releases.

**MR. STENSIL:** And what's -- thank you for acknowledging that and I'll go back to my original point is that no one has denied that this station, according to evidence on the table, is right at the limit of what was

defined as unreasonable risk.

No one has denied that. It's just under the level. I've pointed to a series of things that I think have been excluded, probably wrongly, and the difference with this risk is it's not about core damage; this is about threats to the public, the Canadian society around the station.

Large radioactive releases, as defined by the CNSC, lead to the abandonment of land potentially. These are big accidents. And suddenly when we get near the limit, it's an expectation.

I would note, and I talk about this in my submission, there was a draft regulatory guide in 2009 on probability limits for existing reactors and it was going to make these part of the CNSC's formal regulatory framework. That guide was never passed or approved for some reason. And that's put us in the situation we're in today where people are like, well, it doesn't work for us. It's now an expectation and that's really disappointing. I'm not reassured by this at all.

**MR. ELLIOTT:** Okay. Could I comment on that, Dr. Binder?

**THE CHAIRMAN:** Yes.

**MR. ELLIOTT:** I think I can kind of tie a few things together here.

You've heard about the Fukushima action items. One of them that's being evaluated right now is on containment. And we have to -- one of the Fukushima action items is to look at these issues from containment, these station blackout type issues, these high wind, flooding, seismic issues effect on containment and we have to propose to the CNSC what we're going to do about them.

So we're going to do that. That's underway. One of the things that we've noticed already about Pickering, the emergency filtered air discharge system, the filtered air discharge system that we have now, which not much credit is taken here and you can see that, is actually we're finding it more robust than originally thought. So there's some credit that we may take there.

But we're going to give a fulsome report to CNSC staff on that Fukushima action item. It's all related to containment, which the intervenor is talking about. So there is a way to work through this. It's let us finish off the Pickering A PRA, finish off the Fukushima action items, decide what we're going to do, get that accepted by the CNSC and then come back and look at these numbers.

**THE CHAIRMAN:** Okay. Anybody else has a quick one before we move on?

**MEMBER HARVEY:** I just want to add, maybe to end that, that the -- when you mention that those are numbers and we have to take care in using those numbers because they have been produced with a certain number of assumptions, and we heard from the staff it be very conservative. But when you're here and you look at that, what means conservative? What means assumptions?

So maybe you know that and it's easier for you to understand and to explain it, but for us it's not so easy because it has to be good or no good.

If those numbers are not very useful, why are we asking to have the PSA? And it's long to get to the PSA. It will take a year and a half to get the study. But I don't know how to express that but it's not easy for me anyway -- and I'm not talking for the others but for me -- to really know what to do with the table, what to understand from that table.

**MR. RZENTKOWSKI:** I would like to -- in response, I would like to repeat the point I made before.

Safety goals and PSPS and supporting PSA, it's extremely important tool in identifying practical safety improvements, and this is the main objective of applying PSA. However, PSA just complements the design requirements, so that means the hard design rules, and it's not the only tool by which we regulate.

**THE CHAIRMAN:** Just a second. Hold on.  
You're going to have the final word.

Anybody else, any particular question?  
Go ahead.

**MR. FRAPPIER:** Just one little comment to the last question that, again, we got to remember why are we doing this PSA? So we're doing this PSA because we're trying to identify where are some of the areas that we could make meaningful changes that will reduce the overall risk.

So as OPG has just mentioned, now that we have these results -- they're just finishing them up. They're going to be finishing them up this year. Then the activity is going to be, given these results now, let's take a look at where is it that we should be doing things and so that these overall risks get reduced. And that's how we look at these numbers to answer the question.

Just like Dr. Rzentkowski mentioned, they're in an area now where we're going to be forcing them, take a look at it and you better be able to tell us what you're going to do to reduce them, but you will be allowed to have some cost benefit analysis with that.

**THE CHAIRMAN:** Okay. Anything else here?  
You have the final words.

**MR. STENSIL:** First of all, just a comment



in response to Monsieur Harvey. It's amazing that suddenly, post-Fukushima, we're able to reduce the frequency of large radioactive releases supposedly by an order of magnitude without spending a lot of money. I wonder why that's the case.

It might point out that maybe we need to have a lot more focus on these PRAs in the future because I've never heard OPG say this is an economic for us. I think it's only going to cost them 100 million or something.

That worries me a lot if we can do practicable upgrades for so cheap that reduce risk that much, but we didn't do it before. That's just a comment.

So my concluding remarks, I'm a little worried. As I said, I have intervened in these hearings a lot and these studies are always what is used to dismiss the risk of an accident and tell the public that the reactors are safe and acceptably low.

When we approach the limit, suddenly it's a different story. That worries me a lot.

I'm really worried about the echo chamber effect between the people on my left and the right. They believe in the safety of these reactors so much that they're like, "Well, no, that's not a big deal".

That's what happened in Japan. These are

such low-probability events it doesn't matter.

I have pointed out to you today that this station has an alarmingly high large release frequency according to OPG's study. I've never seen a number that high.

It's right near the limit, and we've heard the CNSC say there's lots of uncertainties with these studies. That tells me we need to be really precautionous if we're right near that limit. And when it comes to large radioactive releases, that triggers your responsibility under the *Nuclear Safety and Control Act* to protect Canadians from these releases and I think we need to see action on that front.

The CNSC's slogan that greets people coming into the hearing room here today says, "We will never compromise safety". Well, you need to set limits and enforce them to do that.

Given that this is one of the oldest nuclear stations in the world, given the new understanding of the large accidental potential for radioactive releases at the station, given the omissions from OPG's risk review and given the known failings of emergency preparedness plans, you may want to reconsider or consider ending the use of this slogan if you renew the Pickering operating licence.

You have an obligation to act to reduce or eliminate risk and not simply renew this licence based on the evidence available. No napkins, please.

In the event that you decide to renew Pickering's licence, I would now like to make the following request for ruling under Section 23 or 20(3) of the CNSC's rules of procedure. And Marc, I will email this to you after I'm done.

I'm making this request because I think the public deserves a more holistic and integrated understanding of the risk posed by Pickering -- the Pickering site in light of Fukushima. My request is in line with another responsibility of the CNSC under the *Nuclear Safety and Control Act* to provide objective information to the public on nuclear risk.

This information is also important, the information that I'm requesting, for informing -- and I would also say motivating -- the provincial government's review, if they ever get to it, of nuclear emergency plans post-Fukushima.

My request is the following. Greenpeace requests a ruling from the Commission that, in the event OPG's operating licence is renewed for the Pickering Nuclear Generating Station, CNSC staff will be directed to publish a site-level integrated risk assessment for both

the Pickering A and B reactors by the end of 2013.

This should include the cumulative risk for offsite radioactive releases for all reactors at the Pickering site. This report should be formally provided to Emergency Management Ontario.

Thank you very much.

**THE CHAIRMAN:** Thank you. I'm going to take a 10-15 -- I need -- we'll take 10 minutes, which should make -- 10 minutes. Thank you.

**MR. LEBLANC:** So this is not the dinner break. This is a health break and then we'll come back and have dinner a bit later, so we'll do a few interventions when we return.

--- Upon recessing at 5:33 p.m./

L'audience est suspendue à 17h33

--- Upon resuming at 5:44 p.m./

L'audience est reprise à 17h44

**MR. LEBLANC:** If you can get back to your seats, please.

**THE CHAIRMAN:** Okay, we are ready to proceed.

**MR. LEBLANC:** No, we are missing ---

**THE CHAIRMAN:** Oh, missing ---

**MR. LEBLANC:** --- Member --two Members.

**THE CHAIRMAN:** Two Members we're missing.

I was going to send a search party for you.

So the next submission is by the International Institute of Concern for Public Health as outlined in CMD 13-H2.127 and 2.127A, and I understand that Ms. Tilman will make the presentation. Please proceed.

**13-H2.127 / 13-H2.127A**

**Oral presentation by the  
International Institute of  
Concern for Public Health**

**MS. TILMAN:** Thank you very much and good afternoon.

I'd like to -- as I show an overview of the presentation, I want to stress that ICPH traditionally has come before these hearings with health as one of its major focus points, just from the name alone. In this particular case, we decided safety is the biggest issue that we're facing; however, I want to preface this presentation with an issue concerning health.

On May 23<sup>rd</sup>, CNSC had released an email with the subject line, "No childhood leukemia found near

Ontario nuclear plants". This was released after our oral submissions were due and well after our written submissions were due.

There's been no opportunity to examine a document that would be very pertinent to this hearing. That's unfortunate. We are, therefore, requesting if CNSC consider convening some forum in order to investigate this document further and allow the opportunity for a critique of the document, so I will not be referring to it. There's, you know, any further, so I'm sorry, but I need to address that right now.

Okay. So I think we all know OPG's plan. It's to extend the designed end of life of pressure tubes and critical components of a reactor in order to keep the six reactors operating until 2020. They will reach their designed end of life.

In Pickering B, the fuel channels will reach their designed end of life somewhere between 2014 and 2016, sequentially.

Now, our key issues are ones that have been brought up. It's the age. This is the oldest and costliest nuclear station in Canada. There's a history of poor performance, frequent breakdowns.

As a matter of fact, in the appendix is a list of some of the accidents and incidents that have

occurred at Pickering A over the years and examples of other incidents that have occurred. They're only samples of incidents or significant events.

The kind of work that is to be done to increase the designed lifetime, there's no assurance that it is even safe or possible. The consequences of something such as a rupture of a pressure tube would be catastrophic. And it's been well stated that Pickering is fairly close to a very large populated area. No other nuclear station in the world is that close to such a highly-populated area, from what I understand, nor would one be allowed today.

We've also seen examples of inadequate and incomplete emergency plans, and this is a consideration. Is this a disaster waiting to happen?

Our concerns, as I said, relate to the safety of the station overall and whether it is fit for service as OPG and CNSC's documents indicate it is. But the record and history of Pickering is not reassuring.

And just as an example, I'm sure you're all well aware of the rupture that occurred in Unit 2 after only 12 years of operation, the shutting down of units and other accidents that are very, very significant that have occurred in that earlier period.

And of course, the history continues with

the shutdown of the four units of Pickering A in 1997 due to safety issues, delays in restarting. This is a typical condition that happens. One unit was restarted in 2005, Unit 1. Even though Unit 4 was restarted in 2003, it had to be shut down again for major repairs, so all this creates a lack of confidence in Pickering A alone.

And as you're aware, Units 2 and 3 were taken out of service. And not too clear exactly all the conditions behind that, but the decision based on the experience with Pickering A was not to proceed with refurbishing Pickering B.

The inadequacy of safety systems in this unit is disturbing. There's only one fast shutdown emergency system all reactors share -- all eight, because that has to include Units 2 and 3 -- share the same containment and cooling injection system. And multiple reactor accidents cannot be dealt with by this system.

We come to a problem that we are all facing, ageing, and these units are really facing it: Old units -- I mean starting in 1971 -- even with all the shut downs and the three kinds of items one sees happening is: creeping, sagging and corroding. None of them are very pleasant.

The pressure tubes are particularly prone to creeping which is expanding, I'm sure you understand,



the diameter as a result of expanding the diameter, and sagging which happens from the weight of the tubes. There is a potential to come in contact with the outer Calandria tube. That's not good.

I believe the Korean CANDU reactor has done some very interesting studies on diametrical creep, and mathematical modelling on that to indicate the problems that do occur. And there's embrittlement of metal walls due to corrosion. All of this leads to an increased chance of rupturing.

I just want to say some discussion was also held about black spots on the fuel bundles and it's very confusing when one goes through the documents to see what the root cause was. And there was discussion, so I won't go any further on it. But the concern that we have is the impact on fuel cooling by these spots.

Now, OPG plans -- we know -- to exceed this designed life by approximately 18 percent but there is no guarantee that this is safe.

OPG has expressed high confidence that the fuel channels will remain fit for service well beyond the proposed licence period but there is absolutely no scientific basis for such confidence.

And I want to refer you to the statement of the CEO of Hydro-Québec, which I think is quite telling,

that he wouldn't climb onto an airplane that doesn't have the permits and does not meet the standards. And it is out of the question to put anyone -- the people, the workers, the public, the company -- in a situation of such a risk.

Further safety issues. Steam generators. Very little talk has been done about them. They have never been replaced but, in the literature I have seen, they've been subject to corrosion from pitting. And an axial crack was developed in one of the pressure -- in one of the steam generators inner tube of the steam generators in Unit 4 during the random inspection. And if that were to rupture that would be catastrophic.

Feeder pipes are also susceptible to wall fitting, particularly at outlets, and Pickering A seems to be the most vulnerable to this. And part of the problem is the contaminating agents that are used. Apparently, the removal and replacement of just one feeder pipe would cost a million dollars and could take a year. That's another consideration.

In terms of health and safety, because the kind of work that would be entailed in increasing the design life would involve greater frequency of repair, work and monitoring, it would result in increased exposure -- potentially increased exposure workers to ionizing radiation as a result and that in turn would have -- could

have long-term effects and potential effects on families.

We have always expressed this concern that the exposure limits by SERP, in fact, work to allowing 3.2 excess cancers -- fatal cancers per hundred workers over their lifetime. This is an unfair burden.

The metric that is used in the documents of collective worker dose -- which sort of amalgamates what a worker, visitor and so-on is over a period -- is a false metric. It shouldn't be used. It obscures the exposure to individual workers which is the most important level that you want.

We come to economic issues. Based on past experience, all repairs, refurbishment at Pickering and other nuclear plants have far exceeded any of the original estimates made by the nuclear industry and their operators, sometimes as much as four or five times, and they've all taken far longer than the estimated period.

Examples are given in here, for example, of Pickering A, but we've seen this in Darlington, we've seen this elsewhere.

The only figures I've seen -- and maybe because I haven't seen enough -- is a figure here, for this work, of 200 million to improve the reliability of components. I am not sure what that means, but there is absolutely no public accountability or public scrutiny of

the kind of money that this operation would cost by extending its life and nor is there any expectation in there that there will be delays in this work. In fact, I would say that no business case has been made for this operation.

Sorry, I've mucked up the slides a little bit.

Probabilistic risk assessments. We heard a lot about this. And it's -- really there's three main bullets here that are to be seen. First of all, you cannot foresee every accident that could occur -- any event that could cause a serious nuclear accident and that includes a range of things, but we don't know what it doesn't include. It's an impossibility to determine the probabilities of all accident scenarios, even if they are foreseen, and we've see examples of that.

CNSC staff has acknowledged at our last hearing on the Darlington refurbishment a probability has no predictive value for one single event. In a single case, anything can happen at any time. No matter how small the probability is of a serious nuclear accident, it provides no guarantee of safety.

As to the probabilistic risk assessments, the PSAs or PRAs, understand that the PRA for Pickering A has not -- will not be completed until 2014. This is a

great concern. Pickering A has been a serious problem.

And I will also say, coming from a mathematical point of view, these PRAs are artifices. You put in things and you get out things and, sometimes, you can put in a lot, you're not sure what you're going to get out. We can't just rely on them and say we've considered everything possible.

But not to have these reports, even alone at the time of this hearing, is disconcerting.

**THE CHAIRMAN:** We are running out of time. Please conclude.

**MS. TILMAN:** I'm coming. Okay.

And the next slide speaks for itself, a serious accident will cause a major disaster.

