DARLINGTON NEW NUCLEAR POWER PLANT PROJECT

JOINT REVIEW PANEL

PROJET DE NOUVELLE CENTRALE NUCLÉAIRE DE DARLINGTON

LA COMMISSION D'EXAMEN CONJOINT

HEARING HELD AT

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REVISED

JOINT REVIEW PANEL

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Transcript :

Throughout the transcript the spelling Mr. Kavlevar was used when it should have read Mr. Kalevar.

Throughout the transcript the spelling “ACL” was used when it should have read “AECL”.

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Results from probalistic risk assessments that were conducted for licencing submissions in regulatory regimes, which are very mature and basically we were able to infer based on those independent studies that they would meet the RD337 safety goals.
MEMBER PEREIRA: When you refer to accident analysis that were done for other regulatory regimes, what particular regulatory regimes were you referring to?
DR. VECCHIARELLI: Jack Vecchiarelli for the record. For example, in the case of the AP1000 and in the E -- indicates the EPR, submissions to the U.S. NRC for design certification applications, as well as for the U.K.
MEMBER PEREIRA: Thank you very much. I’ll go on to get some clarification on some -- a comment you made about, “No safe level of exposure -- there is no safe level of exposure of ionizing radiation.” Does this apply to background radiation as well?
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Courtice, Ontario

--- Upon commencing at 1:30 p.m./

L'audience débute à 13h30

--- OPENING REMARKS:

MS. McGEE: Good afternoon. Mon nom est Kelly McGee. Welcome to the public hearing of the Joint Review Panel for the Darlington New Nuclear Power Plant project.

Je suis la co-gestionnaire de la Commission d'examen conjoint du projet de nouvelle centrale nucléaire de Darlington.

Secretariat staff are available at the back of the room. Please speak with Julie Bouchard if you are scheduled to make a presentation at this session, if you are a registered intervenor and want the permission of the Chair to ask a question or if you are not registered to participate, but now wish to make a statement. Any request to address the panel must be discussed with Panel Secretariat staff first. Opportunities for either questions to a presenter or a brief statement at the end of a session will be provided time permitting.

We have simultaneous translation.

Headsets are available at the back of the room. English is on channel one. La version française est au poste deux.

A written transcript of these proceedings will reflect the language of the speaker. Please identify yourself each time you speak to make the transcripts as accurate as possible. The written transcripts are stored on the Canadian Environmental Assessment Agency website for the project. The live webcast can be accessed through a link on the Canadian Nuclear Safety Commission website and the archived webcasts and audio files will also be stored on this site.

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

CHAIRPERSON GRAHAM: Thank you very much, Kelly, and good afternoon everyone. Welcome to -- welcome to everyone joining us today either through audio link or on the internet. My name is Alan Graham; I'm the Chair of the Joint Review Panel. The other members of the panel with me today are Madam Beaudet, on my right, and Mr. Ken Pereira on my left.

The procedures that we'll start

with today and we're trying to adopt this now on a routine basis, is to go into undertakings that were given over the -- over the period of the hearings and which may be due today. So I will ask Mr. Bourgeot to go through the ones that are up today and -- and get an update on those. Mr. Bourgeot?

--- UNDERTAKING STATUS:

MR. BOURGEOT: I would like to remind you that the undertaking list is updated daily on the CEAA registry as of now. In the matter of the panel hearing undertakings that are due today, I will address OPG pertaining to undertaking 36, an explanation of the exceedances from OPG nuclear facilities listed on the MOE-2009 Industrial Sewage Monthly Summary all regions. Are you prepared to address this undertaking?

MS. SWAMI: Laurie Swami, yes, we are. We have provided a table that expands on the information provided in the Ontario Ministry of Environment's 2009 Industrial Sewage Summary Report. And I will speak briefly to the table. OPG, just to give some context, OPG is required by its certificates of approval for industrial sewage works, issued by the Ontario Ministry of Environment to report to the ministry any time it

exceeds prescribed effluent limits.

OPG is also required to report to the ministry when there is an exceedance under the effluent monitoring and effluent limits regulation for electric power generation sector which is one of the ministry's MESA regulations. The -- the summary that was provided deals with both of these types of reports.

In the table, filed to address this undertaking, we have described each occurrence, the reason for the occurrence and the actions taken to prevent recurrence. I won't speak to each one of them in detail today, but will be available should you have questions later during the hearing process.

However, I'd like to provide a bit of context on two exceedances that are noted as being acute lethality. And that's -- looks -- the MESA requirements are for performance of acute toxicity testing using two tests. One is the Daphnia magna or water flea test and the other includes Rainbow Trout. If the sample passes it means that sample is subjected to organisms. If 50 percent of the organisms survive, it's considered to have passed the toxicity test.

So I use an example to describe this. On February 2nd of 2009, a sample was taken from the Darlington Active Local Waste Management System prior to discharge to the condenser cooling water system which is ultimately discharged into the lake. The sample failed the test for Daphnia magna. There was no mortality associated with the Rainbow Trout test. Discharge samples taken after this event have passed the MESA requirements.

Our review indicated that we had undertaken the draining and refilling of the injection water storage tank as part of our preparations for the vacuum building outage that occurs once every 12 years. The water in that tank is de-mineralized and treated with chemicals to prevent corrosion. And just of note, de-mineralized water is generally toxic when discharged without treatment. And although we treated this effluent, we concluded that the volume of the water in this instance was greater than our effluent management system could address.

As a result of the event, we have taken steps to ensure that water drained from this tank is separately processed through an ion exchange column and adjusted for hardness prior to

discharge into the Active Local Waste Management System.

Now, as noted on the ministry summary table, the MOE has recently introduced an environmental penalty system for these types of exceedances. Environmental penalties are calculated based on a prescriptive formula established by regulation. You will note that in two cases at Pickering, environmental penalties were assessed by the ministry and paid by OPG. In both cases, the maximum reductions were applied by the ministry to take account of OPG's environmental management system.

Mr. Chair, if I could, on undertaking number 35 that arose in the context of the discussion with Mr. Hogarth of the Department of Fisheries and Oceans, regarding authorizations under the *Fisheries Act*, I would like to take an opportunity to briefly speak to that issue as well.

The absence of an --

CHAIRPERSON GRAHAM: Please proceed. I guess we'll do them and then we'll come back -- come back to --

MS. SWAMI: Thank you. The absence of an authorization for the ongoing

impingement and entrainment of fish reflects the historic common practice of incidental takings not requiring authorization. OPG is working with MNR and DFO to determine the most effective means of bringing our plants into compliance with the *Fisheries Act,* including design improvements and offsetting compensation. As described by Mr. Hogarth on Tuesday, OPG has entered into an agreement with DFO and MNR to address this issue for our existing sites on a prioritized basis.

OPG further understands that DFO is addressing existing plants on a risk basis approach. In the original design for the Darlington nuclear generating station, OPG implemented modern design features that significantly reduce impingement and entrainment and believes that that design adequately addresses the issues today. OPG does not believe that our operations are having effects on the fish population. Thank you.

CHAIRPERSON GRAHAM: Thank you very much, Ms. Swami. There -- all of these undertakings will probably generate some questions from the panel, and early next week we will be scheduling some time, and all those that are

providing those answers will have -- will be given that schedule so that we can refer to different ones, because a lot of detail today in what you've given in your first presentation. So just -- and I know you realize that, but for the benefit of others that are taking undertakings, there may be questions that will follow and we'll have that on our schedule.

So you have another -- you have a couple more, I believe, Mr. --

MR. BOURGEAU: Thank you, OPG regarding Undertaking 45. Identify monitoring programs, if any, based radiation exposure. Are you prepared to address this undertaking?

MS. SWAMI: Laurie Swami, yes. Last evening we were asked if Ontario Hydro, OPG had done monitoring of workers who are exposed to radiation. What we have done in the past has been studies to identify for both workers and pensioners, causes of death, and we have had that information collected. It is not considered to be a full epidemiological study, if I can say that word. And what we do now, that -- that process ended a few years ago, and what we do now is we participate in studies that are conducted by other

agencies. And I think the CNSC will be providing a long list of those. We participate by providing the dose information that we have to ensure that our information is incorporated into any studies where Canadian workers are considered. Thank you.

CHAIRPERSON GRAHAM: Thank you. The next one?

MR. BOURGEAU: CNSC regarding Undertaking 30, to provide a list of health studies that have been conducted in nuclear communities and the main findings to provide details on methodologies. Are you prepared to address this undertaking?

DR. THOMPSON: Patsy Thompson, for the record. Yes, we are. Numerous studies have established that exposure to moderate to high radiation doses increase the risk of cancer. Regulatory agencies, such as the CNSC, have put in place radiation protection framework based on those limits and the requirements to keep doses as low as reasonably achievable. The assessment of risks is ongoing as new laboratory and epidemiological studies are reported in the scientific literature and reviewed by international committees.

This undertaking describes the

types of epidemiological studies, summarises the main studies conducted to date and briefly discusses the linear no-threshold model as well as alternative risk models that are presented in literature.

If you will allow us, Ms. Lane will provide a brief overview of the studies we've included in the undertaking, and should the Commission -- or the panel require more information, we would update the undertaking. It will be -- it's been photocopied now and the panel will be provided with copies today.

CHAIRPERSON GRAHAM: Ms. Lane?

MS. LANE: Rachel Lane. I'm the acting director for Radiation and Health Sciences Division.

The atomic bomb survivor studies: The main radiation effects observed are cancer, both solid cancer and leukemia. The excess risk of cancer increases literally as the dose increases. In utero exposures can result in childhood cancers, cancer in adulthood, and mental retardation and delayed growth. Survivors' offspring conceived after the bombings had no excess of congenital anomalies, mortality or cancer incidents when

followed through to the 1990s.

From the atomic bomb survivor studies the incidents of solid cancers and leukemia provide some of the best evidence of the linear no-threshold model, down to doses of approximately 100 milliseverts.

Genetic effects have been observed in plants and animals at high exposures, but have not been observed in human populations. Studies of 30,000 children exposed -- sorry, studies of 30,000 children of exposed atomic bomb survivors show a lack of significant adverse genetic effects. However, the ICRP risk factor for humans attributes a small risk of hereditary effects based on animal studies.

The Chernobyl accident: Twenty-five years after the accident, several important health impacts have been observed. The initial disease projection on the basis of the linear non-threshold model and dose estimates, grossly over-estimated the number of deaths as a result of the accident. The observed health effects are: Acute radiation syndrome. This was found in 134 plant and emergency workers. Twenty-eight died within the first few months of the accident, and 19

additional workers have died up to 2006.

Thyroid cancer: About 7,000 cases of thyroid cancer for children and adolescents exposed to iodine 131 in 1986 have been observed. More cases are expected in the next decades among those children or adolescents exposed in 1986. There have been a total of 15 deaths from thyroid cancer among these children.

Fears of in utero exposure and birth defects were widespread. However, there is no evidence of radiation effects or infant mortality. Quite a high rate of infant mortality compared to other countries, however, was noted in both contaminated and uncontaminated areas.

The German KIKK Study: This case control study involving childhood leukemia cases near 16 major nuclear power plants in Germany found a statistically significant increase in risk of childhood leukemia in children younger than five years old, decreased in distance from the German nuclear power plants. The authors noted there was no clear explanation for a causal relationship between any non-risk factor and the study findings. They noted several flaws in their study, and also that the observed trend in risk decreased over

time. Similar case control studies that were conducted at the same time in France and in Britain found no such effect.

Canadian studies: Numerous Canadian studies have been conducted in Canada. Descriptive ecological studies have provided evidence of a non-significant increase in childhood leukemia, birth defects, and other diseases near Canadian nuclear facilities. These studies were followed up with Canadian case control studies. These more robust study designs found no evidence that childhood leukemia or genetic anomalies were related to parental pre-conception radiation exposure. These studies are consistent with authoritative reviews of pre-conception exposure and the health effects of offspring.

Cohort studies have also been conducted in Canadian nuclear workers. Workers are healthier than the general population. The studies also conducted internal analyses of these workers where they can -- had comparison among the workers with various radiation exposures. These studies provide no substantial evidence of a positive relationship between workers, radiation dose and solid cancer risk.

In summary, based on a weight of evidence analysis of the many epidemiological studies of populations in the vicinity of nuclear facilities, there is no substantive evidence that there are any adverse health effects related to environmental radiation exposures from these facilities. Thank you.

DR. THOMPSON: Patsy Thompson --

CHAIRPERSON GRAHAM: Thank you very much, Ms. Lane. Go ahead, Dr. Thompson.

DR. THOMPSON: Sorry. The epidemiological studies that have been just described form the basis for the linear no-threshold model, and this model is the most widely accepted risk model, both for radiation exposures as well as for chemical carcinogens. There was little evidence of adverse health effects at doses below about 100 milli-sievert.

Since there is no certainty in the linear no-threshold relationship for radiation exposures, other models have been proposed on the basis of mechanistic, which means cellular or subcellular experimental studies, as well as studies conducted on animals.

Both the International Commission

on Radiological Protection and the Committee referred to as the BEIR 7 Committee stated that while evidence supports other models, the LNT model, the Linear No-Threshold Model, provides the best overall fit for radiation protection purposes.

The CNSC will continue to review the scientific literature and participate in international committees to ensure that our radiation protection standards provide a high degree of protection to workers and members of the public.

As mentioned a few minutes ago, the undertaking is being provided to the secretariat, and if more information is needed, we would update the undertaking.

CHAIRPERSON GRAHAM: Thank you very much, Dr. Thompson. Mr. Bourgeau, do you have any others?

MR. BOURGEAU: Yes, we do. CNSC in regards to Undertaking 42, dose limits for US and international nuclear workers. Are you prepared to address this undertaking?

MS. THOMPSON: Patsy Thompson for the record. We are getting the information, and we would submit it to the secretariat tomorrow.

CHAIRPERSON GRAHAM: Thank you.

(SHORT PAUSE)

MR. BOURGEAU: In regards to Undertaking 21 for Health Canada to provide recreational water quality regulatory regime, the panel has not received it yet, and we will report back on it tomorrow. This ends the undertakings for today.

CHAIRPERSON GRAHAM: Thank you very much, Mr. Bourgeau, and now we'll go to our schedule for today, in which the first –- after we've done the undertakings which I thank you for an update, we will now start today's session with a presentation by the Community Coalition Against Mining Uranium as outlined in PMD 11-P1.173, and I believe Mr. Erlichman is the presenter today. Welcome, sir, and the floor is yours.

--- PRESENTATION BY MR. ERLICHMAN:

MR. ERLICHMAN: My name is Wolfe Erlichman. I am President of the Community Coalition Against Mining Uranium or CCAMU. CCAMU is a group of concerned citizens from the greater Ottawa Valley and Kingston area who came together to protect our air and water in light of the possibility of a uranium mine in the Frontenac and

Lanark region.

One of the things we did, in April 2008, we held a citizens' inquiry into the impacts of the uranium cycle, which had 230 written submissions and 157 presentations. And details of that is on our website, which is called uraniumcitizensinquiry.com.

On December the 10th of 2008, we made a presentation to a CNSC panel looking at the issues surrounding the possible refurbishment of the Pickering reactor. At that time, we said that we should not be wasting precious time and tax payers' money trying to find ways of mitigating the harmful effects of a dangerous technology.

We are here to repeat that message. We agree with the other presenters that we are dealing with a technology that has to be handled very carefully and which can have significant impacts on the environment.

Our concerns today relate to broader environmental issues such as global warming, efficient use of resources, nuclear weapons proliferation, and the building of nuclear reactors by countries with lower environmental standards than Canada's.

There does not seem to be a place to discuss these larger environmental issues and the existing environmental or licencing process. If they are discussed at all, it is usually done in a very unsatisfactory way in the political process.

We are concerned that by building these reactors, our government will be sending the wrong environmental message to the world. We will be telling the world that Ontario will not be a jurisdiction which will be focused on developing renewable resources. With most of the money committed to nuclear reactors, there won't be any money for a serious attempt to develop real, clean, and renewable energy.

As well, with nuclear mandate to produce 50 percent of our electricity, there will be no room in the system for any significant contribution from sustainable resources.

For the same reasons, conservation efforts will also be downgraded. This means that we will be continuing business as usual. We will be accepting the nuclear industry's promise that it can provide us with unlimited electricity. This will allow us to continue our wasteful lifestyle.

The reality is that we have to

conserve the world's limited resources. We have to find clean and renewable sources of energy, and we have to seriously cut back on our consumption.

The nuclear industry by making the false promise that it will provide us with reliable, clean, safe, and affordable power and by taking the dubious position that only coal or nuclear can provide base load electricity stands in the way of the changes we have to make in order to build a clean, sustainable world.

By going ahead with reactors at Darlington, we are putting Ontario's stamp of approval on nuclear power, and this might encourage other countries to build their own reactors. This would increase the chances of catastrophic events, such as the one in Japan, as other countries may not be as careful about nuclear power as Canada is.

For example, our uranium reprocessing plant in France is currently polluting the North Sea with radioactive waste. More nuclear plants worldwide will probably mean that background radiation will increase and could result in unforeseen consequences.

I have explained how building nuclear reactors will have a negative effect on

developing real, clean –- real, clean, and renewable energy, but there's a worse scenario.

Nuclear reactors are famous for never being built on time or on budget. The reactor being built in Finland by France is, as you know, a good current example. However, in Canada, we have had reactors which were not only not on time or on budget, but they didn't work when they were finally finished.

The first Gentilly reaction in –- reactor in Quebec did not work, and the two MAPLE reactors at Chalk River don't work. Therefore, it is conceivable that one or more of the proposed new build reactors at Darlington may not work either.

It is possible that Ontario could waste 10 or 15 years and billions of dollars when we could have used the time and resources on building a truly sustainable system.

What will be the source of power if the new reactors don't work? What effect will that have on the environment?

Another problem with legitimizing nuclear power is that it allows countries which want to build nuclear weapons to have a valid reason for building reactors. As you know, India

used the Canadian reactor to develop its nuclear weapons program.

If nuclear power is seen –- is not seen as a viable energy option, this may help stop nuclear weapons proliferation.

We may disagree about how safe the reactors are in Ontario, but if there are problems with reactors anywhere in the world, it is quite possible that we could feel the effects in Ontario, and in that sense, everybody on earth is living beside a reactor.

The Chernobyl and Fukushima reactors are examples of this. So the greater the number of reactors worldwide, the greater the chance of there being a catastrophic event. A non-nuclear clean world environment would be a clean environment for Ontario.

We are participating in a historic event. Ontario has to make a choice which will decide the future course of energy for generations. For politicians, it is easier to choose nuclear power because although it is expensive, it does provide a tourniquet solution, and there is an existing powerful constituency which benefits from it.

On the other hand, sustainable sources –- choices are more difficult because there is no clear blueprint that can be followed and there are many vested interests who want to keep the system as it is.

So in conclusion, we recommend that nuclear reactors not be built and that sustainable choices be made instead. So that's the end of my presentation.