Pickering cannot operate without creating this unacceptable risk, and it's greater and greater if the plants are operated and pushed beyond their design limits. And public safety requires that it be shut.

Sorry. I went back. How do I do this? I've got to get rid of this thing here. Okay. Okay. Sorry. My apologies.

A question in terms of emergency preparedness is to ask -- and each one should be asking ourselves -- if an accident -- a worst case accident were to happen today, right now, while we're sitting in this

room, are essential emergency measures in place?

And there's a number of questions that are asked on this slide, a few of them we've heard a lot about this today, and the answers to all these questions we believe is 'no' and that's a concern.

And one of the issues is the current state is far from adequate because the danger of a nuclear accident is not being taken seriously.

And this is a quote from Toshima Homa from the Japan Atomic Energy Agency about the implicit assumption that such a severe accident could not happen and that insufficient attention was paid to such an accident by authorities.

And I won't read this all, but I think it's an interesting quote about -- from an economist on discounting human lives by continuing these kind of operations, and you can read that.

In conclusion, to keep Pickering going by exceeding design limits is not an option. It should not be considered. It is too dangerous. It also prohibits and prevents the use of safer and cleaner energy.

Therefore, we are urging the Commission to reject OPG's proposal for a five-year renewal licence.

One proposition is to issue a temporary licence with instructions to prepare for closing Pickering

by the end of 2014. We've heard a licensing condition required in terms of the emergency measures.

We also are -- we're requesting the CNSC to direct OPG to develop a decommissioning plan for the Pickering reactors and have that plan subject to public scrutiny and consultation by the end of 2014.

And thank you very much.

**THE CHAIRMAN:** Thank you.

Questions?

Dr. Barriault?

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

It's almost been, I guess, a safety factor of the CANDU reactors to have a redundant emergency shutdown system. And yet the intervenor states that on the Pickering A reactors that they have a slow system and a fast system, they don't have the immediate shutdown.

Could I ask CNSC to -- to comment on this?

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

As a matter of fact, Pickering has two shutdown systems. One is a shutoff-rod injection and the second is a so-called moderator dump.

The only deficiency with the second shutdown system is that it's not as fast as poison injection into the moderator.

**MEMBER BARRIAULT:** Is that a good thing or a bad thing?

**DR. RZENTKOWSKI:** It's limited in terms of it's effectiveness. So if the first system, for whatever reason, is not actuated it will take, I think, approximately 20 seconds to complete the moderator dump. In contrast to about two seconds which is needed to activate the first shutdown system.

**MEMBER BARRIAULT:** So it's not as good as it could be?

**DR. RZENTKOWSKI:** Yes that's correct.

**MEMBER BARRIAULT:** Thank you.

**MR. JAGER:** But OPG could comment on that.

**MEMBER BARRIAULT:** Yes, OPG go ahead. Yes.

**MR. JAGER:** Glenn Jager, for the record.

I'll ask Carl Daniel to describe the shutdown systems. But the -- between the B and A plants, Pickering B of course has two fast shutdown systems that are independent. And on Pickering A units modifications were made to the shutdown system. It does have as CNSC staff said a shutoff rod and a moderator dump.

However we did do shutdown system enhancement and I'll ask Carl Daniel to describe that system.

**MEMBER BARRIAULT:** Thank you.



**MR. DANIEL:** Carl Daniel, for the record.

There are two -- two shutdown systems on Pickering A and on Pickering B. As Mr. Jager described Pickering B has both rods and gadolinium injection.

On Pickering A it was originally designed with rods and moderator dump. The -- when the reactors were taken out for refurbishment the shutdown system ECO, or enhancement, shutdown system enhancement was installed. It adds a new and independent set of triplicated trip sensors and trip logic. And they're called Channels, Gulf, Hotel and Juliet, and that augmented the new moderator dump logic.

So the system does have two systems that are installed. They are independent. And it augments the -- the moderator dump system to increase the speed for certain -- for certain amount of independent trips.

**MEMBER BARRIAULT:** Thank you.

Thank you Mr. Chairman.

**THE CHAIRMAN:** Anybody else?

Dr. McDill?

**MEMBER MCDILL:** Thank you.

In your fourth slide you say that the rupture of any pressure tube would be catastrophic and in your fifth slide you say that there was a metre long pressure tube rupture.

So do you think your -- your language catastrophic in the third slide is appropriate? Yeah, I think.

**MS. TILMAN:** Yes. I'm looking at -- you're looking at slide five -- yeah, I mean I'm saying that in slide five this is what had happened in 1983, okay, in one of the units. And I would consider that it could have been a catastrophic accident. It could have -- it could have led to that.

And so I'm not sure which -- so I guess what I was looking at key issues if that were to happen in any other unit or any other pressure tube the results could be catastrophic. I'm not sure if I understand your question.

**MR. ALBRIGHT:** Yes. I think we would have been better advised to say could rather than would.

But other than that it is, this metre long pressure tube rupture did cause all units to be shut down for re-tubing. That's how serious a matter it was.

**MEMBER McDILL:** Yeah, but what is catastrophic? I mean isn't that a ---

**MR. ALBRIGHT:** A meltdown obviously.

**MEMBER McDILL:** Yeah, but maybe I'm going to ask staff and OPG because if it's happened and I understand from today it's actually happened twice; once

at Bruce cold and once at Pickering. And both reactors are still there. Maybe they were shut down. This is -- this is maybe unfortunate or very bad for us in terms of costs but it is not -- the word catastrophic is ---

**MS. TILMAN:** Okay ---

**MR. ALBRIGHT:** It could cause a meltdown. There's no question about that.

**MEMBER McDILL:** I think we should -- we should check that on both parties because this is not the information we had earlier today.

OPG first.

**MR. JAGER:** Glenn Jager, for the record.

And I'll ask Mark Elliott or Carl Daniel to comment further but it's referring to an event on Unit 2 in which there was a pressure tube failure.

And that unit was safely shut down without the intervention of any special safety system. And there was no threat to fuel cooling at that time.

So it was safely shut down by the operators in full control of that reactor. It did lead to the re-tubing of the units owing to the change in material properties necessary. That was basically made evident by that event.

And I'll ask Mark Elliott if he'd like to comment further on that.

**MR. ELLIOTT:** Mark Elliott, for the record.

There was a -- the original pressure tube that had that one metre long rupture were made of a material called zirc-2. We now have changed that material to zirc-niobium-2.5 in the reactors. We've also implemented like a -- quite an exhaustive fuel channel inspection program. I think I've been talking about it quite a lot the last two days. And to make sure that that new material is one quite positive attribute but also that we monitor them all the way along and that we don't risk another rupture.

**MEMBER McDILL:** Maybe we could hear from staff first and then come back, would that be good?

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I generally have very little to add to what OPG staff already said. But let me provide a quote from a research paper which was published just after this -- this incident happened:

"The incident was handled by; and needed no action other than by the normal plant operating systems and operator action. None of the automatic plants safety systems were called upon to operate."

So we have automatic shutdown safety system, and we have automatic core coolant injection.

There's many, many layers of defence in there because this incident could progress further; actually this incident could progress to an accident.

**MS. TILMAN:** If I could respond to ---

**THE CHAIRMAN:** Go ahead.

**MS. TILMAN:** Is it okay?

All right, I mean I do not have access to all the information that OPG has or so on all these events. But it strikes me that this was one of the -- this unit was never returned to service. And I've never been able to find out why. Unit 1 and 4 were, Unit 2 and 3 were never returned.

And a search of the literature or whatever has never given any explanation. So there's missing things. Now, B also -- so that's one thing.

The other thing is pressure tubes are what we're talking about in terms of OPG's plan is to -- is to go beyond the designed life of the pressure tubes.

So the potential -- I'm not going to say what the probability is of an accident happening of a pressure tube happening, I'm not a nuclear engineer. If you like to say okay if that pressure tube goes there -- there could be, I would say there could be a catastrophic

accident. Perhaps that's a better way of putting it. But I don't -- there is no confidence given in this kind of thing because incidences have happened that haven't been quite clarified.

Where's -- what happened to unit 2 beyond that, why was it never returned? And here we are in going through an exercise, a planned exercise by OPG to extend the life of these pressure tubes beyond their designed life.

So it's a concern.

**THE CHAIRMAN:** OPG, you want to disclose?

**MR. JAGER:** Yes. Glenn Jager, for the record.

Units 2 and 3 -- well, actually, all the Pickering A units were re-tubed following that one event with the new material tubes, as Mr. Elliott described. Following that, the units were operated and then later shut down. The A plant was shut down and went through a return to service refurbishment.

That return to service was executed on Units 1 and 4 only. Units 2 and 3 were not returned to service. That was an economic decision taken by the Board of Directors of OPG, Ontario Hydro at the time.

Those units were subsequently defueled, dewatered and placed in safe state. And just a point of

clarification on the presentation, they were separated from containment.

So those units are separate from the containment, the overall station containment that was done during the vacuum building outage in 2010. They contain no fuel and they've been completely dewatered and placed in a safe state. So that is the status.

For Units 1 and 4, those units, the pressure tubes are at their midlife. They are not being extended beyond their design life or not in the same situation at all from Units 5 through 8. So those units have relatively -- comparatively newer -- new tubes, pressure tubes, compared to Units 5 and 8. They're basically midlife.

**THE CHAIRMAN:** Dr. McDill.

**MEMBER McDILL:** Thank you. I'll leave it there. I don't -- it's late and I don't think we need to go over the Bruce incident again. Thank you.

**THE CHAIRMAN:** Okay, thank you.

Mr. Harvey.

**MEMBER HARVEY:** On page 7 of your submission, the third paragraph on the bottom of the page, I just want clarification by OPG. The last two sentences:

"The emergency coolant injection system is shared by all eight

reactors. The storage tank and pumphouse, which were built during the construction of Pickering B Station, can provide emergency coolant for only one accident at one reactor."

Could you just clarify that point?

**MR. JAGER:** Glenn Jager, for the record.

I might ask Carl Daniel or Mark Elliott to comment further. But yes, that system is sized for a LOCA on a single -- any one of the single units. That's its design basis.

And I would also add that there's additional systems in addition to ECI that can deliver water to the units. It's our emergency water system. So we actually have multiple systems that can deliver water to any of the reactor cores within the station.

I'll ask Mr. Elliott to comment further.

**MR. ELLIOTT:** Mark Elliott, for the record.

The only other thing I would add is the -- there's some systems at Pickering that are unique to each unit. The shutdown systems have been talked about a number of times, independent fast-acting shutdown systems dedicated to each unit.

There's some other safety systems that are one safety system that helps -- that supports the whole



plant. And what's important is not that it's a shared system; what's important is that it's adequate. And the safety systems that we have at Pickering are adequate. They do do the job.

And as Mr. Jager said, in this case, the ECI system is required to handle a loss of coolant accident. There would only be one loss of coolant accident at a time in a station, and so that ECI system is adequate.

**THE CHAIRMAN:** Go ahead.

**MS. TILMAN:** I don't think you clarified any questions I had about Units 2 and 3 because if you read my submission, pages 7 and 8, I said exactly what OPG has said. So I was quite aware of the cost issue. That didn't explain anything further.

My understanding in terms of decommissioning Pickering, the Units 2 and 3 are still connected in terms of the shared shutdown system at Pickering. And this I got from the literature. This is not something I came up with.

And therefore, these units can only be decommissioned when the other units are shut down. So there is that linkage and there is some safety that has been written in your records.

So I'm confused when you say -- you're

implying, "Well they're shut down". Yes, we know they're defueled and so on, but they're still part of that safety shutdown system. There's something that links all those reactors.

And if you're talking about a public perspective here, I don't understand this and I think a lot of people would not understand this, either. And I want to contend that I don't have any reassurance in your reassurance about the ability to shut down these -- a multiple-unit system.

**THE CHAIRMAN:** Do you want to reply?

**MR. JAGER:** Yes, I do. Glenn Jager, for the record.

Units 2 and 3 do not share any systems with Units 1, 4, 5, 6, 7 or 8. Those units have been defueled, dewatered, powered down and separated from the common containment. So there is no connection between those units and any other unit within the Pickering Station.

**THE CHAIRMAN:** Okay. You'll have the final words.

I want to just hear, anybody else has any problem here, any question?

I just think that you mentioned the health study. I don't know if Dr. Thompson would like to clarify and maybe provide some more information?

**DR. THOMPSON:** Patsy Thompson, for the record.

The study that was -- the summary that was put on the CSNC Web site on May 23<sup>rd</sup> was put on the CNSC Web site so that it would be available before the Pickering hearings.

When we were at Darlington in December, there were a lot of questions raised about childhood leukemia and cancers around nuclear power plants. And the same issues were being raised for Pickering, and so I pushed my staff really hard to have a document available for the public hearings of Pickering.

The plan moving forward is to submit this work to a peer-reviewed journal, and that's where we would get the review done.

I'd like to say that when we started that work in 2011, we did the work for three nuclear power plants, the Port Hope facility in Chalk River. And the work done for Port Hope on cancer incidents was actually published in the peer-reviewed literature in January 2013.

It's work that uses similar methodology. The data has been validated by the Public Health Agency of Canada and Cancer Care Ontario. And so the study summary that was put on the CNSC Web site indicating that there was no childhood leukemia -- increase in childhood

leukemia around the three nuclear power plants is a robust study. And the data on other cancers is also vetted with and is compared to Ontario data in other regions.

So the plan is to submit the work for publication in a peer-reviewed journal, recognizing that we've already published two papers using similar methodology and peer-reviewed journals.

The intervenor suggested that we hold some kind of forum for intervenors or the public to critique the work. We believe that the best critique is through a peer review by submitting to a journal.

I'd like to note that for the Port Hope synthesis report, we held public open houses on our synthesis report. We requested input from members of the public and NGOs. We have never received any substantive comments.

The work has been published in the scientific literature, so we believe the approach we have is the best path forward. But I felt it was very important for the information to be available so that the public could feel confident that we have done what we've been asked to do.

I've been sitting in these hearings for many years now and we've been asked repeatedly to do health studies around the Ontario NPP. So we've done that

and I wanted the work to be available.

**THE CHAIRMAN:** But I'm sure, in the meantime, if you feel that you want to critique what was published, I'm sure you feel free to do that.

**MS. TILMAN:** Really, my objection is to -- leaving the report out -- is to get the email, a day, a night after the oral presentation had to be in and certainly well after our written presentations had been in.

So that didn't leave us -- and it was the summary report, as Dr. Thompson mentioned, that was put out. There is no time, you know, for us to go through. I understand it's an ecological study and, as such, that's one of the weakest forms of studies.

But I don't want to say anymore about it until we, the public -- because as Dr. Thompson said, this issue has been raised over and over again, but the timing was very poor.

**THE CHAIRMAN:** Okay. Anybody else?

I have only one last question, and that is on your slide 11.

I really -- I want to ask the question: You talk about exposure limits, well, I -- exposure limits, 3.2 cases. I never see exposure limits displayed in this way.

So I would like staff -- so somebody to tell me is that a proper way of displaying exposure limits?

You will get your last word.

**DR. THOMPSON:** Patsy Thompson, for the record.

So the answer to your question is 'no'.

What the intervenor has done is it has taken the 50 millisieverts per year dose limit to workers and using the linear/no-threshold relationship, as estimated cancer risk for workers getting 50 millisieverts per year during 40 years of their life and using the LNT, you come up with an incidence of cancer.