I just have a couple of questions which may or may not –- you may –- I don't know if you can answer or want to answer. One, the first is that is OPG prevented by law from building large scale voltaic and wind projects? And the second question is –- is this: I'd like to know if it is within the scope of your panel to use the arguments that I have made in coming to your conclusions?

CHAIRPERSON GRAHAM: Thank you very much, Mr. Erlichman, for your presentation, and we will now go to members of the panel who may have questions to you or to the –- the –- to the presenter or to OPG or staff at CNSC. So I'll start off with Madame Beaudet.

--- QUESTIONS BY THE PANEL:

MEMBER BEAUDET: Thank you, Mr.

Chairman. Good day, everyone. Your organization is called Community Coalition Against Mining Uranium. We had a lady who –- who was here a few days ago also defending the invasion of the mining industry on private land, and I'd like to hear a little bit more about your coalition. Are you in the same stream of thought of trying to prevent mining of uranium on private land?

CHAIRPERSON GRAHAM: Sir, if you'd press the microphone and introduce yourself each time just so we can get it on the -- on the synoptics. Thank you.

MR. ERLICHMAN: Wolfe Erlichman. The proposed mine that we're fighting in the Sharbot Lake area was a combination of private and public land. The -- the people who wanted -- who were interested in mining the uranium had staked private land, but, in fact, the work that they were doing -- they were actually doing the work on Crown land, so it was -- it was a mixture of both.

MEMBER BEAUDET: How many members do you have? Do you -- group, associations or just private individuals?

MR. ERLICHMAN: It's essentially individuals. We don't sort of have members per se.

It’s a large -- basically, it’s -- it’s kind of an issue-oriented kind of thing and -- and we operate, you know, through just meetings and consensus and that kind of thing.

MEMBER BEAUDET: You also have in your presentation, looking at other types of energy -- and I was wondering if your group also is active in not only making people aware of uranium mining, but also giving opportunities to be more learned people on other alternatives of energy than nuclear power?

MR. ERLICHMAN: Well, that’s right. We -- Wolfe Erlichman. Yes, we do that. And so, yeah, we’re -- you know, we try to teach people that renewable is doable. And -- and individual people, you know, have put up solar panels and that kind of thing, so -- so certainly that’s been a journey -- my journey personally because I originally started this.

I was curious about the possibility of a uranium mine and then I -- I was concerned and so I worked to try to stop it and then, as a result of that, I became familiar with nuclear energy and -- and then became familiar with alternatives, so I've sort of gone through the

progression.

MEMBER BEAUDET: Thank you. Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you, Madame Beaudet. Mr. Pereira?

MEMBER PEREIRA: Thank you, Mr. Chairman.

Last week we had the assistant deputy minister of energy from the province of Ontario before us, explaining the background to the decisions of the province to maintain a 50 percent nuclear baseload generation capacity and to invest in new reactors at Darlington. And we asked questions about the consultation that -- that was conducted in Ontario to arrive at a -- at that decision. And the assistant deputy minister did tell us about consultation at different stages in their decision-making process.

Did your organization participate in those discussions because, in a sense, the decision to go with new nuclear comes from the province of Ontario and not from OPG.

MR. ERLICHMAN: Wolfe Erlichman. We didn't participate in them because -- do you know when they made the decision to go ahead with

-- with the reactors?

MEMBER PEREIRA: A number of stages at different points, there were decisions they wanted to go with nuclear then. A new long-term energy plan was issued last year --

MR. ERLICHMAN: Right.

MEMBER PEREIRA: -- but prior to 2006 was the first --

MR. ERLICHMAN: Yeah.

MEMBER PEREIRA: -- decision on commitment to 50 percent.

MR. ERLICHMAN: We were more focused on -- at that point on trying to stop the -- the proposed uranium mine and we were more focused on the mining -- *Ontario Mining Act* and so we didn't -- we, at that time, weren't as focused on -- on nuclear power. We were -- we were busy with -- with our other things.

MEMBER PEREIRA: So my point is that some of the decisions were made ahead of this panel's hearings. And this panel is looking at the environmental impact of building new nuclear, which arises from a decision made by the government of Ontario.

MR. ERLICHMAN: Right.

MEMBER PEREIRA: And beyond that, worldwide, a number of countries, as you know, that have committed to nuclear power and generate a lot of their electricity from nuclear energy because of their consideration of nuclear and oil and gas and coal as being baseload generation strategies, what are your thoughts on the challenges generating baseload electricity using renewables and the options that you are proposing?

MR. ERLICHMAN: Wolfe Erlichman. I personally have strong feelings that -- that we have not had very good evidence that baseload can’t be provided by renewables. When I look at the CNA website and -- and read materials put out by people in the nuclear industry, I don't see any statistics. They basically just seem to repeat the mantra that the sun doesn't shine at night and the wind sometimes doesn't blow. People that -- that -- groups that have done -- crunched the numbers, like the Pembina Institute, they seem to think that we can produce baseload. And -- and so there are other -- so I -- I do believe that we can get baseload in -- in various ways.

The other thing that I think is that the renewable technology, especially the

photovoltaic technology and the storage technology, is -- is really growing very rapidly. The pace of change is -- is quite tremendous and that will, I think, just -- practically will outpace nuclear, if it hasn't done so already, because nuclear is very old, outdated technology. It -- it doesn't fit into the information technology situation that we -- that we find ourselves in.

MEMBER PEREIRA: There is some experience in Ontario with generation from renewables and I'm not sure whether it's fair to ask Ontario Power Generation of the experience over the last two or three years of having renewable sources on the grid. I am not sure whether Ontario Power Generation operates some of these facilities like wind power and solar power.

Is Ontario Power Generation able to give us any information on the capacity factors and -- is this something you can speak to?

MR. SWEETNAM: Albert Sweetnam for the record. Ontario Power Generation's mandate does not include renewables. That's a specific directive from the province of Ontario. The province of Ontario is addressing renewables through their FIT program, where private enterprise

can apply through the OPA and be granted a purchase -- a power purchase agreement to develop either solar or wind.

I think it would be best to address the question on capacity factors for both solar and wind to the OPA; however, if you go back through the record -- a transit, you will see that the deputy minister had actually quoted the capacity factors. I don't recall them offhand, but they're in the record.

MEMBER PEREIRA: Thank you very much. We can -- we can look back at that, in fact, for our consideration. Thank you. Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira. You asked two questions and the first one was a legal one which I will not respond, but the second was the panel will listen to all intervenors. We'll write our report -- make our decision, write our report. That then goes to the federal minister. The federal minister will then refer that to the cabinet for a decision. So there is a process which has been outlined in the panel agreement, but that is the process that we'll follow.

With that, I will go to questions from the floor. And the first question I have is a question -- any questions to the presenter from OPG?

MR. SWEETNAM: Albert Sweetnam. No questions.

CHAIRPERSON GRAHAM: Thank you. To CNSC, do you have any questions?

DR. THOMPSON: Patsy Thompson. No questions. Thank you.

CHAIRPERSON GRAHAM: Thank you, Ms. Thompson -- or Dr. Thompson. The next is government participants, government organizations. I don't see any government organizations, federal or provincial. Then we'll go to the floor and we have one questioner. Mr. Kalevar, welcome back.

--- QUESTIONS BY THE INTERVENORS:

MR. KALEVAR: Thank you, Mr. Chairman, for welcoming me back. I appreciate -- listening to my questions.

You have made some very good points I can hardly disagree with. But let me ask you, the renewable energy that you are suggesting, you know, and that creates always the question of baseload, will it mean baseload?

Firstly, as I'm sure you're aware that the battery technologies, they're developing and trying to fill that gap. I will say that even if -- let's say the battery technology is not sufficiently developed to meet the low levels of nuclear -- I mean of renewable energy.

CHAIRPERSON GRAHAM: Mr. Kalevar, could you get to your question, please?

MR. KALEVAR: Yeah, I'm just --

CHAIRPERSON GRAHAM: Just a question because we have a very long agenda. We'd love -- always like to hear you, but please get to your question.

MR. KALEVAR: Well, I just set up the platform and now the question is, do you think baseload is more important than the medical safety of the public at large because the dangers that nuclear power poses?

CHAIRPERSON GRAHAM: Thank you, Mr. Kavelevar. Mr. --

MR. ERLICHMAN: Wolfe Erlichman. I think we can do base-load without using nuclear power.

CHAIRPERSON GRAHAM: Thank you, very much. With that, I have no more indications

of questions. Thank you very much for coming today. Thank you for presenting your views of -- which the panel is always interested in everyone's interventions.

We will now move to our next intervenor, which is Mr. George Biro on PMD11P1.242 and, Mr. Biro, the floor is yours, sir?

The mic -- there is a button there to press the mic on and then there's -- each time when you're finished, turn it off, please, because we get a ringing noise, if there is too many mics on. And each time you speak, would you identify yourself? Thank you very much and you may proceed?

--- PRESENTATION BY MR. BIRO:

MR. BIRO: Thank you. George Biro, retired professional engineer. Ladies and gentlemen of the panel, I had initially planned to start by expressing regret that these hearings are being held at all. That they are continuing in spite of the still unfolding disaster at Fukushima, speaks to a profound lack of wisdom, coupled with a relentless drive for profit and power, unconcerned with public sentiments.

As I wrote this on Monday, I am particularly astounded by a small detail in the

report from Japan. Soil samples show traces of plutonium in five adjacent locations.

No surprise, as the samples were taken immediately outside the grounds of the leaking reactors. What is a surprise worth considering is that only two of the plutonium samples originated from the reactor complex.

The majority, leftovers from previous testing during the past six decades, could have been detected anywhere on earth.

The world hopes that the efforts of the doomed heroes of Fukushima will stave off a major disaster and that of the now dead heroes of Chernobyl, but who will guard the same materials in 100 years or in 500 years or in 1,000 years or in 20,000 years.