This is not the appropriate way of presenting the dose limits. What I would say is that the data for Pickering -- and it's been presented for Day 1 and the CMD to the Commission that, for the Pickering workers, 80 percent of workers at Pickering receive doses less than 1 millisievert per year; 95 percent of workers receive doses less than 5 millisieverts per year.

So there are no workers receiving for 40 years doses of 50 millisieverts per year.

And I would also like to say that we have reanalyzed 42,200 workers from nuclear -- nuclear workers in Canada and the excess relative risk is minus 1.20.

And so the risk is negative. There is no evidence of an increased cancer risk for 42,000 Canadian workers.

**THE CHAIRMAN:** Would you say this would be the fear mongering here, displaying it this way?

**MS. TILMAN:** No, I would say ---

**THE CHAIRMAN:** Okay, go ahead.

**MS. TILMAN:** Okay.

Again, when you put a PowerPoint together, and you try to shorten things -- it's much -- it's better explained in the written submission.

The point I'm trying to make there wasn't specific to Pickering or specific to any one facility, it was the fact that we do set limits and they're based on ICRP limits and Dr. Thompson gave an explanation where it was extrapolated from.

And because worker limits are set higher and we -- you know that, it really -- I'm just saying that that is an unfair burden. That is the point I'm trying to make.

That setting these as an allowable -- the ICRP limits are allowable limits for exposure. And the comment there is meant to reflect that workers are subject to an unfair burden. I didn't say the workers are receiving an unfair burden at Pickering, I'm just saying

that, in general, it's a critique of that limit.

So I just want to explain that.

**DR. THOMPSON:** Patsy Thompson.

I don't want to belabour the point, but if somebody looks at the *Radiation Protection Regulations*, the limits are accompanied by requirements to maintain doses ALARA.

And so the limit is not used to set an acceptable level of risk for workers, the requirements that the CNSC has in place is for all licensees to have radiation protection programs with very well developed ALARA programs, such that workers are not exposed to those levels.

But, essentially, the 50 millisieverts per year is developed on the basis that from epidemiological evidence there is very little evidence for an increased cancer risk at doses below 100 millisieverts.

But the driving factor is ALARA programs and the results I've talked about earlier.

**THE CHAIRMAN:** Okay. We'll leave it at that.

You have the final words.

**MR. ALBRIGHT:** Could I -- I'm sorry, could I just add a comment to that?

First of all, did this calculation of 3.2



excess cases of fatal cancers per 100 workers under the full allowable limit is, in itself, based on a lot of uncertain assumptions. It could, in fact, be greater than that as well as it could be less than that.

These calculations have a lot of uncertainty in it and the precautionary principle obviously applies. And let us not confuse actual exposures with allowable exposures.

The message here is that this allowable exposure limit is much too high and should be reduced and, obviously, from what we're being told, there's no reason why it can't be reduced.

I have a couple of other points about earlier things. First, a question: If Units 2 and 3 are completely independent from the other six units, can they then be decommissioned independently while the other units are still running?

Because from what we've understood, that's not possible and, therefore, there must be some interconnection.

And, finally, the claim that only one LOCA is possible at one unit, one loss of coolant accident, we have already seen at Fukushima that it can happen at more than one unit simultaneously.

So I don't understand the basis for this

claim that the system is adequate because only one LOCA is -- one unit at a time is possible.

Clearly, more than one is possible and, therefore, the system is inadequate.

**THE CHAIRMAN:** Okay, do you want to do a quick reply to this, please?

**MR. JAGER:** Glenn Jager, for the record.

Units 2 and 3 have been placed in a safe state, which is the same state that the entire plant would be placed in following the end of commercial operations in 2020 and will remain that way for a substantial period of time until eventual decommissioning of that would be done as an entire site.

So it is basically in its safe storage state awaiting decommissioning, which is the same state that all the units would be in following the stabilization period after 2020.

And that's a substantial period of time to allow for decay of components and so on and so forth that we have discussed previously.

**THE CHAIRMAN:** Okay.

Final, please.

**MS. TILMAN:** Thank you very much.

There is a concern, an economic concern, that doesn't seem to get a fair hearing and that's public

accountability.

I haven't seen, other than one number, to explain what these total costs will be to extend this plant to 2020 and beyond, nor do I have any confidence that the plant will not be pushed even further. There's no guarantee that it won't be pushed further. A lot depends on other things.

I think that -- I fear that the risks that Pickering poses, given its age, given its history, is not being fully accounted for and I really fear that all these probabilistic risk assessments that are done are manufactured artifices to say we can keep this unit running.

Really and truly, look at the history, look at the legacy and ask yourself: Is that what we should be doing or should we be shutting it down?

Thank you.

**THE CHAIRMAN:** Thank you.

I'd like to move to the next submission, which is an oral presentation from Ms. Simeuvonich, as outlined in CMD 13-H2.88.

Please proceed.

**13-H2.88**

**Oral presentation by**

**Ms. Michelle Simeuvonich**

**MS. SIMEUVONICH:** Good evening and thank you for this opportunity to speak today.

I realize that it's very late on the second day of hearings. Everyone is hungry and so I promise to keep my submission as short and to the point as to why I'm speaking today.

My name is Michelle and I am here as a private Canadian citizen and a current resident of Pickering. I am deeply concerned with what I know through experience and what I have read in the literature, such as the "*Durham Region Nuclear Emergency Response Plan*", the "*Nuclear Public Safety*" brochure, and "*Are you ready? Personal Preparedness in Durham Region*" brochure, especially as it relates to evacuation and shelter procedures in the event of a nuclear accident.

A bit of background about myself. My childhood was spent in Southwest Florida and adulthood in coastal South Carolina. We had sun, beach, hot weather and hurricanes, lots of them. My grandmother used to say it's the price we pay for living in paradise.

I'm here to speak about my experience and not as a spokesperson for others who may have had worse experiences, such as what occurred tragically with

Hurricane Katrina in more recent years.

Twenty-three (23) of my adult years were spent living on the coast of South Carolina in Myrtle Beach. I remember these hurricanes more because I was older, obviously.

Hurricane preparedness is a fact of life when you live on the eastern seaboard. We learn about what to do, what to expect, from a very young age we are inundated with transparent information. Most of us are lucky and stubborn; we weather out the storms.

You know when they are coming and the National Hurricane Centre, as well, has various news media outlets are fairly accurate with their warnings and landfall prediction. Remember with a hurricane, you have days of warning, days to plan, days to gather your families, days to evacuate.

In September of 1989 came Hurricane Hugo. Hurricane Hugo was a rare but powerful Cape Verdes style hurricane that caused widespread damage and loss of life in the southeast United States.

When Hugo made landfall on September 21, 1989, just south of Myrtle Beach at Charleston Harbor, it was a Category 4 hurricane on the Saffir-Simpson Scale, catastrophic damage.

At the time, I had a three month old baby

and a two and a half year old. Hurricane Hugo was barreling directly towards us and upgraded to Category 4. The orders came down to evacuate low-lying areas and the coast, prepare now.

When the mandatory evacuation order came, you had to leave. While the police can't physically force you out of their home, they will warn you that you are on your own and they can take your next of kin information and make note of where to find your body if you don't get washed out of the house, and then they leave.

So I made a decision and joined the thousands of other souls, put the babies in the car and we left for a shelter. We evacuated. We packed the car, gassed before the power went out and hit the road for a shelter. Everyone knew where to go.

All local area high schools inland became Red Cross shelters and although we had to leave our pets behind, which by the way, no pets are allowed in shelters -- for all of you animal lovers, in spite of what these brochures allude to.

We were turned down by two different locations as they were filled to capacity but we found a shelter. We knew what to do and the different options of where to go. Because mandatory evacuations were enacted, no one could come back into the area.

Southbound lanes to the beach were open for emergency vehicles only and cars leaving the coast. You need these extra lanes. This is called contraflow lane reversal.

In an emergency evacuation, contraflow lane reversal roughly doubles the number of lanes available for evacuation traffic. All incoming traffic is blocked until the end of the evacuation. It was time consuming and stressful but orderly and everyone that wanted out, eventually got out.

If you've ever travelled south, you've probably seen the blue hurricane evacuation route signs on the side of the road. What this means is contraflow lane reversal would take effect during emergency evacuation procedures.

The roads are clearly marked and everyone knows where to go and what route to take. It's a slow mass exodus but it's an exodus.

In addition, states can utilize their roadside rest areas for bathrooms, drinking water and information centres to assist motorists who may be stuck for hours in the mass exodus and need these services.

If you are stuck in evacuation gridlock, you can at least find a bathroom, get water and information.

Understand one thing; as much as a blessing as finding a shelter is or as you call it in the brochure, evacuation centres are, you need to be mentally prepared.

We were in the shelter for only three days. You are in a high school with perhaps 700 to 1,000 strangers. The first thing you do is find and secure your place on the floor. You live, sleep and eat on your six foot by six foot blanket on a hard floor in the hallway.

You protect your food and your belongings because you will get things stolen from you. There is backup generated power which means no air conditioning, no heat and the doors and windows can't be opened too widely because of the storm outside.

The heat and smell will become intolerable. Trees are going down all around the building; the toilets stop working and back-up; toilet tissue runs out; no one showers; garbage over flows; dirty diapers everywhere.

The noise was phenomenal, babies crying, kids yelling, people fighting and wailing in despair 24/7. You have no cell phone. You are completely cut off from your family and the outside world unless someone has a radio.

You don't know who is dead or alive. No access to money, you don't even know if you have something to go back to, like a home. Many didn't.



This is life in a shelter. Be it long-term or short term, a hurricane or a nuclear incident, you need to mentally prepare yourself to be humbled because all you have is your life. All you live for is that moment that you are alive.

Now, picture a nuclear accident. How long can you live like this? We did it for three days. You have no job to go back to, you may have no home. Where are you going to go? Is OPG going to save you now?

If you are in a long-term shelter situation and I mean weeks, months, years, who is going to fund this shelter? The local economy has just collapsed. The government, OPG?

When it was all said and done, Hurricane Hugo caused 27 deaths in South Carolina alone. It left nearly 100,000 homeless and resulted in \$10 billion in damage overall, making it the most damaging hurricane ever recorded at the time but life eventually returned to normal and it was a price we paid for living in paradise.

Looking back on the event, I realize how lucky we were. We had orderly routes out; we knew where to go; we had information overload; we had time to gather our families and we had time to prepare.

There was gridlock, there was fear, there was stress but not widespread panic and confusion. Myrtle

Beach is not a commuting city like Toronto. While most residents do drive down there, many people live and work within a short distance of each other.

We had 70,000 permanent residents over a 65 mile long stretch to evacuate. It was planned and all things considered.

Now, let's fast-forward time and compare my evacuation experience with the evacuation planning I'm reading about in the event of a nuclear accident here in Pickering.

I immigrated to Canada in 1997, and for the past 15 years, have lived in Durham Region and worked in downtown Toronto. For many years I was a go-train commuter but for the past few years, I've been a driving commuter.

I've watched traffic increase and gridlock get worse and worse with every passing year. Drive anywhere around Durham and the housing and condo developments, urban sprawl, are everywhere.

As of 2011, over 608,000 people reside in Durham Region alone -- 608,000. According to the Toronto Star just last month, on a typical week day, 51,500 people ride the go-train east of Union Station. Sounds like a lot?

Well in 2006, there were 2.4 million

commuters, in what Statistics Canada calls the census metro area of Toronto and 71.1 percent of them used a car to get to work. That's an extraordinary amount of commuters going in and out of the City of Toronto on any given day.

A nuclear accident can hit at any time and the work week is no exception. My two deepest concerns today, knowing that this is a commuting city and what I went through, is what I am reading with traffic control plans in the DRNERP and the lack of logical information contained within these brochures which were distributed to the local population, although from what I understand, not everyone who should have received these, actually received them.

What alarms me first is within the DRNERP, they only mention Durham Region transit responsibilities. What about the TTC, what about the go-train, VIA? If a nuclear event happens during the work week, what is going to happen to our go-train commuters?

We'll go, switch to a rush hour schedule to get 51,500 people back home in the middle of a work day?

Are they going to deploy additional trains to handle the volume? Will drivers even want to shuttle commuters back into contaminated zones? Will they be allowed to?

Then there are the roads. Ask anyone who lives in the GTA what happens to rush hour traffic when you throw in something like a rain shower, a bit of snow, a fender bender or a full-scale accident.

Traffic is literally crippled and I personally have been stuck on the 401 with a four-hour commute into Toronto in and out of the city one way.

So if a bit of rain can cripple our main roadway arteries, what would a Fukushima or Chernobyl type nuclear accident do?

Unlike Myrtle Beach, which during Hugo had a base population of fewer than 100,000, according to the DRNERP, as at 2006, seven years ago, the maximum population of the Pickering primary zone was a quarter of a million people. That's just the primary zone. A quarter of a million people trying to get out on our roads?

There is no warning to a nuclear accident, and with no warning, how can the average citizen ever plan for this? No one is taking into consideration the traffic that needs to come back into contaminated areas due to the volume of commuters into Toronto on any given workday.

A nuclear accident can happen at any time. It can happen at night. It can happen during a snowstorm, during a severe thunderstorm, during the weekday when

people aren't home. And you add these factors in, and you have a traffic control nightmare.

This is a major flaw of the DRNERP. When the sirens go off, it's already happened. You don't have days of hurricane planning. You have a catastrophic emergency that just happened.

Think about this scenario for a moment. While everyone is trying to get either home or to safety from downtown Toronto, their kids -- if this is during a school day -- who now go to school out in Durham, as mine does, have now been shipped to one of five reception centres for decontamination? So now you have a mass exodus of people trying to get home, trying to find their kids, trying to get to a reception centre, maybe an evacuation centre or, if they're lucky and have money, a hotel or the cottage.

Meanwhile, there may be no cell service, electricity, public transit, complete gridlock. The environment is contaminated and mass panic has now occurred.

Let's say I drive, try to get into the city with thousands and thousands of other drivers or out of the city, all panicking.

Say you have contraflow lane reversal in place. This means no one gets back into Durham region via

road because you need the lanes to get people out. Even if you didn't have contraflow, can you imagine the mass exodus trying to get back into Durham Region all at once, only to turn around again with their families, if they found them, trying to get back out?

I am shocked at how flawed and naïve traffic control has been addressed and thought about in the DRNERP. Perhaps there is no better plan because you are running a nuclear power plant in the shadow of 25 percent of the population in all of Canada ---

**THE CHAIRMAN:** Please complete it, okay. You're way over time here. We get it. We get it.

**MS. SIMEUVONICH:** Thank you, sir.

**THE CHAIRMAN:** So please complete it.

**MS. SIMEUVONICH:** I'm going to complete. Shut this plant down now before this happens. This is a disaster waiting in the wings, and unlike a hurricane, it can be stopped. We can stop ever having to evacuate due to a nuclear accident.

For all of the people that live and work and have built their lives in and around Durham region, for all of the commuters that leave their families behind every day just to earn a living, this aging and dangerous Pickering plant, which is still being operated, is not a fair price to pay for not living in paradise.

Thank you.

**THE CHAIRMAN:** Thank you.

By the way, were you here for the EMO presentation yesterday?