I'll now read from my written submission.

"We must not fail to acknowledge that there are two conflicting world views. One of them ended its influence here 500 years ago. It was based upon the understanding that all creatures, including human beings were interconnected and at one with the earth.

It is the other world view that

came to the fore, mainly by overwhelming brute force said to be justified by God. It touched all parts of the world and goes on to today generally in the wake of U.S. and Allied Military Force.

The attitudes and methods, which led to the near extinction of North American Natives can best be observed in the Israelis treatment of the occupied and dispossessed Palestinians.

Although our own oppression of Haitians and Afghans, and we'll soon possibly add Libyans. It's not far from behind -- it's not far behind." Excuse me.

"Our other world views sees the earth as ours to exploit, including the living things and any humans conveniently proved inferior.

Profit can be made from all with impunity. Our laws enshrine our world view, and our institutions are self-perpetuating, but driving Natives to near distinction did nothing to invalidate their world view.

We were successful only in making their traditional lifestyle impossible. Long before we coined words for ecology and environment and genetics and half-life.

Meanwhile only the most deluded of us fails to recognize that our world view has been proven unworkable in the long run. It is absolutely shameful that we would even consider new nuclear projects given the knowledge we have gained in the past 60 years.

Uranium mining was singled out for a moratorium by the handful of remaining proponents of the first world view. It is no accident that opposition to uranium mining seems stronger in the Native community.

The Algonquin moratorium is recent and based partly on scientific knowledge as well as traditional wisdom. It was, however, previous decisions, which linked Natives to deposits of uranium.

The assignment of land for reservations was mostly based on its unsuitability for other uses. It was land relatively unproductive. Not as vibrant and healthy as the lands usurped by the settlers. Even safe in the ground for millions of years, it has been transparent to the conquerors long before they were able to make a Geiger Counter.

Over the centuries Natives have

already had more than their share of radiation. Twenty (20) years ago I began an unsuccessful campaign among my fellow professional engineers to alert the public to the greatest danger that we face. The waste products and weapons, which we keep on creating with every ounce of uranium that is mined are accumulating in rudimentary containment.

We have come no closer to safe disposal in half a century. What makes this particularly frightening is the necessity for the maintenance of an advanced technological society for at least the next 40,000 years, simply to keep the products we have already created from destroying all biological organisms on earth.

While I could not get consensus 20 years ago, there was one notable new secret method of radioactive waste disposal discovered in the meantime, the use of depleted uranium for weapons. The word depleted should more properly be expressed as economically unsuitable.

The amount of radiation from the 30,000 atmospheric tests and the DU vapourized over Serbia, Afghanistan and Iraq, no doubt wreak havoc on the locals and occupiers alike, but eventually

in a matter of weeks had distributed itself in the atmosphere and will continue to cause more death and sickness than 100 Hiroshimas.

It is well passed time for a moratorium on nuclear energy. We can be citizens of our communities, afraid for our children's survival. We can be citizens of Ontario afraid for our economic survival. We can be citizens of Canada, afraid not to hold a bully's coat.

But Kingston, Ontario and Canada, these are not real, they embody imaginary ideas of imperfect men, so let us deliberate and act as citizens of the world, perhaps even the citizens of Turtle Island. These concepts are real.

Let us accept this reality as the gift from the people we conquered. It could be the beginning of our seeing our world order for what it is, an engine for consuming and polluting the earth. An engine to dispossess those who do not pollute or consume fast enough. An engine to monetize all and then drain all resources to the few.

And uranium for what it is, a finite resource for a short-term, grossly inefficient and highly dangerous, but highly

profitable industry cloaked in Military secrecy and doublespeak.

After six decades we are no closer to safe disposal of waste products, although people are trying seawater as a new twist right now. The only new idea was depleted uranium.

Serbs and Iraqis will die faster for a while, but we all get some to add to the products of the 30,000 atmospheric tests and decades of weapons production.

Our pitiful containment schemes depend on the survival of our runaway and unsustainable world view.

Don’t expect to see a mushroom cloud where uranium is mined, but do expect a devastation of the local watershed and the thousands of excess deaths in the region, which will be forever.

As long as there is a profit, our present laws will extract it and allow it to float to those at the top.

They who pull the strings feel it is essential to their survival among the rest of us, and it may well be if we allow ourselves to see money for what it is, a direct measure of the guilt

of destruction and dispossession.

Thank you very much.

CHAIRPERSON GRAHAM: Thank you very much, Mr. Biro. Thank you for your presentation.

We will now proceed to questions from panel members, and I'll start off with Mr. Pereira.

--- QUESTIONS BY THE PANEL:

MEMBER PEREIRA: Thank you, Mr. Chairman.

I'll ask you the same question that I asked the previous intervenor.

Did you participate in the consultation that the Department of Energy of the Province of Ontario held with respect to the Ministry of Energy with respect to decisions on energy options?

MR. BIRO: George Biro.

No, I did not.

But I feel a little bit of connection as a past student of Dr. Porter who headed the Porter Commission, which was, I think, instrumental in making the governments come to that decision.

And whereas I had all but -- nothing but admiration for Dr. Porter while I was his student, I feel that his commission came up with the wrong answers for the Province of Ontario.

MEMBER PEREIRA: Thank you, Mr. Chairman. No further questions.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira.

Madam Beaudet?

MEMBER BEAUDET: Thank you, Mr. Chairman.

You say in your presentation that you began an unsuccessful campaign among your fellow professional engineers.

I'd like to know first, are you a nuclear engineer?

MR. BIRO: I am not a nuclear engineer.

I am more of a systems engineer and industrial engineer.

So I -- and I've never worked actually in the nuclear industry, but I have been a life-long follower of all things nuclear, especially bombs.

MEMBER PEREIRA: So when you say

you started the campaign that was unsuccessful, would you mean -- did you start an organization?

How did you contact your peers and try to create a movement of opposition?

I would like to have more details on that.

MR. BIRO: It never really got off the ground.

What I was trying to do was among my fellow professional engineers, mostly at U of T and at Queen’s, to rally around the idea that this was the most dangerous thing that we are facing in the history of mankind.

And for the most part, all the engineers that I contacted were, what I feel, unreasonably optimistic that all these problems will be solved in their lifetime or soon thereafter.

So there was never anything actually formed.

MEMBER BEAUDET: Thank you. Thank you.

CHAIRPERSON GRAHAM: Thank you very much, Madam Beaudet.

We will now go to questions from

the floor.

And the first I'll go to is OPG.

Do you have any questions to Mr. Biro, OPG?

MR. SWEETNAM: Albert Sweetnam.

No questions.

CHAIRPERSON GRAHAM: CNSC, do you have any questions to Mr. Biro?

MR. HOWDEN: Barclay Howden speaking.

We have no questions.

But we'd like to make a comment on depleted uranium.

Under the Nuclear Cooperation Agreements for Canada -- and this is just for Canada -- there is -- anyone who imports uranium from Canada and enriches it, may not use Canadian-origin uranium in conventional armaments.

So I just wanted to make that clear from a Canadian perspective.

CHAIRPERSON GRAHAM: Thank you very much.

The floor to government participants, federal or provincial.

No, there is none.

Floor for public intervenors.

And I have Mr. Kalevar for a question.

Mr. Kalevar, if you could be concise, it would be appreciated.

--- QUESTIONS BY THE INTERVENORS:

MR. KALEVAR: My aim is not that good, Mr. Chairman, but I'll try.

Mr. Engineer, I am also an engineer or was, anyway.

I would like to ask you in your many conversations with the many engineers that you canvassed, did you find these engineers willing to retrain themselves into renewable energy, or will they -- or were they too beholden to their rhythms of the paycheque, as I call it?

CHAIRPERSON GRAHAM: Mr. Biro?

MR. BIRO: George Biro.

I don't think I can recall anyone who took it seriously enough at the time to actually look at how it might affect his own life plan or career.

I think we have to approach this from the top.

CHAIRPERSON GRAHAM: Thank you

very much.

With that, I see no other questions.

Mr. Biro, thank you very much for coming. Thank you for your presentation and a safe trip back to -- oh, just one moment.

Someone didn’t register, but -- and so I can’t introduce you, but you may have a question, and would you introduce yourself, sir?

MR. TROY: Sorry. My name is Richard Troy. I am a professional engineer.

Can I ask a question of the gentleman that talked about depleted uranium? Is that fair or --

CHAIRPERSON GRAHAM: You put your question to the Chair --

MR. TROY: Okay. But I --

CHAIRPERSON GRAHAM: -- and then I decide.

MR. TROY: Okay.

CHAIRPERSON GRAHAM: You ask -- all questions come to me, sir.

MR. TROY: Okay. Sorry.

Okay. The gentleman mentioned that when Canada exports depleted uranium, it has

to be -- the government has assigned that they don't use that for armaments.

If that's correct, I just wondered if that applies to the United States as well.

CHAIRPERSON GRAHAM: Thank you very much.

Mr. Howden, would you like to respond to that? I will direct it.

And, sir, after this, if you don't mind, our procedure is lady at the back registers intervenors when they want to speak so we can keep an order to it and so we can introduce you.

But I'll allow your question, and I'll ask Mr. Howden to respond.

Thank you very much.

MR. HOWDEN: Barclay Howden speaking.

If I understand the question, it's regarding the US use of Canadian uranium that may be enriched thereby creating depleted uranium.

Presently under the Nuclear Cooperation Agreements with the United States, they're not able to use that depleted uranium in conventional armaments.