**MS. SIMEUVONICH:** No, sir, I was not. I was working.

**THE CHAIRMAN:** Ah, okay. And just for the CELA, the Canadian Environmental Law Association, just -- what is it, two hours ago?

**MS. SIMEUVONICH:** No, sir. Again, working.

**THE CHAIRMAN:** Ah, okay. I think you should take a look at the webcast when it's available. They dealt with many of the same issues.

**MS. SIMEUVONICH:** Oh, great. Thank you very much.

**THE CHAIRMAN:** Questions? Anybody has any particular question?

No questions. Well, it was clear, I guess.

Thank you.

**MS. SIMEUVONICH:** Thank you. Good night.  
Thank you.

**THE CHAIRMAN:** Thank you very much.

Okay. We're going to break for dinner and come back at 7:30. It's a quick dinner. Thank you.

--- Upon recessing at 6:44 p.m./

La séance est suspendue à 18h44

--- Upon resuming at 7:30 p.m./

La séance est reprise à 19h30

**MR. LEBLANC:** We will now resume. Thank you.

**THE CHAIRMAN:** We would like to move on to the next submission by the Durham Strategic Energy Alliance as outlined in CMD 13-H2.94, and I understand that Mr. Kobzar will make the presentation. Please proceed.

**13-H2.94**

**Oral presentation by the  
Durham Strategic Energy Alliance**

**MR. KOBZAR:** Thank you, Mr. Commissioner. And I will be brief, and I mean it this time.

I'm Michael Kobzar, the Chairman of the Durham Strategic Energy Alliance. We are a member-based organization based out of Durham Region. Our member organizations come from academia, the private sector, the public sector and the economic development community here in Durham. And a list of our members is provided on the



back page of our written submission.

But it's an organization that started nine years ago when a number of energy companies came together in the region to recognize the region as an energy cluster and to promote it as an energy cluster, and it's our mandate to spawn energy initiatives in this region to further grow the energy aspect of it. And so I speak for all our members on this occasion.

On balance, the Region of Durham does support the energy sector in this region. We are a willing host, certainly more willing than Oakville and Mississauga have proven to be recently. And we're a willing host because of the number of quality high-paying jobs that the energy industry brings to this region and, as a result, the positive impact that's felt in the community.

I understand that there's 3,000 jobs directly attributed to the Pickering power plant. Sometimes it feels like 4,000 jobs directly, if you're ever going north on Brock Road at 5 o'clock in the afternoon. But you know that there's many times more jobs are created to support those people in their day-to-day living.

And not only does the Region support the energy sector, but OPG has also supported the Region over

the years as well. As the DSEA, we have a number of events every year, and OPG does support them all. And I can only imagine that they're supporting other organizations in the community to the same extent.

Now, it can't be understated that, over the decades, the Pickering power plant has supplied a good chunk of Ontario's power without emitting any CO<sub>2</sub> gases, and now we need to be building more CO<sub>2</sub>-free facilities and not fossil-based facilities.

As Ontario grows in population and as we grow our economy and as we consume more, if we have any hope of decreasing our greenhouse gas emissions, nuclear power needs to be part of that solution.

In the '70s, when the plant was being built, there was no concern for CO<sub>2</sub>. There was no notion of global warming, even. At that time, they were talking about things like acid rain and whatnot, but today, it's a real concern. In fact, it's the most important concern environmentally that we have.

So we cannot afford to take any CO<sub>2</sub>-free power sources out of the system, especially if we're going to only backfill them with fossil-based power.

It's another mandate of the DSEA to find energy projects and try to bring them to Durham Region. One of the things we did just a little while ago is we put

in electric vehicle charging stations throughout Durham Region.

Our members got together and they collaborated and made this project happen because we believe that the future of transportation will be electric, maybe not in our lifetimes, but certainly in our children's lifetime. They will be driving electric vehicles. We're one breakthrough away from electric vehicles growing exponentially.

But there's no benefit to driving an emission-free vehicle if the energy that was used to charge that vehicle came from fossil fuel anyway, and we believe that there's no better way to power an electric vehicle than by nuclear power.

So every power source has its pros and cons. Coal and gas have CO<sub>2</sub>; hydro's wonderful, but there's only so many God-given places that can be exploited; wind and solar are not reliable; and Canada is not the right place for geothermal or concentrated solar, which leaves nuclear as the only source of reliable, abundant CO<sub>2</sub>-free energy.

So, in summary, I would like to say that Pickering has been an important part of our energy mix. It's a great asset that Ontarians own, and we should continue to benefit from it.

Thank you, Mr. Commissioner.

**THE CHAIRMAN:** Thank you.

Question?

Monsieur Harvey?

**MEMBER HARVEY:** Merci, monsieur le président.

I understand very well your position, which is based mostly on the economic -- the economics, the PNGS, but what is your perception of the concern expressed by many presenters here and in front of the Commission?

Is this to say that among your membership nobody cares about the security or ---

**MR. KOBZAR:** Yes, among our members, we have elected officials, businesses, people in the service industry and other people who make their living off the energy sector, so there's -- so within the group that our group represents, nobody really has any special knowledge of the safety aspect of a nuclear power plant.

That isn't our mandate.

**MEMBER HARVEY:** But you are not looking for -- trying to get information or -- about the security aspect?

**MR. KOBZAR:** I'm not, no. I'm making ---

**MEMBER HARVEY:** You're not?

**MR. KOBZAR:** No, I -- the point we're

making is that the Pickering Power Plant is an important part of the Durham Region, the community, the economy, and the businesses that matriculate in it, and it will -- it would be a shame if -- if it's licence were not renewed.

**MEMBER HARVEY:** Okay, thank you.

**THE CHAIRMAN:** Dr. Barriault?

**MEMBER BARRIAULT:** Just briefly, are you involved in an educational program to educate the public on the benefits of nuclear versus wind, versus solar, versus fossil fuels?

**MR. KOBZAR:** No, we haven't. That hasn't been our mandate to date.

One of the things we do do is we sponsor informational breakfast sessions where we have guest speakers come in and speak to an audience about different aspects of the energy sector.

So we've glanced upon -- on that subject, but that isn't our mandate; that's just an activity we've done.

**MEMBER BARRIAULT:** Thank you.

**THE CHAIRMAN:** Anybody else?

Okay, thank you.

**MR. KOBZAR:** Thank you, Mr. Chair.

**THE CHAIRMAN:** Thank you for your presentation.

**MR. LEBLANC:** The next presentation should be by Madame Kelly Clune.

We have not identified her in the room. Is Ms. Clune here? No.

As she is not here, we will consider her submission as a written submission only, and I think we're trying to get CCNB, Mr. Chris Rouse, on the line.

**MR. ROUSE:** Hello?

**MR. LEBLANC:** You're with us?

**MR. ROUSE:** Yes.

**MR. LEBLANC:** I'll let the President introduce you, thank you.

**THE CHAIRMAN:** Okay, we will now move to a submission by CCNB Action, as outlined in CMD 13-H2.99, and I think that I -- I heard Mr. Rouse on the phone, so you've got the floor.

Please proceed.

**13-H2.99**

**Oral presentation by**

**CCNB Action**

**MR. ROUSE:** Dear Commissioners, before I get started, I would like to point out something to you, Mr. Binder.

Whenever an anti-nuclear intervenors speak of anything other than safety, you are quick to remind them that that is not the mandate of the CNSC. But, if any pro-nuclear groups speak of anything besides safety, it seems to be welcomed by the Commission.

Please, Mr. Binder, I ask you as Chair of this hearing, that if you want intervenors to stick to the mandate of the Commission, please ask that all intervenors adhere and not just the ones you don't agree with.

Our intervention is quite simple: Readily available technology exists, which the CNSC staff approve of and have recommended in the Fukushima Action Plan, and is being installed, or has been installed, in other Canadian reactors, but it is not being installed at Pickering, even though OPG wants to operate it past its design life.

As it is practicable to install a filtered vent, why is it not being installed?

The IAEA post-Chernobyl recommended that, regardless of the probability, steps should be taken to protect containment integrity. Why have we still, 30 years later, not acted on this lesson learned?

Why isn't the CNSC requiring OPG to install a filtered vent? Is cost trumping safety?

OPG will gain financially by operating

these reactors for an additional five years. They are not going to install the safety feature.

Mark Elliott mentioned this morning that OPG spent \$40 million doing a study to see if the reactor is safe to run past its design life. Why will they not spend in the range of \$15 to \$35 million for this very important safety improvement?

This speaks loudly to the fact that OPG and CNSC staff put a low value on safety.

Readily available technology exists, costing a maximum of, say, \$35 million, that could prevent the cost of hundreds of billions of dollars in the case of "one bad day", as Mr. Gundersen mentioned this morning.

Maybe if OPG was liable for the hundreds of billions of dollars an accident would cost, instead of only \$75 million, they would see the value of an emergency filtered vent.

During the Durham nuclear awareness intervention, the CNSC staff person told the Commission the CANDU containment was less redundant than other reactors yet OPG is not seeing the value of this extremely important safety improvement for that one bad day.

Staff also mentioned the existing filtered vent is only for a design basis accident and not a severe accident, like Fukushima or Chernobyl, and the existing



vent is not passive, and requires power.

Mr. Binder, you have told the public many times you are not concerned with protecting the machine, and that your only concern was protecting the people and the environment, and this safety improvement would do just that.

Mr. Binder, it's time for you and the other Commissioners to put your money where your mouth is and not allow OPG to gain financially by running this old reactor past its design life, without the installation of an emergency filtered vent.

If a hardened emergency filtered vent had been installed at Fukushima, the consequences of that accident would have been far less than what they turned out to be. Similar to Pickering, Fukushima did have venting capabilities, but, like Pickering, it required power to operate.

There's been a lot of talk about all the portable emergency generators, and pumps, and -- for additional back-up. Well, Commissioners, Pepco did have fire trucks available, and some rudimentary electrical back-ups to cooling systems, like using car batteries to reactivate the isolation condensers, but the unit still melted down, it still blew up and released large amounts of radiation. This hampered the efforts to maintain the

other reactors at this multi-unit station.

One of the reasons the fire trucks could not help mitigate the accident was that they could not overcome the internal pressure of the containment because Pepco was having problems venting the reactors.

So without the emergency filtered vent, the additional equipment that they have was not effective in mitigating the accident.

I'd also like to point out one very important thing about Fukushima, and that is that the tsunami damaged the diesel generators and, more importantly, it damaged the electrical systems. Even if there had been lots of portable generators on site, they would have had to have been useless because there was no way to get the electricity to the important electrical safety equipment.

There doesn't even have to be a tsunami to cause a similar situation. Electrical system faults can easily happen on their own. A fire, or an internal flood, could cause severe impairment of the electrical systems.

This morning, CNSC staff said that additional venting capability was not needed because of the large amount of water in a CANDU system, and because there's plenty of time for operator intervention. Well, Commissioners, bad days do happen.

And, as you referred to it, Mr. President, there is a Binder scenario. The truth about the Binder scenario is that for a total loss of heat, like Fukushima, the core may start to melt in about four hours, and a complete core meltdown in around 11 hours. This is not a design-based accident, and very large releases of radiation could occur.

It's my understanding that even though PARs are being installed, they could keep up with such a severe accident, and a hydrogen explosion could happen.

The only piece of mitigating equipment that could help reduce the consequences of the Binder scenario is an emergency filtered vent.

Well, enough about the vent. I would like now to talk about a few observations I've heard over this hearing.

The first thing I noticed was that Commissioner McDill on day one asked CNSC staff if the licence condition handbook was part of the licensing basis and if it was something she had to approve. She mentioned this question because previous issues regarding our group and the licence condition handbook for Lepreau.

Commissioner McDill, why did you not ask that question at the public hearing when this came up, instead waiting until the Pickering hearing? Seems to us

an odd way to address our concerns.

On day one, staff answered your question that it was part of the licensing basis and you did have to approve it. You specifically state in the reasons for the decision for Lepreau that you, indeed, did approve it.

That licensing basis was subsequently changed by Dr. Rzentkowski. Although it was not documented, it was he who changed it. You were also not notified of the change as you are required -- as you required in your reasons for the decision.

I read just about everything on your guys' Web site and have attended the CNSC 101 information session. In several documents, it shows flow charts on how the licensing process works. And in none of them does it show the CNSC staff are allowed to change the licensing basis between the end of Day Two hearings and the Commission's decision.

I first flagged the safety concern -- since I have first flagged the safety concern, have the Commissioners asked for official legal advice if a law was broken? Did the Commissioners consider reporting this to the Audit Evaluation and Ethics?

Do the Commissioners even have the authority to determine the staff broke the law?

I would have expected after Fukushima that

the Commissioners would have taken this issue a lot more seriously.

The change in the licence condition handbook brings me to the next item. The thing that was changed in the licence condition handbook was that the Commissioners approved licence for NB Power when they showed compliance with their safety goal and it now has been changed that they only have to compare the result of the safety goal.

If truth be told, NB Power in its licence application only committed to doing cost benefit analysis for reaching its safety goals. They also committed, however, to be compliant with the safety limits, which should have been added to the licence condition handbook.

In the licensing application, which was approved by Dr. Rzentkowski, NB Power states the following:

"The limit represents a threshold whereby a combined result of the above limits would constitute an unacceptable level of risk."

It is my understanding that this statement is meant to ensure that NB Power's compliant with *RD-98: Reliability Programs for Nuclear Power Plants*, so it appears that the PSAs are a licensing requirement, which

conflicts with Dr. Rzentkowski's opinion that it is not.

Last, I would like to mention the wind large release frequency.

Internationally, seismic large release frequency is assigned the same as core damage frequency. I think this would hold true for wind events as well.

I can't imagine wind acting from outside the reactor strong enough to cause core damage would not result in a large release of radiation. I've not heard from OPG or the CNSC staff if the wind core damage event would result in a large release of radiation. I think it's up to OPG to prove that core damage from wind would not result in a large release of radiation.

Thank you very much, Commissioners.

**THE CHAIRMAN:** Thank you.

Commissioner Tolgyesi.

**MR. TOLGYESI:** Yes, the staff. What's the impact of containment filters venting on the core damage and the large release frequencies?

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

The impact of emergency filter venting could be very significant depending on the specifics of the reactor design. And for example, the one identified for Point Lepreau Station I think provided almost a factor

of 10 benefit to the large release frequency safety goal.

But it has to be remembered that the containment is the last line of defence, so I fully agree with the general point made in this intervention. It's very important to protect the integrity of the containment envelope, but emergency filters is not the only means of doing this because there are other means of maintaining retention of the air inside the containment and also reducing pressure in the containment so that the pressure doesn't get to the value which can eventually impact the integrity of the containment.

So we are looking at this in a very holistic fashion, and the best way is through PSA involving comparison of safety goals. In the case of Point Lepreau, emergency filters were the best solution.

**MEMBER TOLGYESI:** OPG, did you consider this installation of something like this?

**MR. ELLIOTT:** Mark Elliott, for the record.

I also agree with the intervenor that protecting containment, preserving containment is absolutely an important safety function that must be maintained, and we're looking at ways to maintain that. I'll just tell you kind of where we are in that review.

The -- it's a Fukushima action item to look at containment and how to preserve that. We're kind of

midway through that.

We're going to be making a decision by the end of the summer on what our path forward is around containment. We'll be presenting that to the CNSC for their acceptance. That's ahead of the Fukushima action item schedule, which says we would present it December 2014, so we're ahead of the game there because it's so important. But there's some other things that we are doing that we've already have decided to do. We've made decisions. I just want to talk about them.