Just from a timing perspective,

the Nuclear Non-Proliferation Treaty was signed in 1970, and following that, the Nuclear Cooperation Agreements were put in place. But the present regime is the -- that uranium may not be used for armaments.

CHAIRPERSON GRAHAM: Thank you.

Okay. That ends your presentation, Mr. Biro. Thank you very much for coming.

We will now go to the next intervenor for the day, and that is Madam Dorothy Goldin-Rosenberg under PMD11-P1.199.

Ms. Rosenberg, thank you very much for coming. The floor is yours. The mic is there. You can turn on. And each time you're asked a question, if you could -- or time you speak, if you could introduce yourself, we'd appreciate it.

Thank you very much and welcome.

We recognize that's been for the last eight days.

The floor is yours, Madam.

--- PRESENTATION BY MS. GOLDIN-ROSENBERG:

MS. GOLDIN-ROSENBERG: Thank you. My name is Dorothy Goldin-Rosenberg, and I am -- I teach about environmental and ecosystem health at

the University of Toronto.

I am here today presenting on behalf of the Women’s Healthy Environments Network.

I also work with the Toronto Cancer Prevention Coalition and the Canadian Cancer Society in the stakeholders’ group as well as another -- a number of other organizations that are involved with health and the environment.

I -- my -- our Women’s Healthy Environments Network, of which I’m the volunteer education coordinator, promotes a safe clean environment and the use of the precautionary principle with regard to contaminants causing harm to our health and ecosystem on which we depend.

It’s the reason that I am doing this work.

And WHEN believes that individuals can make a difference when they take action for prevention in their homes, communities, and so on. But there’s also a very important role for governments in protecting human health and the environment.

I’m not paid to be here. I’m here as a volunteer and out of my deep concern for the present and future of all life on earth, in

particular relating to the planned expansion of nuclear power at Darlington in Ontario.

As an environmental health researcher, educator, and film producer -- and I've done a film on children's health and the environment called Toxic Trespass and a film -- another film called Exposure: Environmental Links to Breast Cancer.

I am aware that we have more than enough evidence of growing numbers of diseases and conditions related to preventable exposures of toxic and radioactive materials.

And I was wondering if I could ask the panel a little bit about who they are because I read your CVs, and I wanted to ask a question about how many of you are parents.

Can I ask that question of the panel, if you are parents?

CHAIRPERSON GRAHAM: You -- we'd ask you to do your presentation.

MS. GOLDIN-ROSENBERG: Okay.

CHAIRPERSON GRAHAM: Then we'll -- then if panel members wish to --

MS. GOLDIN-ROSENBERG: Then I can find out about your --

CHAIRPERSON GRAHAM: -- wish to --
MS. GOLDIN-ROSENBERG: Okay.
CHAIRPERSON GRAHAM: -- we'll handle it that way -- presentation, then we'll then -- if panel members wish to -- wish to we will handle it that way. And I can assure the answer is in the affirmative for all of us.
MS. GOLDIN-ROSENBERG: Okay. And grandparents as well?
CHAIRPERSON GRAHAM: And grandparents as well.
MS. GOLDIN-ROSENBERG: Okay.
CHAIRPERSON GRAHAM: Anyway, I'm not speaking for everyone; I'm speaking for myself. I just want to say I notice you're reading your whole presentation and to allow time and making other points, maybe if you'd get to the points we'd appreciate it --
MS. GOLDIN-ROSENBERG: I will.
CHAIRPERSON GRAHAM: -- because we have read your presentation and I know the panel here has questions for you.
MS. GOLDIN-ROSENBERG: Okay, good. In light of the serious and ever-more dangerous crisis in the Japan reactors at Fukushima, now

radiation is in the air, water and food despite the initial denials in the beginning. The health impacts are widespread and not only in Japan, but travelling all over the world. And this tragedy is much worse they're saying now than Three Mile Island according to reports yesterday and today. And there was a major article in the New York Times, *"Confidence Slips Away as Japan Battles Nuclear Peril,"* with a whole lot of information about the different exposures that are happening, not only there, but in other parts of the world.

I made a list here of articles that have been in the newspapers since the Japan situation and how they relate to what's happening here in Ontario. I'm not sure if anybody here has mentioned previously the Chalk River near meltdown in 1952, in the past, if we're looking at the history of some of the nuclear accidents right here in Ontario. There was a major core meltdown and there was an explosion releasing radioactive gases into the atmosphere and it flooded the reactor basement with millions of litres of contaminated water.

This was an article that was in the paper. I was in Montreal at the time; I'm from

Montreal. And Barney Hannibal Pawlson (phonetic) was one of the cleanup people; he was in the military and many of them suffered gravely because of cleaning up that accident. And he was treated at a hospital in Montreal with people that I knew and it was a very public issue at the time for us.

This article goes on to describe some of these issues, but then says the -- what we know of Three Mile Island, Chernobyl and now the horror of Fukushima, we -- it's a disturbing reminder that as long as we use nuclear reactors to generate power, there will always be potential for disaster.

Then there was a headline the other day about a water leak at the Pickering nuclear plant. It was a radioactive water leak. I see that they're calling -- they're calling radioactive water de-mineralized water now in these articles. And this is really the language of neutrality that's coming into this. It's kind of normalizing radiation. It's making it seem like it's normal and that it -- you know, we should accept it and so on. But it was 73,000 litres of water released at the Pickering A generator. They're calling it negligible.

Some of us are very concerned about the fact that there is no safe level of ionizing radiation and you know from my brief that I have examined the BEIR, the Biological Effects of Ionizing Radiation Number 7 Report of the National Academy of Sciences which says, *"There is no safe dose of radiation."* There is no safe dose of ionizing radiation. *"Radiation is a known human carcinogen, mutogen and teratogen,"* if you read IARC, the International Agency for Research on Cancer. I teach about environmental and ecosystem health and I had been reading about these issues and studying these issues with radiation biologists for many years so I know of what I speak. And I'll comment later on the comments from CNSC because it's -- it really comes down to your scientist versus my scientist. And there are a whole range of scientists talking, as previous speakers spoke about. There are many, many other studies that showing quite a difference from what we heard.

But what -- what this article went on to say is that in China, the government ordered a safety crackdown on new nuclear reactors in light of the nuclear crisis in Japan. And we are very concerned that this whole Japan experience be

utilized in terms of what's happening in Ontario in terms of health and safety.

What -- what happened after this release from the Pickering reactor, at the end of this special interest station updates from -- from these reports, from Ontario Power Generation, the last line from these reports -- this I think -- when was this dated, it's -- it was from March 15th and it said:

> *"From a regulatory perspective this is a very low-level event. There's no impact to quality of drinking water."*

Well, ionizing radiation tritium in the drinking water is a major concern to people in Ontario because we know that millions of people get their drinking water from Lake Ontario and our Toronto Cancer Prevention Coalition intervened with Toronto Public Health. It led to a whole series of events with Toronto Public Health, with the Board of Health, with city council, leading to the Medical Officer of Health writing a letter to the then Minister Broughton, which led to the issues about tritium in the drinking water, which have not

been discussed for many, many years since the ACES report in 1994.

And what happened was this led to the issue of tritium in the drinking water being put on the table in terms of the Ontario Drinking Water Advisory Council. And that advisory council was set up at the time of the Walkerton water situation a few years ago. They really weren't sure what to do with tritium because they hadn't discussed it for so many years and they hadn't been relating it to the city of Toronto till this came up from the medical officer at Health. We had hearings; we all did our deputations; mine was concerned with the issues that I've raised in terms of women's health and children's health, cancers, birth defects and a whole range of conditions related to ionizing radiation.

So when this says there's no harm, well, there can be a real question of harm. And just a little anecdote. After Three Mile Island -- I've been very involved in these nuclear issues, as I said, for quite a long time. I'm an old grandmother now. I see gray hair, which is very welcome. I have been around for a long time.

At the time of that reactor

accident at Three Mile Island, right after that, you may remember Three Mile Island, they spilled the beans of the whole accident right after the accident. Then there were programs for people who were in the industries, not just the nuclear industry, but a whole range of other industries that were related to potential accidents. They had a special workshop on -- for media people, CEOs of these institutions, people who were going to handle audience reactions after major accidents.

And one of the -- somebody who went to that -- one of those meetings, one of those workshops, wrote an article about it in a publication in the United States after Three Mile Island. And they were training people to respond to accidents, and they taught them and I made a couple of notes here, and it was after Three Mile Island. CEOs and public relations people were -- were there.

There’s been a major accident; there have been spills and releases, but we have it all under control. So everybody, don’t worry. There was no danger; there’s no danger to the public. The -- the implication was, don’t worry about it, we’re taking care of you.

So my concern when I see this, there is no impact to the quality of drinking water, I think back to those reassurances to the public that everything was safe and -- well, we hear that after all the accidents. I wanted to bring that up because the releases into Lake Ontario are routine releases from the existing reactors and those are routine in addition to the spills and accidents. There are routine emissions in the normal functioning of the nuclear reactor. So there's always tritium and other radionuclides, carbon 14 going into our drinking water as we live, breathe and talk, 24 hours a day, seven days a week, et cetera.

So I get very concerned when I read about these reassurances that everything is safe when we know that it's potentially not. So another article that I got a headline for, was this no -- the -- *"A Brief Partial Loss of Power at the Pickering Nuclear Station, Unit One."* And it said they experienced a brief, partial loss of power while performing start-up activities; standby systems automatically restored the power, *"With no impact on employee, public or equipment safety."* Again, always the reassurances so reflecting the

public relations training.