We're going to have three barriers for actually challenging containment. We're going to be adding -- we already have equipment to add water to the steam generators. We've talked about that.

We have water ready to add to the moderator. We've talked about that.

There's one more that we're going to add, and that's to the shield tank, so there'll be three different interventions that we can make to preserve the fuel and preserve containment. But you need to do one other thing and we've decided to do this as well, is containment cooling. You've got to remove that heat that's going into containment so you can keep the pressure down and preserve the containment integrity.

So what we're going to do is repower the



vault air-conditioning units with generators. We're going to put water to those air-conditioning units and we're going to repower some recovery pumps that are in the reactor building to recirculate the water.

So we've already agreed to -- Dr. Rzentkowski talked about there's other things you can do. We've already agreed to do those things, and those are part of our Fukushima Response Plan. So we're doing a number of things to preserve containment and we're going to make a decision on the filtered containment.

**MEMBER TOLGYESI:** So these measures, what will be the impact on the PSA?

**MR. ELIOTT:** That's the question of the day, is the impact on the Fukushima -- of the Fukushima response on the PSA. And we've talked about, you know, my desire not to include it, but let's not go there. Let's just talk about how to do it.

The international community has no methodology for doing that right now, so -- but we are working with EPRI to come up with a way of -- you know, the U.S. has the FLEX Plan. The way to credit the FLEX Plan in the U.S., our Fukushima items in Canada into the PRA, that methodology does not exist right now, but we're working with the international community to come up with that methodology so that we could do that.

**THE CHAIRMAN:** Dr. Barriault?

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

I guess I'm kind of fascinated by this filtered vent system for containment, I understand. Can CNSC explain the pros and cons of filtered vents?

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

Definitely there are pros in installing emergency filters for the event of severe accidents; so there's absolutely no doubt about it. But the comment made by CCNB Action is in the context of the Point Lepreau reactor, and the technology which was applied in Point Lepreau cannot be used at Pickering.

The difference is the containment pressure. It would be significantly higher pressure in the Point Lepreau containment versus Pickering. So at Point Lepreau it would be significant delta P, or the pressure differential between the containment and outside of the containment, to drive the flow through these emergency filters. There's a lot of resistance in those filters because there are wet filters.

In the case of Pickering containment, the maximum pressure is quite significantly lower because of the existence of the vacuum building. The vacuum building will suck the air in and because of that it will reduce

the pressure under accident conditions.

So that means that OPG has to look for another solution like, for example, dry filters which don't require as much delta P to drive the flow through.

**MEMBER BARRIAULT:** So if I understand correctly, really, Pickering, vacuum container only can, I guess, drain -- if I can use that expression -- one reactor at a time.

So if you have multiple reactor problems, what happens then?

**DR. RZENTKOWSKI:** Still the pressure would be reduced by a certain amount, not as effectively, probably by 15 to 20 percent, and I understand that even under those conditions, that means multi-unit accidents, there is not enough pressure differential to use the same technology.

So they're evaluating other options, and one of the option is rebuilding their existing emergency filters. The filters are already installed, but they're installed for so-called design basis accidents. So they may not be effective under severe accident conditions, predominantly because of the moisture present in the air.

So we are waiting for the engineering solutions and they have the time to propose this to us until December of this year. This is covered under

Fukushima Action Plan.

**MEMBER BARRIAULT:** Thank you.

**THE CHAIRMAN:** Does it make sense to ---

**MR. ROUSE:** Is Darlington not having the same technology?

**MEMBER BARRIAULT:** I'm sorry, go ahead.

**MR. ROUSE:** I believe Darlington is installing a new emergency filter vent. And it was under my impression from that AREVA document that it was a very similar filter.

**MR. ELLIOTT:** I can answer.

**MEMBER BARRIAULT:** Yes, OPG.

**MR. ELLIOTT:** Yes. Darlington as we talked about it at the December hearing, has committed to installing a containment filter venting system and the exact design is being developed right now.

The containment system is -- the rating -- the containment pressure rating is different from the Pickering and Darlington.

So Dr. Rzentkowski is right about -- we have to be sure that we've got the filter that fits are -- the Pickering containment.

So once we make a decision on what we'll do, it has to be one that works for Pickering.

**MR. ROUSE:** Would even additional venting

help regardless of filtering?

**THE CHAIRMAN:** Sorry, we couldn't understand you. Can you wait until -- you're going to have the last word.

So you're coming out too loud here. Can you -- actually somebody reduce the volume?

Go ahead and ask your question, Mr. Rouse.

**MR. ROUSE:** Oh, I was just wondering is there any value to adding just additional venting, you know, irregardless of the filtering.

I mean, one of the big lessons learned from Fukushima was that the internal pressure was in the reactor didn't allow all this mitigation equipment that they did have to work.

**THE CHAIRMAN:** So in the same vein, I'd like to piggyback on that question; does it make sense to actually put the filter in the vacuum building?

I mean, I'm, just -- I don't know, does it even make sense?

**MR. ELLIOTT:** Mark Elliott, for the record.

We'd have to put it in a location that would make use of the vacuum building first, and then as the vacuum building pressurized and it all got equalized, then you'd take that whole volume and discharge it through a filter.

So the exact location would have to kind of bear in mind that you'd want to use the vacuum building first.

**THE CHAIRMAN:** Are you looking at that?

**MR. ELLIOTT:** Yes.

**THE CHAIRMAN:** Okay.

Dr. Barriault, anything else?

**MEMBER BARRIAULT:** No, that's all, thank you.

**THE CHAIRMAN:** Anybody else?

Monsieur Tolgyesi?

**MEMBER TOLGYESI:** One more. On this table from AREVA, there is -- in Canada they are talking about Gentilly-2. It's a -- status is delivered. It is there and it could be re-used or ---

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

Yes, we made it very clear to Gentilly-2 that this would be a part of the refurbishment project; filtered venting. So that's the reason why they ordered this, but what is the status of this order? I am not sure. If it has been delivered, it's probably on the site because it's a standalone unit, it's not really a part of the design. It's a standalone unit you attach to the containment -- to the outside of the containment, then you

just connect the piping.

It's very easy in installation as a matter of fact. So it can be re-used somewhere else but not necessarily for other reactors in Canada because of the fact that you have to size them to the exact design of a given reactor.

**MEMBE TOLGYESI:** So I thought it would be half price for you.

**THE CHAIRMAN:** Dr. McDill?

**MEMBER McDILL:** Thank you.

We're here for Pickering, so it requires some consideration.

Mr. Rouse raised the issue of the Licence Condition Handbook and changes to the Licence Condition Handbook. So in a generalized sense, can you help us address those questions?

**DR. RZENTKOWSKI:** Yes, I do understand the concern, but as the Commission realizes, in our CMD for Day One and Day Two relicensing hearing, we provide only a draft copy of the Licence Condition Handbook.

The reason is that the Licence Condition Handbook can be only finalized once the licence is fully approved, because of course it has to be a very seamless transition from the information in the licence to the information provided in the Licence Condition Handbook.

And in the Licence Condition Handbook, as you know, we have two different sources of information.

The first one is the compliance verification criteria, which are mandatory requirements which are directly taken from the licensing basis of the facility.

In addition to that, we have recommendations and expectations. Those are not truly a part of the licensing basis. This is something what we want to be a part of the licensing basis, and we are preparing the licensees to include them into their program, so that once we make a revision to the licence, they are in compliance. So this is the general concept behind.

And regarding the specific change Mr. Rouse made the reference to, I recall this case. I do recall.

This was the description of the objective for the probabilistic safety reviews, it's a common topic today. And I didn't agree with the description of the objectives. The reason is that it was taken from the new version of the standard, which hasn't been released yet.

So I decided that we had to adjust this description to the standard which was referenced in the licence, which is a current standard S-294. It was simply for the co-existence of the compliance verification



criteria. I didn't want to confuse the issue.

**MEMBER McDILL:** I think Mr. Jammal wanted to add something.

**MR. JAMMAL:** Just to complement Dr. Rzentkowski. The LCH, we report back to the Commission on a yearly basis as part of the annual report, any modification and changes that's been made to the Licence Condition Handbook.

So everybody is -- it's transparency and the Commission is apprised of any changes to the Licence Condition Handbook.

Just to repeat one more time, even the licence attached to the CMD is a proposed licence until the Commission issues the licence. So everything is in draft until the Commission renders its decision.

**MEMBER McDILL:** Mr. Rouse, is that helpful?

**MR. ROUSE:** Well, not really. I mean you guys specifically named that document that you guys approved, and the Licence Condition Handbook wasn't approved for two days later. So if what Mr. Rzentkowski is telling me, you let a plant operate for two days without any compliance and verification information.

It just seems to be -- there's nothing in any of the CNSC documents or anything that I listened to that shows that that kind of a change can be made after

the Day Two hearing. It's unacceptable.

I agree with Dr. Rzentkowski; I don't think as far as Point Lepreau is concerned and what they consider their safety goals, they were ever meant to be compliant with, they were only supposed to be cost-benefit, but they were -- have to be compliant with safety limits.

But that doesn't change the fact that it was changed and it wasn't noted, and that really scares me about nuclear power and what I see going on in the Canadian nuclear establishment.

It's not ethical what happened. I think, the Commissioners, you should report this to your Ethics Commission for investigation.

**MEMBER McDILL:** I'm going to pass that back to staff for a response.

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

I do understand a concern to some extent but I would like to clarify the point again.

This was only information provided in the preamble to compliance verification criteria. At any point of time, I did revise the compliance verification criteria after they were presented to the Commission.

**THE CHAIRMAN:** Okay. Anybody else?

Okay. You have the last word.

**MR. ROUSE:** So in summary, it seems that the CNSC staff and OPG agree with me that there'd be huge benefits to a filtered vent and the actions they're talking about doing all require power, same as the vent that they do have.

I'm a little concerned whether they even have --- whether filtered venting -- even the venting capacity to safe containment. This is a very serious, serious, serious lesson learned from Fukushima, Commissioners, and you guys have the authority to make them put in something that doesn't really cost that much money.

They're going to operate this for five years and so there's that.

As far as safety goals, I believe the safety goals and limits aren't even part of ST94, Mr. Rzentkowski. I believe it's requirement RD98, I believe.

And it is written in their thing that they would be posing unreasonable risk. I think this is all kind of -- it's really, really scary.

Darlington is putting in a filtered vent. The only thing I see different is nobody wants to spend the money on this piece of equipment.

One other thing, nobody mentioned my last

comment about the wind large release frequency. The Commissioners asked the staff what is generally done for these kind of external events.

Well, for seismic events, the large release frequency is considered the same as the core damage frequency, and that should be the case.

They shouldn't be allowed to just not add in one number to safely meet their safety limit. That's ridiculous.

**THE CHAIRMAN:** Okay. Thank you. Thank you for this intervention.

I'd like to move on to the next submission by the Citizen for Safe Environment and the Committee for Safe Sewage as outlined in CMD 13-H2.107. I understand that Ms. Buck will make this presentation. Please proceed.

**13-H2.107**

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

**MS. BUCK:** Yes, that's correct. And good evening, Chair Binder and Commissioners.

I am Karen Buck, President of Citizens for

a Safe Environment of Toronto Foundation Inc. and David Done, founder of the Public Committee for Safe Sewage, sends his regrets that he couldn't make it tonight.

Together, we have founded and are the Directors of the ad hoc committee opposed to the commercial nuclear production of electricity and we have come and expressed our concerns before.

CANDU reactors are noted for their large releases of tritium like no other reactors in the world, and so our concern began with the fact that we found that Toronto drinking water, on a daily basis, has levels of tritium that are above background levels.

And in the series of tritium studies in 2006, it was reported that it was at 5.1 becquerels per litre. The maximum in 2010 has been reported by the City of Toronto as 11 becquerels per litre, and I don't know why there would be this fluctuation.

We're concerned that tritium, through drinking water and food, is going directly into the bodies of the public and also of the workers and disintegration is happening with these radioactive particles within human bodies. And I think this is really a very huge public concern.

I don't think -- and we've expressed this before -- that the levels of regulatory levels that the

industry is required to keep below of are adequate. I think they're very permissive and I think there is a need to lower them.

Even in your own studies, the tritium studies -- and I'm going to straight to that right now, "Health Effects, Dosimetry and Radiological Protection of Tritium" -- there certainly is evidence that there are information gaps, at times poor information going into studies and maybe requirements for greater controls and for the fact that there is a lack of information and that this may only apply -- your studies may only apply to adults.

So I'm going to just start by picking out different -- on page 41 of the Health Effects:

"Although tritium doses were assessed and used, there was little analysis specific to the effects of tritium exposures."

That's a concern. I really am speaking here on behalf of the public, who deserve clean water, clean food and a lack of exposure inside their bodies to radioactive isotopes.

Once the issue with the historic dose records at AECL is resolved, which I guess it isn't, the Canadian Nuclear Workers Cohort may provide a useful

source of information to assess tritium risk, but it seems not to now.

The risk estimates for these studies indicate very low risk, if any, for leukemia and solid cancers among nuclear power workers with occupational radiation exposures, including tritium. The four -- but the four U.S. studies showed positive associations between leukemia mortality and low level occupation exposure to ionizing radiation.

Again, it is difficult to infer much about tritium risks from these studies. Although tritium doses were assessed and used, there were no analysis specific to the effects of tritium exposures. However, tritium exposures are relatively high among the SRS workers, so this workforce could potentially be informative about future tritium risks.

Page 145 in the conclusions from the health effects:

"Hereditary effects have not yet been demonstrated in humans for any radiation exposure, although the ICRP recommends a risk estimate."

And they've got it here for severe hereditary effects since it is highly unlikely that humans are immune to germ line mutations and associated trans-

generational effects.

The risk from organically bound tritium, OBT, should intuitively be greater than that from H<sub>2</sub>O tritium in water, but -- or tritiated, water but studies looking specifically at OBT-related health effects are few, with most of them using DNA precursors.

While most OBT produced in the environment would not be DNA precursors, the organic compounds into which it is incorporated will have a longer residence time in the body, therefore posing a greater risk.

Biokinetic models appear to account for this difference reasonably well, but new, improved models continue to be developed. A review of the relative biological effectiveness, RBE, of tritium radiation indicates a fairly wide range of values. And we've talked about this before in our oral presentations.

Although there have been very few suitable laboratory studies using cancer as their end point, the weight of the evidence points to an RBE factor of two or more. And I believe that maybe your studies were still, in the past, using an RBE of one.

Current ICRP models for intake of HTO, HT and OBT are reasonably consistent with experimental results. While improved models are under development, they will only apply to adults in the public. So an



expansion to various age groups would be required for use in public dose assessments.

Recent studies have indicated that ---

**THE CHAIRMAN:** Can you come to the point?

We all read those reports.

Can you make the point? We are talking about the licensing of Pickering ---

**MS. BUCK:** Well, I am making ---

**THE CHAIRMAN:** --- so let's hear the point.

**MS. BUCK:** I'm making a huge -- okay. I'm making a huge point here that there are deficiencies in the actual looking at risk assessments and public risk.

I mean, here -- the one that I am particularly -- so what I'm saying is, RBE factor. The fact that, you know, there's a lot of data gaps and available studies of cancer and other adverse health effects in workforces are not always useful, due to data that is not tritium specific.

Like, I'm talking about tritium that is being released in large amounts on a daily basis from Ontario Power Generation.

And here's another interesting one; it is thus very difficult to use current epidemiological studies for an adequate assessment of tritium-related health risks, because there are few studies that are actually

related to tritium. And the CANDU reactor is, in fact, very tritium release based.

Then there's a part in here -- I'll skip through then, if you feel that you've read all of this and that you agree that this -- that your studies don't say that there are higher risks than what you believe or are talking about here.

Conclusions from the facilities handling tritium is that some specific practices, if adopted, could further reduce the releases of tritium to the environment. That would be in the public interest.

High quality primary containment is the most important control feature, and the most effective use of abatement technology occurs at the point of generation of the release.

Pickering does not even have a tritium handling facility or reduction facility, and when it comes to public interest, it is public health goals that we're interested in, in the public.

However, public health goals are not regulatory and represent only non-mandatory goals, even though they are based solely on scientific and public health considerations, without regard to economic cost or technical feasibility.

And that's why California actually has an

unenforceable but public health goal of 14.6 -- 14.8 Becquerels per litre in their drinking water.

I believe that the -- and we've talked about this in our last one, the Ontario Advisory Committee on environmental standards for tritium in drinking water was a huge public consensus on what the public wanted in terms of nuclear generating stations, and that was a reduction to 100 Becquerels per litre, and a final 20 Becquerels per litre of tritium in drinking water. That was a consensus statement.

Now, also there is a new emerging concern that is stated in your tritium studies project synthesis report, that the emerging concern is that of contamination of groundwater. And there's no way of removing that radiation from the groundwater.

And I would suggest is there a way of removing it from Lake Ontario or from just surface water because there is a huge movement, with large populations in the Province of Ontario, to be drinking surface water, not groundwater. We just don't have enough of it.

**THE CHAIRMAN:** Okay. Can you please complete, you're way over time.

**MS. BUCK:** Oh, am I over time?

**THE CHAIRMAN:** Yes, you are.

**MS. BUCK:** Sorry. Okay.

So groundwater is critical and in conclusion -- and we've already handed this in in part of our written statement prior to asking for an oral presentation.

Please accept this submission as a rejection for the continued licensing of the Pickering Nuclear Power Generating Station until the year 2020, and as a request to the Ontario Power Generation, to expedite a plan, including an implementation timeframe for a safe shutdown of the remaining Pickering nuclear reactors by 2014, thereby limiting their operation beyond their designed life.

**THE CHAIRMAN:** Thank you.

**MS. BUCK:** All right.

**THE CHAIRMAN:** Questions?

Go ahead, Ms. Velshi.

**MEMBER VELSHI:** A question for OPG. The intervenor talks about no tritium removal facility at Pickering. Perhaps you can talk about how the tritium is removed from your heat transport or moderator water?

**MR. JAGER:** Glenn Jager, for the record.

As stated yesterday and earlier, the tritium emissions from Pickering are very, very low and contribute to very low doses for the public.

We manage tritium very closely at that

Pickering station. There are a number of different aspects to maintain those very low emissions. Number one, as you mentioned, is detritiation of heat transport and moderator systems.

And although there is no tritium removal facility at Pickering, there is one at Darlington that serves both sites and we have a means of transferring water between the sites, and water is exchanged for all the units and detritiated at the Darlington site and returned to the Pickering site. And that is one way that we're able to keep emissions very low at Pickering, by basically keeping the source term very low at those sites.

In addition to that, we have a focus, as I mentioned yesterday, a focus on leak reduction and monitoring. We installed instrumentation on all the units, so as soon as there is a leak in a unit we are very -- operators are immediately aware of that, are able to track it down and pinpoint the leak and then we effect repairs.

And finally there's mitigation. We have dryers and containment that -- for any tritium that escapes the heat transport moderator systems that is collected by the dryers and then again returned to the system or upgraded through our upgraders and the tritium removed.

All the effluent pathways are monitored and we report that in an annual report, as well as to the CNSC.

**MEMBER VELSHI:** Thank you.

And a question to staff, I know we've talked about tritium levels in drinking water around the Pickering Nuclear plant.

We discussed that fairly extensively yesterday but I don't believe we talked about levels in Toronto's drinking water and the intervenor says it's gone up from, I think, it's 5.6 to 11 Becquerels per litre.

Can you comment on that, and if it has gone up, what could have been the contributor to that?

**DR. THOMPSON:** Patsy Thompson, for the record.

I don't have the data for Toronto with me, but as we mentioned, I believe earlier today, the values for drinking water supply plants around the Pickering facility range in the five-year licence period between 8 and 18, and so there are variations, depending on the operational activities at the plant, and I would suspect that variations in Toronto also depend on what is going on at the facilities.

But also, if you recall, Environment Canada talked about changes in lake current, and so it depends as

well on the direction of lake currents, either west or east of the facility.

But in all cases, if you compare those values to the Ontario Drinking Water Advisory Council, the recommendations, that they remain below 20 Becquerels per litre.

But if you'd like, Ms. Velshi, we can get the more detailed data for Toronto, if you'd like, for tomorrow.

**MEMBER VELSHI:** That would be helpful, thank you.

**THE CHAIRMAN:** Anybody else? Any other questions?

Okay, thank you. Thank you very much.

The next submission is an oral presentation from Ms. Chaloner, I'm not sure I'm pronouncing it right.

**MS CHALONER:** Norah Chaloner.

**THE CHAIRMAN:** Chaloner -- as outlined in CMD 13-H2.100.

Please proceed.

**13-H2.100**

**Oral presentation by**

**Norah Chaloner**

**MS. CHALONER:** I'm here as a mother and grandmother and public health nurse who cares deeply about the future, and that the right decision made by you to reject the renewal of the Pickering nuclear reactors is crucial to the safety of the future.

Climate change is predicted to increase the chaotic heat and winds that are part of continuing increases in planet temperature. We're now at 400 points of carbon emissions. Wind is going to be a huge, huge problem.

We hear about the tidal problems, the increased heat of the oceans, extinction of species, all the other things, but not many people are actually talking about winds. And I would like you to spend some time after you've been here today looking at tornadoes, looking at the problems with winds.

A friend of mine does tornado watch professionally and there is a map, I understand -- I just picked it up by looking at one of the submissions that has been sent to you by email from Louise Lanteigne -- and you will notice that it has the tornadoes across Southern Ontario that we have had. So it's a significant number of dots, a significant number of problems.

And today, when they were talking about 220 kilometres an hour in the wind studies this afternoon that



people referred to, I think we have to remember that in Oregon last week, there was a tornado that was 340, I think it was, kilometres an hour. There was five minutes warning for people and it was there.

So I'm not sure your studies go to over 300, but I would urge you to spend some time looking at that because that's going to have a different kind of an impact from tornadoes that are in the 200 kilometres range.

But regarding the renewal of the old Pickering nuclear reactors, I am strongly opposed to this, especially since they are at the end of their planned and predicted lifespan. This was a science-based decision. Ageing reactors present many unknown problems. All of them can't be predicted.

Would each of you pour vast sums of money into renewing a decades-old car and hope to drive it another couple of decades? Would you at the same speed, with the same events, stay on the major highways? How old are your cars, I wonder? Or would you consider adding another few hundred thousand kilometres on it with some retrofits and updating?

What about the furnace in your home? Are you retrofitting the furnace that was in your home, maybe 30-year-old home, a 30-year old furnace? Are you

retrofitting that or are you looking at not using it anymore?

These end-of-life reactors should be shut down. There's a need to go forward with less complicated and less risky solutions than the continued operation of old nuclear power plants. These increased risks are borne by those most near the old reactors and those who work in them.

Quebec had a look at their old nuclear reactor and they made a decision to put safety first; safety for their workers and the public at large. I quote the former head of Hydro Quebec, Thierry Vandal:

"I would no more operate Gentilly-2 beyond 210,000 hours than I would climb onto an airplane that does not have its permits and that does not meet the standards."

Regarding an issue of great concern that was raised at the December 2012 hearing regarding the Darlington nuclear reactors, I have some questions considering the increasing risks being taken on by workers and residents who live near them.

This concerns the safety education of those living within the zone of influence in the case of a nuclear accident of any size. Now, this was brought up

earlier. Are you ready?

And I do notice that there is an addition of two extra pieces of pamphlets that are handed out, but I am not aware that most people have them. Most people perhaps don't have them. The people I know in the Whitby area do not have the extra pieces of paper that actually deal with a nuclear accident.

And as we heard, I won't go over all my notes on this because they were really, really well addressed by Michelle Simeuvonich, who spoke just before we broke for supper. I was very impressed, as maybe others were in the room, with her description of living in a hurricane area and how evacuation orders bring absolute chaos to a community.

Chaos is a huge problem. And she was talking about living in communities of 110,000 people. We're looking at millions of people trying to evacuate an area and there's no plan. No one knows where they're supposed to go, how to get in touch with their loved ones. These things have to be addressed.

Has a random door-to-door check been made throughout the zone of influence, for example? I don't know that this has ever been done to make sure that people do know what kind of a plan their family is going to use to get in touch with each other, to locate each other, to

find how to get to the shelter that's supposed to be for their area.

And what happens to the vulnerable in the communities who aren't connected to their neighbours and don't have family? The single people living alone, the elderly, perhaps people who aren't very versed in English, perhaps people who are deaf who haven't heard a siren if there is a siren in the streets, these things have to be addressed.

There are many more people than you think living like that. From my years as a public health nurse, I do know that. We made -- the years when I was working, and I don't believe they do this much anymore, but we made a lot of home visits; home visits that were set up for us to visit because these people were on their own and were vulnerable and having problems.

But a lot of these aren't identified now because we have a different system of healthcare. So you need to know, you need to mandate that the communities have to know where these people are and they have to also know what the plan is or someone on that street has to know where they are, so they can be taken into some kind of a plan of action.

I lived also in a small community, a community called Elmira over near Kitchener-Waterloo. The

major employer in that town in the fifties was Uniroyal chemical plant. In the eighties, it was found that they had been burying waste and leaking -- and it was leaking into the water table for years and no one knew about it.

We knew there was something wrong because of the emissions coming off the top of the pipes, the top of the towers behind the building, but no one knew. We all presumed that it was a safe situation for the people to live in. And yet, we all knew people around us who were dying of cancer, who were affected with other conditions.

And in the eighties, they found out that they can no longer drink their water. And yet, it's still leaking into the river there and has to be monitored by a watchdog role of people.

So if governance isn't right to look after what's going on, if you don't set the regulations in place and you're a safety commission and should be, terrible things happen to a community. In that community Elmira, they had to pipeline water from the city miles away. And they've had to bear the effects of health on their children.

This is not a risk that the public should bear when there are other alternatives, especially with regard to nuclear power plants.

So when looking at the safety of renewing the old Pickering reactors, the risks of more contaminated nuclear waste must be weighed. Eventually, nuclear waste moves around underground if you're going to bury it and that seems to be the most popular solution, deep geological burial.

But anyone who has ever known a farmer with a stony field knows that soil is alive under there. Every spring, if you've got rocks in one field, you've got to go out and pick off those rocks. And you get them all picked off, the field is fine; the next year, wow, you've got a whole lot more. They've come up from underground because it's alive underground, things happen, things shift.

So deep geological burial is a no-brainer. If you know a farmer who has a stony field, you know that there's going to be something at some point shifting underground.

The increasing amounts of nuclear waste represents serious threats and we must start reducing their presence and build-up in our world.

Finally, I would like to add that there is an assumption that our energy needs will not be met without the extended operations of Pickering reactors. Yet, the facts show that we have a reducing demand for energy and have many safer renewables on the sidelines

that can provide less risk than extending old reactors would entail.

Combining the attributes of solar, wind, geothermal and biomass power production with increasing conservation and efficiency is a safer option, the public does not have to take these increased risks and there's less waste and lower emissions.

I would just end by saying I think the CELA presentation was excellent and the Greenpeace was excellent. There were many excellent today. But I was really very moved by Michelle's personal memories that she shared with us of the chaos she went through when the hurricanes hit her world.

**THE CHAIRMAN:** Okay. Thank you.

Question?

Anybody? Any questions?

Okay. Thank you. Thank you for your presentation.

I'd like to move on to the next submission by the Canadian Coalition for Nuclear Responsibilities as outlined in CMD 13-H2.120.

And I understand Mr. Edwards will make the presentation by teleconference. Dr. Edwards, can you hear us?

13-H2.120

**Oral presentation by the  
Canadian Coalition for  
Nuclear Responsibilities**

**MR. EDWARDS:** Yes, I can. Thank you. Can you hear me?

**THE CHAIRMAN:** Yes, we can.

Please proceed.

**MR. EDWARDS:** Thank you very much.

I would like to thank the Commissioners for providing this opportunity to make views known regarding the proposed plan by OPG to extend the lifetime of the Pickering reactors even though they had previously decided not to refurbish these reactors.

Now, I think that this is really a very important critical point in the evolution or the history of the regulatory agency. The question is: Is there going to be one rule which fits all or is there going to be a double standard?

The previous speaker, I believe, quoted the words of Thierry Vandal, the -- at that time, the CEO of Hydro Quebec. She didn't mention that he was actually testifying at a parliamentary commission in Quebec City before the National Assembly on January 29<sup>th</sup>, 2013 when he



made those comments.

And I'd just like to read you his -- some of his statements here. He said:

"This is an important issue and I would like to take the time to explain it well. While it is true that we have an operating licence from the CNSC, the permit that we received for continued operation included an important condition: that there be a mandatory stop at the end of 2012, after which we would do one of two things: Either we would shut down the plant, which is what we have done, or we would begin the refurbishment."

(As read)

End of quote.

Now, I believe that that's exactly what the CNSC should do with regard to the Pickering. They should say to OPG: Either you shut down the plant or you begin refurbishment. You can't have it both ways. You are at the end of a lifetime of these plants, the engineering lifetime, and you have to decide whether you want to spend the money to repair them so that you can run them more, or shut them down.

And if the CNSC truly does not compromise public safety, then the course is clear: You do what you did in the case of Hydro Quebec.

Now, quoting a little further on what Thierry Vandal said during his testimony on January 29<sup>th</sup>, he said:

"We asked ourselves, what should we do because we really wanted to have a close look before proceeding. We looked at this question in the context of, what for us, is the ultimate date, what I would call the extreme limit of operation, the 210,000 hours which is the design value for this power plant." (As read)

Parenthetically, he's referring here to the fact that the plant is supposed to run for 2100, sorry, 210,000 hours of full-time operation, that that's the expected lifetime.

Continuing the quotation:

"When we shut down the plant, we were almost there, within a few hours, having run the plant for 198,000 hours since the very beginning. These are the hours of operation of full power.

It is a measure of ageing, if you will, of the plant components. So for how many hours could we continue to operate from a safety point of view? I can tell you that Hydro Quebec's management in no way would have considered to go beyond 210,000 hours even if it was made possible. I would no more operate Gentilly-2 beyond 210,000 hours than I would climb onto an airplane that does not have its permits and that does not meet the standards. So it's out of question for us to put anyone, i.e., us, the workers, the public and the company in a situation of risk in the nuclear domain." (As read)

End of quote.