When you read about this spill of tritium into the drinking water, we are reminded that the 7,000 becquerels per litre, which is the allowable amount of tritium, now under the current standards. We have not heard back from the government, from the Ministry of the Environment following the Ontario Drinking Water Advisory Council's recommendations to lower the amount of allowable tritium to 100 and then to 20 becquerels per litre, when I read that this spill that they were talking about earlier was 56 becquerels per litre in the water for that spill.

And ODWAC is recommending 20 becquerels, coming down to 20 becquerels. So -- and the California one is -- is a recommended 15 becquerels. And others have low as well. You know, you can be a little bit concerned that we are not up to the mark.

Then I have an article that says "Minor Quake Rattles the Ottawa Valley." This was March 29th. There was an earthquake. The 3.5 magnitude quake struck 70 kilometres northeast of Chalk River, where the reactors are, according to Earthquakes Canada, and it says,

"By comparison the moderate June 23rd, 2010 quake northeast of Ottawa that toppled chimneys and caused a bridge to collapse, measured 5.0."

And THEN it says,

"The March 11th devastating northern Japan causing a full-blown nuclear crises measured 9.0."

However, the issue around earthquakes is very marginalized in all of this discussion. I'm not sure if other presenters have talked about earthquakes under the Pickering and Darlington reactors. Have -- had any -- have any of them spoken about earthquakes?

CHAIRPERSON GRAHAM: Yes, we had a lot of discussion the first day. We had present -- or second day, I think it was. We had presentations from the geological survey group on earthquakes. There's been a map produced of earthquakes in this part of Ontario.

MS. GOLDIN-ROSENBERG: Okay.

CHAIRPERSON GRAHAM: It's part of

the record. And there's been a considerable amount whether we're on a fault or not, fault line, whether or not the magnitudes and what that means and so on. Yes, there has been and you can see that on our record.

MS. GOLDIN-ROSENBERG: Okay. Thank you. So I have a quote from a geologist, Joe Wallach, I don't know if his name is familiar to you. And then I have a list of ten studies relating to earthquakes that were sent by -- by him and others. And he said:

> "I'm the person who discovered the fault that I named the Niagara-Pickering Linear Zone, because it goes beneath both the Niagara Peninsula and Pickering. It extends northward at least to Minden on the Canadian Shield, and southwest into Ohio. The structure was discovered by first looking at some geophysical maps, then topographic maps. There was precious little, if that,

on the geological maps, so I went and started looking. The reason that I'm writing this is to just try to help you and others through the jargon. Beside the Niagara-Pickering site there is the Georgian Bay linear zone, which extends along the rather straight coastline of Georgian Bay and projects into the western New York State where it intersects in a certain Clarendon-Linden Fault.

Anyway, there -- there has been -- there have been earthquakes, 1929, the there was an earthquake, the Attica earthquake, which was a magnitude of 5.7, 5.8 in Lake Ontario. There's a triple intersection involving the Georgian Bay linear zone, the Niagara-Pickering, the St. Lawrence fault zone, which extends westward through the Dundas Valley. And he said there's a lot more. And he's willing to present and give people more information.

So that's a discussion and ten studies. And then in addition to earthquakes and the geological faults and nuclear plants in Canada, I also wanted to raise the issue of accidents. And there was just a major accident in Port Hope area, a train derailment near Coburg, and lots of chemicals and oil spilled. Apparently it's taken days and days to clean up. And what if that was nuclear stuff being transported? And a lot of this is on the highways going back and forth all the time.

Anyway, I wanted to just mention Chalk River because we have evidence of Chalk River and the leaking legacy of radioactive material leaking into the Ottawa River, into Chalk River and the Ottawa River, and lots of concerns.

Also since the Chernobyl disaster in 1986 there have been at least 22 major accidents at nuclear power stations around the world, of which 15 involved radiation releases, and two of them came dangerously close meltdowns. So this is -- this is another issue that I wanted to bring up because it's of great concern.

And some implications for your panel is that in the United States -- sorry, in the

United Kingdom the Deputy Prime Minister, Nicholas Clegg, says the coalition in England, the current government, will be unable to subsidize nuclear energy should current uncertainty cause investors to pull away.

And I think that there are implications now also in Germany, because in Germany they are looking at addressing these issues in a way that's hopefully going to change their policies, and in Hamburg, Berlin, Cologne and Munich, 200,000 protestors took to the streets demanding the closure of all 17 of Germany's nuclear reactors. And Angela Merkel has already acted, and she's declared and three-month moratorium on a decision as to whether to extend the life of the existing reactors. And we think that there are lessons here for Ontario as well.

And as another person recently just said that, Fukushima raises two significant issues that are not addressed within the scope of this current review, Canada's approach to nuclear safety, including the risk of accidents, consequences, and emergency planning, and a transparent evaluation of alternatives to the Darlington process, we request that the panel

suspend these hearings pending a public review of Canada's regulatory approach to nuclear safety in light of lessons learned from Fukushima. And also we request that the panel suspend these hearings pending a public assessment of the cost of nuclear reactors and the potential alternatives to this project.

So I wanted to talk a little bit about primary prevention, and the need for us to understand ionizing radiation. And my -- my thoughts in terms of cancer, birth defects, many, many of the illnesses relating to ionizing radiation, are of great concern.

I am a former health professional myself. I have seen many people develop cancer and die. A very, very dear friend has just been diagnosed with breast cancer. We see this very, very often. The rates of cancer are very high. Almost half of all men in North America are going to be diagnosed with some form of cancer at some point in their lives, and close to -- not -- but not quite a half of women also will be diagnosed, which is very hard.

We know that for most cancers only 5 to 10 percent are due to inherited genetic

mutations. So we have to ask what's causing the other 90 to 95 percent of people who develop the disease, what could be the cause, and how can it be prevented. And how much cancer can be attributed to radiation?

The fact that we don't know exactly what type of reactors we're even talking about when we're talking about the Darlington new builds, other than it's going to be a generation 3 design as opposed to the current CANDUs, it highlights the limitations or one can even say the absurdity of these hearings, because we don't even know what kind of a reactor we're talking about. But these are brand new designs that have not been used, and undoubtedly the others will all probably say too that they're -- that they're going to pose very different, but likely even more serious problems because they're probably going to use enriched uranium resulting in more toxic radio-nuclides and long-live radioactive wastes. And we understand that because of costs, some of these safety features may not be as strong and stringent as they should. Although after the Japan experience, hopefully things will change.

I also mentioned in my brief that

most of the -- even the health aspects that are being discussed, don't focus primarily on women, the developing fetus and young girls' breasts in puberty. The gender focus has been a missing link in the general discourse of the health impacts of ionizing radiation, with the exception of a few scientists.

So I know that there's some real concern now by -- from a lot of us now, that the direction to go ahead is -- it's almost like the feeling that many of us who are concerned about this have is don't confuse me with the facts, my mind is made up. And what we are hoping is that you, as the panel, will take our concerns about health and safety very, very seriously because the mantra now is we're going ahead. The policy is there. The government has come out with this. Both the -- both the Liberals and the Conservatives are hell-bent on nuclear expansion. Green -- the NDP and the Greens are not.

And what we're looking at -- and there is some discussion and there has been some discussion about energy issues. I wanted to talk more about health, but I also have a background in the energy issues. And this goes back to the

1970's with Ursula Franklin during the Trudeau era, Canada as a -- Canada as a Conservative Society was the name of the study and it was chaired by Ursula Franklin. It was under the Science Council of Canada. Some of you will remember Trudeau and the Trudeau era and the Science Council of Canada. And at that time, we were doing Soft Energy Paths governed by Amory Lovins, who some of you may have heard of and know. Amory Lovins was a former nuclear scientist. He heads the Rocky Mountain Institute in the United States.

He has recently written a wonderful paper that I would advise you to read called Eight Convenient Truths, why we don't need nuclear power for either climate change issues or energy electricity issues because it's –- it doesn't have to be, and there are things happening all over the world which really to be understood, and Lovins helped us.

Back in the '70s we were talking about these issues this way. Soft Energy Paths meant, how do we look ahead 50 years from now, and what do we have to do working backwards to put in place the different energy strategies and policies that we have to address to get there.

Can you imagine where –- where we would be now if we did the Soft Energy Paths looking at, first of all, energy efficiency, conservation, then renewables, and Amory taught us about energy efficiency and conservation and showed us how so much energy is wasted.

And he said to use electricity –- which is what nuclear produces, to use electricity for the wrong things, like heating homes –- which they did live better electrically encouraging so much use and waste. When we don't have efficient uses of energy, he said, to use electricity, a very high-grade form of energy, to do a very low-grade job and bringing it down to do that job like home heating, space heating, et cetera, he said the inefficiency is like using a forest fire to fry and egg or like using a chainsaw to cut butter.

In other words, you're wasting a lot of that energy. And then the example the –- now, the California Sacramento refrigerator project where they're giving people who have an old clunker refrigerator a brand new EnerGuide refrigerator which uses one-third of the electricity of the old clunkers, and they're having them pay it back over time where they will –- because you can do that now

with their bills.

They pay a much higher rate for their electricity. They pay a true rate; it's subsidized here. But they're saving the equivalent of two nuclear reactors in terms of the energy saved.

So it's changing the way we think about how we use energy and how we live in a way that is much more efficient.

I teach in a building that is so energy inefficient where the big glass windows get heated up in the summertime, people forget to close their blinds. It's an institute of higher education at the University of Toronto, and the air conditioning units are right at the window and they're fighting hard to meet the thermostat.

On the other side of the building –- because the glass is so hot, that's what they –- the other side of the building, people are freezing, and I've seen students wearing coats and I even saw one time an electric heater and it was boiling on one side of the building and freezing on the other side.

So it's a whole mismanagement, and if every building could be retrofitted with those

billions that are going into nuclear, then perhaps we would have a different equation and a different way of looking at these things.