Well, one more line:

"So this deadline of 210,000 hours, this is a hard deadline." (As read)

Now, I believe that this is the position that the CNSC Commissioners have to take if they want to have credibility and if they want to really live up to their mandate of protecting the public.

The problem here is that there is a great deal of guesswork. When we talk about the probability of core melting or core damage, when we talk about the probability of large releases, these are mathematical calculations based on a great deal of uncertainty. We've already heard something about this before.

I would like to refer to another document that is a -- I'm quoting these because they are from pro-nuclear sources, not from anti-nuclear sources.

AREVA Corporation put together a presentation on filtered containment venting systems, which has already been talked about. It's entitled "*General Overview and Applicability to CANDU Plants*" and this was prepared as a follow-up from the CNSC and NRC bilateral meetings and the site visit to Point Lepreau.

On page 5, they give some simple figures for the five core damage accidents and four large releases that have already occurred: The Three Mile Island in 1979, Chernobyl in 1986, Fukushima in 2011 and they say:

"Actual core damage is happening at an order of magnitude more often than probabilistic risk assessment calculations." (As read)

End of quote.

So when you look at these probability risk

assessment calculations and when you see that they are already coming close to the limits and exceed already the targets, you have to bear in mind that they are in themselves inclined to be underestimates of the actual risk, possibly by as much as an order of magnitude.

One also has to bear in mind that the kilometres of piping, there are about -- I don't know how many kilometres, at least six kilometres of small piping in one of these CANDU reactors at Pickering and nobody is able to know the actual condition of all these pipes. They're -- partly because of the intense radiation fields around the core of the reactor which make it very difficult to operate in that environment and partly because of the very close proximity of these pipes to each other which makes it really very, very difficult if not impossible to monitor those pipes.

So the difficulty is that we have seen various examples of pipe degradation which was always a big surprise every time it was discovered. There was the bursting of a pressure tube at Pickering way back in the -- I believe it was 1983, I can't remember the exact year. This was a big surprise to everybody and a big shock.

There have also been discoveries of thinning of the walls by up to 40 percent of some of these pipes -- again, a big surprise -- and findings of various

kinds of corrosion cracking that was completely unanticipated.

There have been many documentations provided by Dr. Frank Greening who worked for 23 years at Ontario Hydro -- and particularly with the Pickering plant -- documenting the difficulties of ascertaining the condition of the pressure tubes themselves, the calandria tubes, and the feeder pipes. And so, I submit that all of the assurances of safety that are being given by both the Proponent, and the CNSC staff, who again, I think --I am sure that their intentions are very honourable and I'm sure that they're working in what they believe to be the public interest, but they are clearly working together to make a case that this plant should be allowed to continue to operate.

And one -- the Commission, I don't think, can afford to overlook the fact that one's attitude towards the nuclear power does condition ones views, and the kind of evidence that sticks out.

That's true of anti-nuclear people; it's also true of pro-nuclear people. And when you have people who have a zealous enthusiasm for nuclear power and want to see these plants be successful, then there is a danger that they are overlooking some very serious drawbacks which are beyond their control.

And so I think that the only thing that is open to the CNSC as an honourable regulatory agency, is to say, look, it was your decision not to refurbish these Pickering B reactors. That was your decision; you made that decision as a corporation based on economic grounds of which we have no concern.

But having made that decision, you have basically committed yourself to saying that they have reached the end of their useful lifetime.

I would also like to mention that although economic considerations are not really in the mandate of the CNSC, nevertheless there have been several references to cost benefit analysis, that certain things, for example fish entrainment all the way to having a filtered vent, that whether these are really -- whether the cost benefit analysis makes them worthwhile to do or not.

So I think that one has to consider in that regard, the cost benefit analysis of the decommissioning of nuclear reactors. It's very important to realize that a recent study from the U.K. showed -- this is from the U.K Decommissioning Authority -- showed and revealed that their estimated cost of decommissioning their nuclear facilities, in just four years, had escalated from an estimated 37 billion pounds to 56 billion pounds. That's a 16 billion pound increase in four years.

And that's because they are in fact, in Britain, starting to do the work of decommissioning. Here in Canada we have not even begun. When we look at the work and the cost overruns associated with refurbishment, and bearing in mind that a refurbishment is in a way, sort of like a mini-decommissioning, because you have to begin by taking out the old stuff before you put in the new stuff, those cost overruns should sound a clear warning sign that the CNSC does not have a handle on decommissioning difficulties, because the industry does not have a handle on it, and will not have a handle on it until they actually start doing the work.

So I think it is very important for the CNSC to urge the industry to demonstrate that they are able to take these things apart safely, within a reasonable timeframe, and within a reasonable budget because that is an important and essential item of information. Not only for the safety of the workers and the safety of the surrounding environment, and the safety of the people living nearby a decommissioning project, but also for the cost-benefit of nuclear power itself.

And I think that the Commission has an obligation to do what they can to facilitate decision makers having the best information available on all these topics.



**THE CHAIRMAN:** Okay.

**DR. EDWARDS:** So I'd like to thank you again for your patience in listening to this and I'll stop there.

**THE CHAIRMAN:** Okay. Well, we would like to engage in some discussion here.

So who wants -- any questions?

Well, let me start. Obviously you -- let me start with the last point you made. I assume that experience with G2 will -- is right now upon us, and it will be a good test to see if the decommissioning plan that was tabled by Hydro Quebec will make sense, and I guess we can learn from that. And from some international decommissioning that's going on, has gone on, in the past.

Staff? Anybody wants to add to that?

**DR. EDWARDS:** Do you want me to answer that?

**DR. RZENKOWSKI:** I think that's a very good summary of our current experience, that means we are learning from past actions taken by the licensees.

Pickering is one of the examples where already two units at Pickering A have been fully transferred into the safe storage, and are well into the safe storage. We are getting to the point, probably, when the fuel will be taken out of irradiated fuel bays to dry

storages.

We are learning from those experiences we are building on them. This is the key basis really for deciding how this concept or how this strategy for decommissioning should look like.

I understand that we have Bob Barker connected from the head office in Ottawa, so I am sure that he'll provide more information onto our approach to define the strategy for decommissioning.

**THE CHAIRMAN:** Ottawa?

**MR. BARKER:** Thank you. Bob Barker, for the record, I'm in the Wastes and Decommissioning Division.

Although it's true that we haven't actually completed a full decommissioning project of the power reactor in Canada, the decommissioning cost estimates that we have, have been developed through consultants that actually have a decommissioning experience in the States.

In addition to the -- to Pickering reactors that are in safe status storage, we do have three demonstration power reactors that have been put in safe status storage. They have been in that condition for about 30 years.

**DR. EDWARDS:** And not one of them has been dismantled.

**MR. BARKER:** I beg your pardon?

**DR. EDWARDS:** And not one of them has been dismantled.

**MR. BARKER:** They are in various states of safe status storage.

**DR. EDWARDS:** Okay, perhaps I should have said dismantling instead of decommissioning, because obviously we are talking about two different things.

Safe storage is not, in my view, decommissioning. And I don't think that is what the U.K. Authority is talking about when they said \$16 billion -- 16 billion pounds of additional cost. This is not safe storage, this is dismantling and disposing of the structures. That's what I am talking about.

**THE CHAIRMAN:** I understood you, and yeah you're right, we haven't done a full decommissioning besides small facilities.

And yes, we will learn -- and by the way, in terms of financial investment, all of the financial allocation to those decommissioning is guaranteed by the government.

So Quebec government is backing Hydro Quebec on all of this, and so is Ontario government as OPG. So we will learn as we go along, as the rest of the world is accelerating decommissioning. Absolutely

correct.

**DR. EDWARDS:** Point of interest -- or point of information, could I ask the Chairman, is it not the case, that the CNSC must ensure that the licensee has sufficient funds to cover decommissioning set aside?

**THE CHAIRMAN:** Yes. And it's based on a third-party assessment of, you know, an estimate of what it will cost.

Staff, do you want to elaborate on this?

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

You're correct; it's based on a third-party assessment reviewed by staff based on our requirements.

And of course, as the operations change, as it's accelerated decommissioning, it's been reviewed as the Commission is aware of, and so is Dr. Edwards, it's reviewed on a five-year basis, at minimum. Five years depending on the escalated or accelerated decommissioning those funds are adjusted.

But the end point is, every facility in Canada with reactors are backed up through financial guarantee by the provincial government.

**THE CHAIRMAN:** Thank you.

Any other questions?

Ms. Velshi?

**MEMBER VELSHI:** A question for staff.

We've heard the CEO of hydro -- or the ex-CEO of Hydro Quebec being quoted numerous times. And I'm hoping you can elaborate on what the licence condition was for G2, where we've said was one of two options, either to shut it down or to refurbish it when the pressure tubes reached the whatever, the 210 equivalent full power hours.

Was extending the life or the continuous operation an option, or is that one that they ever came and investigated with you?

**DR. RZENTKOWSKI:** That's a very interesting question, and Dr. Edwards pointed out to the similarities in the situation between relicensing G2 and relicensing Pickering. So I would like to focus my response on the differences.

The main difference is that for Pickering we have an integrated safety review conducted in 2008 and '09, and this integrated safety review gives us a wealth of information with regard to fitness of service of major components, ageing degradation of those components, and the overall review of the safety case, because there's 12 safety factors reviewed which form a very systematic and comprehensive assessment of the safety of operating facility.

We could build on this, forming a continued

operation plan. So this is one difference.

The second difference is condition of the pressure tubes. There was clear indication that in G2, pressure -- many pressure tubes will have to be retubed at 190,000 of effective full power hours of operation. This was due to one of the degradation mechanisms, which we call "elongation", because as they get longer, they are fixed at one end and they expand towards the other end.

And in this particular case, it got to the point that they would have to replace many pressure tubes, even to continue beyond this point of 190,000 of full power hours of operation.

There was one more reason. Because since about 2005, they were absolutely confident that refurbishment is the only option to go forward, many of major repairs and replacement activities were postponed towards refurbishment.

Of course, we couldn't accept this anymore. So that's the reason why the only option for G2 was to refurbish; refurbish was with the objective to double the operating life of the facility, instead of operating for a couple more years.

**MEMBER VELSHI:** Thank you.

And question for OPG: you had mentioned that you had worked with other utilities in the industry

as you were looking at the option of continuous operation. I think you said that.

And I'm just wondering, is this you coming forward with something that we may expect other utilities, say Bruce B for their units, to come and ask for continuous operation? I just wondered whether this was Pickering-specific initiative or something broader than that.

**MR. JAGER:** Glenn Jager, for the record.

I believe it's a -- at the moment, a Pickering-specific initiative. Pickering did -- we did do a lot of benchmarking to evaluate other utilities that had done life extension. There are a number of them in the U.S. and they had programs and we followed a lot of templates and so forth for the balance of plant, but fuel channels, of course, make that unique for CANDU.

And the CNSC issued a guideline, RD-360, which forms the basis, as well as the technical basis that CNSC staff has talked about for the life extension of the plant.

So we put in place a program. There are two different components to that. One is the evaluation of the balance of the plant, and that's where the ISR, the CCAs, come into play in evaluating all the components and what's necessary to extend the life of the plant.

The second item is the Fuel Channel Life Management Program and that is a joint project between ourselves and Bruce Power. We would expect that Bruce Power would also leverage off of that and utilize it for their units, but that program is used to extend the life of the fuel channels.

That combined forms the basis of the continued operations plan and allows us to safely take operation out through to 2020. It requires a significant investment to do that, both in the balance of the plant and, of course, in the program for the fuel channel life management.

What's been done so far is the study itself, the basis for which we can support the operation to 2020. What's left to do is all the necessary inspections, testing and further work to confirm, or validate if you will, the studies that support the life extension out to 2020.

So the work is by no means done. There will be, obviously with every outage and with every piece of work, support for a fitness for service argument that has to be supplied to CNSC staff along the way.

So that's, in summary, all the work that has gone into the continued operations plan to take life out to 2020.



**THE CHAIRMAN:** I think I saw Mr. Jammal.

**MR. JAMMAL:** Ramzi Jammal, for the record.

If we could just go back on Hydro Quebec for a second, Mrs. Velshi, just not to spread political rumours of any sort, Mr. Vandal still is the CEO of Hydro Quebec. So I just wanted to put that on the record.

**MEMBER VELSHI:** Thank you for clarifying that.

**MR. JAMMAL:** One key element though that is very important to mention here, is the hold points that were put by the Commission had clear criteria. Hydro Quebec, for commercial reason and political reason, decided not to pursue the operation. There was no safety impact.

That means that the whole point was for Hydro Quebec to update their safety case, based on continued operation, and they elected not to do so.

**THE CHAIRMAN:** Okay. I have heard so much about this Hydro Quebec. As you know, there was a real understanding about what's going on.

So let me ask you hypothetically, if Hydro Quebec came to you and said, "You know what, CNSC, we don't know what the politics is going to be. How about extending our life, allow us to run for another two years?" Hypothetically, what would you have them do?

That's what I can't understand, kind of the difference between shutdown, refurbishment, and life extension.

**DR. RZENTKOWSKI:** Yes. The first question would be: where is your condition assessment of all the structures systems, and components? This would be the first question.

And then, of course, based on the condition assessment, we will decide if it would be feasible to do so, because, really, the safety case has to be built on the fitness for service of the facility. This is the absolute requirement.

**THE CHAIRMAN:** So to take your example, because they haven't done anything because they know they were going to go refurbish, you probably would say, "You cannot do it"?

**MR. JAMMAL:** Hypothetically, yes.

**THE CHAIRMAN:** Okay. I just wanted to so everybody understands kind of the three options here.

Mr. Frappier?

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

Just to add a little bit from -- because of the comments you talked about with respect to the 210,000 hours. So as was just mentioned, Hydro Quebec from awhile

back has been looking at refurbishment or those sort of thing as being the options.

So although this is for the public maybe something to be talked about over the past few days, or maybe since Day One or whatever, from our perspective we've been looking at this for several years.

Bruce Power and OPG and AECL got together to do this research project called the Fuel Channel Life Management that we've just been making reference to. Importantly, Hydro Quebec decided not to join that research project.

So when the CEO was talking the other day, he does not have the benefit of the results of the research or the insight that the research is providing as to why there's hope, if you like, or that there's a view that the 210,000 hours are going to be able to be extended to 247,000 hours.

So if the -- as the research is finalized and there's the new engineering tools that demonstrate how and under what conditions you can go beyond the 210,000 hours, Hydro Quebec would have to have some ability to get in on that, if you like, if they wanted to go any further.

And just on his very good sound bite with respect to permits and standards, that he wouldn't go on a plane without the permits and standards, I think it's

important to recognize that what this research project was all about was to get the information needed so that they could modify the standard. Because there is a standard that covers this and that will be modified based on the research results, and then they would be getting a permit which is what would be coming from yourselves, as the Commission, to go beyond the 210,000 hours, if that's what you choose to do.

**THE CHAIRMAN:** Dr. Edwards, would you like to comment on this exchange?

**DR. EDWARDS:** Yes. I think that there's an awful lot of money involved, there's an awful lot of careers involved, and I'm reminded of people in the military, generals and so on, who once they're retired, they're able to say things that they were not able to say when they were in their official position and their official capacity.