I just wanted to –- I wanted to point those things out because we have known so much about these energy for –- these energy issues for so long that if we don't deal with –- with managing the electricity better, we'll be continuing to build for waste, which Sacramento, California decided they were not going to do when they said, we don't want more nuclear, here is what we're going to do, and that refrigerator project that I mentioned is only one of many strategies that they're doing.

So I just wanted to mentioned that.

CHAIRPERSON GRAHAM: Ms. Rosenberg, I just want to remind you, you have about three minutes, so if you could sum up, we'd appreciate it.

MS. GOLDIN-ROSENBERG: Yeah, I will do that. So we've talked about –- in my brief you know that I said the *Green Energy and Economy Act* and a lot of other work that's going on in terms of energy efficiency.

I mentioned –- one of the things that’s really important in terms of the presentation that we heard from the CNSC, I mentioned in my brief manipulating public health research, The Nuclear and Radiation Health Establishments by Dr. Rudi Nussbaum, and I just wanted to share with you the opening little description of this –- this article because it’s really a question of your scientist versus my scientist.

Some of the statistics that we heard are very challenged by others. There are studies that say very different things from what we heard earlier.

So in this paragraph, it says, “Industry, government, and the military have systematically supressed or manipulated epidemiologic research showing detrimental effects on human health from accidental or occupational exposures to ionizing radiation. This leads to conflicts of interest and compromised integrity among scientists in the radiation health fields. It stifles dissemination of “unwelcome” findings and endangers public health”

Key words are radiation, health

effects, research censorship, conflicts of interest, scientific whistleblowers, Chernobyl, and Three Mile Island.

And amongst some of the reports and studies that I wanted to just comment on, radiation and breast cancer, The High Cost of Living Near Nuclear Reactors by Dr. Gould. And the Radiation of Public Health Project. A Short Latency Period Between Radiation Exposure From Nuclear Plants and Cancer in Young Children by Dr. Joseph Mangano. International Journal of Health Sciences. The Nuclear Industry Family Studies. The British Medical Journal. Leukemia and Non –- excuse me –- Leukemia and Non Hodgkins Lymphoma in Children of Male Sellafield Radiation Workers. The International Journal of Cancer.

So those are studies that are very different from the ones that we heard about earlier.

As I wrote in my brief, we also need to look at The Environmental and Occupational Causes of Cancer Review of the recent scientific literature by a group of scientists from the Harvard school of –- from the –- sorry, from the School of Public Health and Environmental Health

Initiative at the University of Massachusetts in Lowell, Massachusetts.

They list the various cancers and chemicals and radiation they're related to, and the State of Science by Cancer, the relationship of ionizing radiation to bladder, bone, brain, breast, colon, leukemia, liver, lung, multiple myeloma, nasal and nasopharynx, stomach, and thyroid Cancers.

So in closing, I've said a lot of about BEIR initially. I've said about –- I've talked about the precautionary principle in my brief. I talked about the fact that many of our briefs to the Ontario Drinking Water Advisory Council recommended going back to the Ontario –- to the Advisory Council on Environmental Standards back in 1994 calling for a major reduction of allowable Tritium and other radionuclides into our drinking water, going from 100 down to 20 –- down to 20.

And some of us in our briefs and the Canadian Environmental Law Association also said that it should go down –- we should have it at zero. There should be zero discharge of Tritium and other radionuclides into our drinking water

after five years.

And this is really critical. So I beseech you as a panel. You're going to be writing -- you're going to be writing a report after this. I beseech you to pay attention to some of these strict standards that should be adhered to in terms of the Advisory Council on Environmental Standards Recommendations and the recommendations of a lot of our groups.

We rely on science and statistics from very reputable scientists and radiation biologists. And I don't know if you have radiation biologists in all of your fields working on these issues. Certainly we know of many.

So I urge you to think very seriously about the future, about what has to be done, the standards that have to be changed, and look at the alternatives to nuclear power in terms of the energy policies that we should be pursuing in the future. Thank you very much.

CHAIRPERSON GRAHAM: Thank you very much for your presentation. Just one comment. You mentioned in your comments this afternoon about saying that the -- the hearing should be postponed. That was dealt with under -- under motions on the

first day, and the panel did make a ruling. And if –- there were rulings on that by –- there were motions by certain groups saying that we should postpone, and we have dealt with that on the first afternoon.

With that, I will go to my colleagues, and I will go first of all to Madame Beaudet for questioning.

--- QUESTIONS BY THE PANEL:

MEMBER BEAUDET: Thank you, Mr. Chairman. And, yes, I'm a mother and a grandmother.

MS. GOLDIN-ROSENBERG: I thought you might be.

MEMBER BEAUDET: I'd like to refer in –- in your submission, however there's no page numbers. You refer to a study of the International Agency for Research on Cancer, and I was wondering, I know that the International Agency has produced several studies, and one of them by the –- the Radiation Group, I believe, talks about low doses of radiation linked to small increase in cancer risk and this was
done -- included workers from Australia, Belgium, Canada, Finland, France, Hungary, Japan, South

Korea, Lithuania, Slovak Republic, Spain, Sweden, Switzerland, the U.K. and the U.S. Would this be -- this study it was, I think, tabled in 2005?

MS. GOLDIN-ROSENBERG: I wasn't referring specifically to a specific study. I was just saying that IARC lists ionizing radiation as one of the cancer -- one of the carcinogens in their long list of carcinogens.

I'm not sure which study you're referring to. I'm just talking that I know generally that this is a carcinogen and a mutagen in their categorization of carcinogens.

MEMBER BEAUDET: I would like to go to CNSC, and I know yesterday you did mention that you always tried to be well-informed of international studies and adjust your future studies or standards. And your review this afternoon was mainly with Canadian study and the KIKK study.

And I would like to know what are the studies also that you base -- you have based your standards or that you upgrade your standards?

Would you refer also to the -- to this international agency or to the World Health Organization and to what extent?

DR. THOMPSON: Patsy Thompson, for the record.

Yes, the CNSC actively reviews the scientific literature related to health effects of radiation and the -- Canada has participated in the 2005 study that you've mentioned from the international agency on the -- research on cancer.

We rely essentially on the open scientific literature as well as the work of international committees, such as IARC, the World Health Organization, the United Nations Scientific Committee on the Effects of Ionizing Radiation, the International Commission on Radiological Protection.

The main organizations, as well as BEIR or the USNRC, the major organizations involved in either producing research or reviewing research. We have CNSC staff members actively involved in these committees.

And the CNSC is involved in the joint research with other regulatory agencies to support the moving forward and essentially improving our understanding of the radiation effects of -- the radiation and cancer and other health effects.

MEMBER BEAUDET: Would the present Canadian standards for doses to worker and to workers in the public reflect the findings from this 2005 studies?

DR. THOMPSON: Patsy Thompson, for the record.

The 2005 study essentially indicated that the -- the Canadian cohort in the IARC study had a higher risk of cancer than what had been expected from previous studies. And the Canadian cohort essentially significantly increased the overall risk of cancer in the workers, the various cohorts as part of that international study.

And the findings of the IARC study were surprising and disturbing and, as a result, the CNSC has since 2005 been involved in trying to understand the findings and the information from the Canadian cohort.

We have undertaken a number of initiatives including an updating of the Canadian cohort information as well as a re-analysis and that work is almost ready to be published.

But essentially with the re-analysis we've done, it indicates that Canadian

workers are not at a higher risk of developing cancer than workers in other countries.

And the studies that we are referring to in the undertaking where the internal analysis among the other cohorts show that there was no relationship between radiation exposure and health effects in workers. It is maintained in the re-analysis.

MEMBER BEAUDET: Would that be a CNSC publication or is it in the scientific journal?

DR. THOMPSON: Patsy Thompson, for the record.

The work was conducted by an independent research scientist on behalf of the CNSC and there will be both a CNSC report on this as well as a publication in the scientific literature.

MEMBER BEAUDET: And do we know the date of publication yet? The month or is it before we table our report or ---

DR. THOMPSON: Patsy Thompson, for the record.

The CNSC report is almost finalized and the paper to be submitted to a

journal is also nearly final, but then there is the process that the journal goes through before it's accepted, so a date is difficult to provide at this time.

MEMBER BEAUDET: So we would be kept informed if your publication -- CNSC publication when it comes out?

DR. THOMPSON: Patsy Thompson, for the record.

The process the CNSC uses is that we post on our website all publications done by the CNSC or for the CNSC.

MEMBER BEAUDET: Thank you.

My second question; what is the basis of CNSC to agree or to propose the lowering of level of tritium in the drinking water from 7,000 to 100 Becquerels per litre?

DR. THOMPSON: Patsy Thompson, for the record.

Just to clarify that the Canadian Nuclear Safety Commission does not have a mandate to set either federal or provincial standards for drinking water or other quality standards to protect the environment or public health.

We do ensure that through the

licencing of nuclear facilities that releases to the environment will not result in exceedences to standards.

We made presentations to the Ontario Drinking Water Advisory Council and we provided the reports that the CNSC did during our tritium studies project.

We indicated to the Ontario Drinking Water Advisory Council that what was important to the CNSC is that whatever standard they recommended to the Ontario Government that the rationale for the standard be well documented and transparent.

We have, through our tritium studies project, analyzed a lot of information on releases from nuclear facilities, and it is well documented that there are no drinking-water supply plants near Canadian nuclear power plants, such -- the ones in Ontario where drinking water exceeds 20 Becquerels per litre.

All values are below 18 Becquerels per litre and so our focus in the tritium studies project was to make recommendations for groundwater in the vicinity of nuclear power plants and other facilities releasing tritium because of the

behaviour of tritium in the atmosphere and the our proposal is for protection in the long-term of groundwater as a potable water resource.