Generals have spoken out against nuclear weapons, for example. They've spoken out against various wars that they were involved in, and I think that we also have seen people from within the nuclear industry who have become independent of that and I would count Thierry Vandal among those because he was the very gentleman who announced the refurbishment of the Gentilly reactor at \$1.9 billion a few years ago.

And after the government had decided not to refurbish that reactor but to shut it down, he produced a report showing that the actual cost of refurbishment would have been, in their estimation, 4.3 billion and not 1.9 billion and that, in fact, he had advised the previous government not to proceed with refurbishment because Hydro-Québec did not figure that it was cost-effective.

But because of the political environment under the previous government, he was not allowed to release that information to the public.

So I do think that we're seeing here a very powerful organization, Ontario Power Generation, with the sympathetic help of the CNSC staff, trying to get some extra value out of their investments without spending the money necessary to really make it safe.

Why don't they just replace those old pipes? Why did they decide not to do that? And why now do they -- do they want to get a life extension when they decided not to do that refurbishment?

I think that this is something the Commissioners have to search their conscience and say: Are we simply enablers of what the OPG wants? Or are we going to say: Look, there has to be ultimately a relatively simple decision as to what is in the best interest of public safety.

All these arguments that it's too complicated, that there are too many factors to understand, are really intended to paralyze judgment.

I think the Commissioners have to look through that and say: Look, we have to have a clear criterion for deciding and we have to ask ourselves: Is it really just rolling the dice in order to let this old plant keep running bearing in mind that we really don't know the condition of all those feeder pipes and all those pressure tubes and Calandria tubes despite whatever research they may have done on some of them?

Or would it be, in fact, in the public interest to say: No, if you want to extend its lifetime, you have to renew it, you have to refresh that plant by refurbishing it. Otherwise, no licence.

**THE CHAIRMAN:** Okay.

Anybody else?

Dr. Barriault?

**MEMBER BARRIAULT:** For CNSC, what I'm hearing really is that you've gone through the hoops to test this reactor and you say: "Well, it's okay to go on now with an experiment for four years."

Is that what we're hearing? That this is an experiment, that this has not been done, this is not an industry standard? Or is it an industry standard?

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

Actually, Dr. Edwards mentioned something very important: clear criteria for continued operation.

As a matter of fact, we don't have the clear criteria right now. That's what we are working on.

Two hundred ten thousands hours of effective full power operation is not a criterion. By all means, not. This was just a design assumption made 40 years ago.

Now, we have a research project which we call "*Fuel Channel Lifecycle Management Project*" which is supposed to establish clear criteria for the fuel channels when we have to end commercial operation or re-tube.

So the criteria will be probably stated very clearly, in our License Conditions Handbook when we bring this broad project to conclusion.

**DR. EDWARDS:** Am I suppose to have the last word or?

**THE CHAIRMAN:** You will get the last word but you're generating some -- still some discussion amongst ourselves here.

**DR. EDWARDS:** Okay.

Could I comment on that last statement by Dr. Rzentkowski?

**THE CHAIRMAN:** Yes, please.

**DR. EDWARDS:** Again, I'm addressing the Commissioners here, not the staff, because I think the Commissioners are the ones who really bear the responsibility for decision-making, not the staff.

And, I think that the Commissioners have to find it in their own view, they have to be clear as to what it is they are approving or not approving.

And I find it distressing -- as has been expressed by some of the other people who have spoken today, such as Shawn-Patrick Stensil from Greenpeace -- I find it distressing that, in fact, there are no criteria for refusing to grant a licence. There is no criterion for not granting a licence.

It seems that anything you try and find out that might be considered an indication of why you should not renew a licence -- certainly, Thierry Vandal made it quite clear that, from his perspective as CEO of Hydro-Québec, he thought that this 210,000 was an absolute limit and it was a safety consideration. He stated that very clearly.

So, I mean, maybe he was in a position where he was now free of the responsibility for trying to justify the continuation of the Gentilly-2 nuclear reactor, and so he could speak frankly.



But perhaps these people who are now in the room are feeling that they cannot speak frankly because there is so much momentum and so much pressure from OPG to get this thing approved, to get this thing extended.

The Commission has to ask itself: In your hearts, do you really believe that, given the siting of the Gentilly-2 reactor (sic), so close to downtown Toronto, given the age of the reactor, given the unknowns and given the experience worldwide, is it really in the public interest and are we or are we not compromising public safety to let this plant run when we have heard ourselves that they haven't finished doing the work, they don't even have the standards in place yet.

What's the hurry here? That you get the -- they want to get your approval, members of the Commission, before they've done their homework.

**THE CHAIRMAN:** Dr. Barriault?

**MEMBER BARRIAULT:** I guess what I'm doing really is looking at the design of the design of these reactors and a time element placed on that.

If you compare this, for example, to aviation, you know, a Cessna 172, the engine has to be replaced every 1800 hours, no matter what kind of shape that you think it's in, and that's based on history. After 1800 hours, they experience problems, you can get it

into what's called "under-condition" but that means that you have to get your oil checked -- tested really, for metal deposits on almost a monthly basis, and so on and so forth.

So what I'm wondering about, really, is that what kind of mechanism are we going to have in place, if we do a lot of this, to make sure that this reactor is really tested and examined over and above what we normally do?

Otherwise, what we're doing is saying: Well, we're going to try this experiment and if it goes 1000 hours more or 500 hours or whatever, well, then we'll have that documented as this has been done in other, I guess, reactors.

**DR. RZENTKOWSKI:** Greg Rzentkowski, for the record.

Perhaps I was not clear referring to a research project. The reactor is not a research project. The research project is performed in the laboratory environment to assess the ageing mechanism of the pressure tubes and define what is the actual limit for the pressure tubes and establish the acceptance criteria for the real reactor. That's what I meant.

We will absolutely not experiment on the reactors. We have to be absolutely sure that the safety

will be guaranteed beyond any research doubt. And this is the objective of the project: to take us to the point where we can very conclusively establish the criteria for the end of operation of the pressure tubes. The reactor is not an experiment.

**MEMBER BARRIAULT:** Not an experiment.

**DR. RZENTKOWSKI:** That's one point I wanted to clarify.

Now, a research project is only one part of the story. The second part of the story is surveillance, testing, maintenance, and this is a part of the Continued Operation Plan. We are developing much stringent testing requirements for the pressure tubes.

And this will be, as I mentioned, part of the Continued Operation Plan. I will ask Mr. Miguel Santini to describe this part of the continued operation.

**MEMBER BARRIAULT:** I'm sorry, the next part of my question before you go on was: Is this a standard of industry?

Does this go on routinely in industry?

**DR. RZENTKOWSKI:** Yes, it's a CSA standard which describes the metalurgical conditions of the pressure tubes at the end of operation so, basically, establishes the acceptance criteria.

**MEMBER BARRIAULT:** But I don't ---

**DR. RZENTKOWSKI:** The standard has been written a long time ago and, now, the data are being revised based on the current research study.

**MEMBER BARRIAULT:** I don't think it was -- my question was that: Is this a standard within the industry for other reactors?

Are there other companies doing this on a regular basis?

Are other countries doing this on a regular basis?

**THE CHAIRMAN:** We already discussed this, the life extension in the U.S. and everywhere else, but every plant is a different design, different circumstances, different studies.

But they all now are running into 60 years of operation and now there's talk about 80 years of operation.

Am I right?

**DR. RZENTKOWSKI:** That's correct. There are international research studies on ageing and the extensive information on ageing. Mr. Gerry Frappier will describe this effort.

**DR. EDWARDS:** Could I point out, however, that the CANDU design is fundamentally different from the American design, much more complicated, with many more

kilometres of small diameter pipes which don't exist in the American design.

And it is precisely because of the deterioration of those small diameter pipes that the refurbishment of the reactors which have been refurbished, the Bruce reactors, the Point Lepreau reactor and the proposed refurbishment of Darlington were authorized because they were considered to be necessary. Is that not true?

**THE CHAIRMAN:** Staff?

**MR. FRAPPIER:** It's Gerry Frappier, for the record.

I'm going to answer that, but I'll do it in a little bit of a long way. What is very similar to the rest of the world and the United States in particular is, as OPG referred to, the balance of plant.

So there's a whole bunch of areas here that are similar and how to ensure that they are good for extended life and what not, there's various standards and templates and that that have been referred to by OPG that have been out of the EPRI down in the United States research organization and whatnot.

The piece that is unique, as Dr. Edwards was just saying, is the fuel channels. And that's why several years ago, industry started a research project to

look at the -- what would be the correct criteria and how to update the standards to ensure that the fuel channels themselves would be able to last for a longer time of operations.

And that is the research project that we're making reference to. That research project, the results of that research project, as Dr. Rzentkowski was saying, will be used then to update the standard, the CSA standard that has the tight controls that industry users in everyday work.

So that is the process by which we're evolving this and making sure that both ourselves, and internationally, that the additional length of time that reactors are operating are going to be done in a safe way.

There's also lots of research being done in a much more basic way of metallurgical and all this sort of stuff that is very compatible between ourselves and other regulators around the world. And we are continuing to exchange our information on those sides as well.

**THE CHAIRMAN:** Okay, anybody else?

Is -- we keep talking, staff are being asked all kinds of questions as if they are running the machines. Let's remember that we have an operator here that is in fact the majority of accountability to make sure that things are safe.

Got a regulator, make -- oversee that it is safe, so it's a double accountability scheme here.

So let me hear from OPG. Why are you comfortable in continuing operation?

**MR. JAGER:** Glenn Jager, for the record.

I'll ask Mark Elliott to comment in detail the basis for the continued operation of the fuel channels. But I would say that we have high confidence in the plan that we have set out.

Each time that we start up a unit coming out of an outage, we have to provide fitness for service certification, if you will, that the reactor is fit to operate.

That includes the feeders, the small bore piping that we have an inspection program for that as well. Its wear is well understood and part of that fitness for service program overall.

If we find a condition that is not fit for service, we either do not start up or we fix it until it's ready to start up. So each time we start up an operator reactor during its operating interval, we ensure that that reactor is safe to operate right through that operating interval, and that will occur each time right through to 2020.

So I'll ask Mr. Elliott to speak in greater

detail about the program and how we ensure that happens.

**MR. ELLIOTT:** Mark Elliott, Chief Nuclear Engineer, for the record.

One little fact that I want to get back to before I jump in is the -- just the number of years, 210,000 is 30 years, 247 is 35. We've been throwing around 40 years and it's 30 years is where we are now, and we would like permission to go 35.

And before asking for that permission, the first thing we have to do is satisfy ourselves. We're the licensee, we're responsible for safety and we wouldn't be submitting this unless we were confident that the pressure tubes were safe.

To come to that conclusion, we started several years ago, in 2009, with a research project. And this was a unique project because we knew that the CNSC would have to be involved every step of the way to verify our findings, to verify our conclusions.

So what we did is we wrote a protocol. This was a protocol, a written kind of Memorandum of Understanding with the CNSC staff that laid out 18 research reports, 18 pieces of research to look at all different aspects of pressure tube life.

And so we agreed that those were the right research reports, those were the things that needed to be



investigated.

We also agreed on the closure criteria, in other words, what was the -- once you do the research, what do you need to see for it to be successful, to say that part of the research was not only done, was done appropriately and had a successful result. So we wrote closure criteria as well.

And those were laid out on a schedule and OPG had -- and Bruce Power both signed, the two Chief Engineers signed the protocol for the utilities and Greg and Gerry signed -- Greg Rzentkowski, Gerry Frappier signed for the Commission -- the Commission staff.

And that laid out a schedule for when the research had to be done, the report submitted. It also laid down a schedule of when the CNSC would reply with their comments.

So it was quite a business-like approach to a project where we knew it would need a lot of CNSC expert oversight. And their experts have been involved every step of the way.

All 18 reports are finished, all 18 reports, research reports were completed on time, were submitted, and the replies were received on all 18. And there was no significant negative issues with any of the research or the replies from the CNSC.

Just to characterize one of them, I won't go into all 18 of course, but one of them is that when pressure tubes age, they pick up hydrogen. And so what we did is we added hydrogen to the pressure tubes. We took pieces of pressure tube out of the reactors, added hydrogen to them to simulate ageing, and then we did pressure burst tests at Chalk River nuclear labs.

I've been there for a few of them. When you know the lab staff on a first-name basis, you know you've been paying attention. So that's kind of where I am with the hot cell people at Chalk River.

And we -- and so we did those burst tests and we found that the pressure tubes were strong past 2020 in terms of how much hydrogen.

And I think I mentioned this morning that right now, we have 50 ppm of hydrogen, we're going to be going -- we think we'll be at 80 at 2020. Even the current CSA limit is 100. So -- but we burst test to 120. So we know there's safety margin there.

So that's just one example, but there was research, you know, 17 other research activities done. So it's -- we know, we have a phrase in OPG, I know because I looked, and this really applies in this case. We know that the pressure tubes are safe because we really looked into it.

**THE CHAIRMAN:** Okay, thank you.

I think Dr. Edwards, you got the final words here.

**DR. EDWARDS:** All right. I will make available to the Commission some communications written by Dr. Frank Greening, who was probably the most knowledgeable person on the whole question of materials and corrosion and other types of hydriding experiences, not only with the pressure tubes, but with the feeder pipes and so on.

According to his experience, there are completely unexplained differences -- sharp differences in the condition of pressure tubes, which are adjacent to each other in the nuclear reactor and which should have virtually the same condition. And yet there are fairly sharp divergences in the condition of these pressure tubes.

So I'm going to send this information to the Commission as to confirm the fact that what I believe to be true, and that is that there is a great deal of uncertainty despite any tests they may have done at the laboratory.

There is a great deal of uncertainty about the precise difference between all of these tubes, these hundreds and hundreds of tubes inside the core of the

reactor.

If you replace them with new tubes, then you know they're all the same because they're new. They've been freshly manufactured. They've been freshly inserted, and you're not playing games. You're not playing. You're not rolling the dice. You're not taking chances. You're not working on ignorance or on your best guess.

You're working on something which is a known condition and that is that these pipes are all new. That's a totally different situation from using some laboratory simulation for the basis of continuing the existence of this old plant for another five years. I believe that's rolling the dice.

Now, with regard to increased surveillance as was pointed out, as anybody knows, you just can't keep an eye on these things when the reactor is running because the radiation is so intense, it would kill any human being in there.

So the result is that one of the great difficulties of nuclear power, which is rather unique to nuclear power, is that it all has to be done so much by remote control and by instrumentation, and because of the instrumentation, there often enters in a degree of guesswork. You just don't know the conditions.

You know, for example, at Three Mile Island, there were two days when they didn't know what the water level in the core of the reactor was or they didn't understand what the water level in the core of the reactor was because nobody could go in there to look.

So I think that this is why we have to be very careful with nuclear power. Nuclear power is not only a wonderful device for generating electricity and a marvelous physical system for deriving energy, but it is also a warehouse of radioactive poison and that's the problem.

That's the problem that engineering breakdowns, which would be of little consequence in most other systems, can be of major consequence in nuclear plants because it may accidentally provide an escape route for these radioactive poisons. And that's the difference. And that's why I think the Commissioners should say no.

**THE CHAIRMAN:** Okay. Thank you. Thank you very much.

This brings to a closing, believe it or not, of today and the hearing will resume tomorrow morning at 8:30.

Thank you for your patience. Have a nice evening.

--- Upon adjourning at 9:26 p.m. /

L'audience est ajournée à 21h26