We have made a commitment to do a formal public consultation on this recommendation and to accompany the recommendation with a technical discussion of how it could be implemented and how it should be used.

MEMBER BEAUDET: Thank you.

I would like to go to OPG now, and you did mention that you were trying to lower the doses, even that -- you don't admit 7,000 Becquerel? I believe you say that it is much lower than that, but I would like to know how realistic for you is it to obtain -- to have a goal that would be zero discharge?

MS. SWAMI: Laurie Swami for the record.

We have long considered what zero discharge would look like, and it would not simply apply to a nuclear facility.

This is something that, as an -- you know, across industries, is something that's always under consideration and, I would say, is extremely difficult to achieve in many, many

regimes.

What I would look to, though, is the ALARA principle, is where we aim to reduce emissions to the extent that we can.

As we've described for the new nuclear project, we're looking at ways and means of implementing engineering barriers to prevent discharges, but I think it -- at this point, there will continue to be small emissions from our -- from our stations and for new plants.

But we look to what the public dose impact would be, and as we calculate the public dose impact, as we've talked about, Darlington today is 0.7 microsieverts in an -- on an annual basis.

That would be considered to be De minimis or of no real significance from a health concern perspective.

So I think while zero discharge is obviously -- you know, if there was industrial development with zero impact, that would be obviously better.

Unfortunately, you know, there is small-measured releases, but what we look to is, are we having an impact, and we measure that

through our public dose.

MEMBER BEAUDET: Thank you.

Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you, Madam Beaudet.

Mr. Pereira?

MEMBER PEREIRA: Thank you, Mr. Chairman.

I was interested to hear about the work of the Advisory Council on Environmental Standards in the report they issued in 1994, which talked about reduction and eventually elimination of tritium emission from nuclear facilities.

From what you understand, what were the reasons why the recommendations of the report were not adopted or not given a further consideration beyond that time?

MS. GOLDIN-ROSENBERG: Dorothy Goldin-Rosenberg.

I understand from people who were directly involved with the government at the time -- it was the NDP government. It was an economic crisis in the province at the time, and they were informed that they would break the budget of the province if they dared to impose those standards

because there'd be a -- there'd have to be a lot of money put in to tightening up those nuclear reactors so that they would not be releasing the tritium on a routine basis that they were.

And also the fact that a lot known about ionizing radiation says that there's no safe dose. We knew this even before the BEIR 7 report.

I mean, we've been hearing this from scientists for many, many years.

And so I won't forgive the NDP government for not adhering and passing the ASIS report because it was a very important first step.

It went on -- they went on to use those findings, though. Ruth Grier, when she was the Minister of Health in the NDP government, commissioned a report called the Report on the Primary Prevention of Cancer.

And tritium and ionizing radiation was mentioned in that as one of the carcinogens that had to be addressed.

And we -- our Toronto Cancer Prevention Coalition really came out of that particular report. It was a wonderful report on the prevention of cancer for Ontario.

What I wanted to say, though, is

that with that report and many others, there's no safe dose.

So when we hear about permissible ALARA, et cetera -- when we're talking about children, we're talking about the developing fetus; we're talking about growing children; we're talking about young girls developing breasts; we're talking about young boys in puberty as well when they're sperm is beginning to develop; and there's a whole lot of relationship to the tiniest amounts of radiation or chemicals when those cells are rapidly multiplying that can affect them and cause havoc, not only to that child, but to future generations.

So we really need to think about the development of eggs and sperm and little girls developing breasts, rapidly-multiplying cells.

You can't apply the whole notion of -- of risk assessment is based on a healthy male working in a factory, what it will take for him to get sick.

And then, of course, there's a latency period.

So we really need to think of our most vulnerable populations, which are the germ cells of our future generations.

I -- you have grandchildren. I have grandchildren. I look at their whole generation.

We've done a film called Toxic Trespass. It's a National Film Board co-production, and it's on children's health and the environment.

And what's happening to children is just really obscene.

And I -- when I grew up, we ate peanut butter all the time. My children had peanut butter all the time. You cannot take a peanut butter sandwich into a school today because children have so many allergies, and they have to have their EpiPens, et cetera.

So we're seeing a diminishing of children's health in a very slow, gradual way, which is really -- has a lot of implications for the future.

So when we talk about -- there's no safety in lesser amounts of these radionuclides. We're talking about the tiniest exposures.

And if that doesn't get addressed, then we're not really fulfilling our mandate for health and safety.

The other comment that I wanted to make was in terms of the World Health Organization and IARC -- IARC is a World Health Organization.

IRAC is International Agency for Research on Cancer. It's part of the World Health Organization collection of different institutions. They are under the control of the International Atomic Energy Agency.

And I'm not sure if you're aware of the fact that the International Atomic Energy Agency has the right to veto any materials that come out from any other United Nations organization before it goes out.

And this has been -- there have been campaigns to try to break that loop so that there could be more independence.

But all United Nations agencies, if they're writing about radiation, has to go -- has to be filtered through the International Atomic Energy Agency, which has as its mandate to promote nuclear power, as you may know, as you may have heard.

So this is -- I wanted to bring those issues out because I'm hearing things here that we have heard over the years that just don't

make sense when you're talking about children and vulnerable populations.

MEMBER PEREIRA: Thank you.

In your presentation and also in your -- in your submission, you talk about only 5 to 10 percent of inherited cancer -- cancers are due to inherited genetic mutations, and you wonder what causes the other 90 to 95 percent and whether this might be related to radiation.

In your experience and in all the literature you've studied, do you see any evidence of increasing rates of cancer incidents with the growth of the nuclear industry? Do you see a clear relationship there?

MS. GOLDIN-ROSENBERG: Dorothy Goldin-Rosenberg.

The overall incidents of cancer -- I mean, the Canadian Cancer Society says that cancer rates are rising in many cancers, not in terms of lung cancer so much because of -- smoking has declined, et cetera, but certainly many other cancers are increasing -- the incidents is increasing.

Maybe the mortality isn't because of treatment and so on.

The studies that I've mentioned are showing a direct link with cancer and not all cancer in the people who are exposed, but in their offspring.

These Sellafield studies have been known for years, and they've been replicated for years.

The Gardiner study in Great Britain was replicated. First it was denied, and then it was replicated and shown to be true.

So we're also talking about the children of workers who are exposed because we're talking about damaged eggs and sperm.

So there are studies that show major changes where people are exposed to ionizing radiation, major cancers and birth defects. And I've mentioned a whole lot of other conditions in my -- in my brief.

So I think that what we have to talk about is the precautionary principle.

When we do not have 100 percent proof of all the things that we are concerned about, we have to take precaution and stop doing it.

We have enough, what we call,

weight of evidence to show that there is enough damage caused by radiation.

It’s the one thing you can see the proof of. You can see cellular damage in the cells from radiation. It’s not like all the other things we talk about, pesticides and a whole range of other chemicals that we know are carcinogens and hormone disruptors and the neurotoxins and so on.

We know that there are many exposures, but the one that shows cellular damage is radiation, and so this is the area that we have to talk about when we’re talking about nuclear power and the whole nuclear fuel chain.

As I mentioned in my brief, we’re talking about -- you know, from uranium mining, as the previous speaker talked about -- uranium mining to refining, I mean, the Port Hope situation, the high-level nuclear waste that you’ve heard on -- you know, deputations on and so on and so forth.

The whole nuclear fuel chain is rife with exposures.

What do we say about the whole nuclear fuel chain? I'm talking about Tritium in the drinking water and the impacts on children and women and vulnerable populations. But, you know,

these are issues that you're hearing about from other people, so I'm hoping that this will make a real mark for all of you because this is -- this is really, really critical. This is -- this is a good time to raise these issues with what's happening.

I think there's a -- a consciousness now because of Japan, that they've reawakened the whole question of what we should be doing. And that's why we hope that the government, whoever, is going to reconsider what they're doing and look at what the future is for these things. The billions of dollars going into nuclear stuff should be going into energy efficiency, conservation, renewables, et cetera. We know that's going on all over the world.

Germany is a good example of -- it's too bad that Hermann Scheer died, but he was a real wonderful inspiration in terms of -- he was an engineer. The whole renewables issues is way ahead now because of him, but it's a model for the rest of the world and -- and northern Europe too. I mean the systems are there if you're talking about baseload. They are managing baseload without nuclear power because they don't want it.

MEMBER PEREIRA: Thank you. I'll

just turn to another subject matter that you touched on. You referred to geomagnetic linearments that intersect near the Darlington and Pickering reactors and the work done or spoken about by Mr. -- Dr. Wallach, I -- I think is his title.

CNSC, are you familiar with the work done by Dr. Wallach on seismic hazards in the vicinity of the generating stations?

MR. HOWDEN: Barclay Howden speaking. Yes, we are. Our folks that work on the seismic area are quite familiar with it. I think Mr. -- Mr. Wallach has done -- Dr. Wallach has done a lot of work in the area.

What we have done is we have worked with the geological survey of Canada, who has characterized the zone around the Darlington site. And I think -- I don't believe there's any issues with the factual info -- information about the -- the entire sort of geology of the site. I think that’s well documented and I think Dr. Wallach’s brought a lot of information.

I think it comes down to the determination of the risks and this lies with, in our view, Geological Survey of Canada as the

authority in Canada. And previously, last week, the -- the panel heard from Dr. Lamontagne, who works for the Geological Survey of Canada. And he described the -- what the area was like and how earthquakes occur, but also how they determine the risk to be able to provide information such that designers know what kind of peak ground accelerations they have to design to and, hence, what kind of safety factors they have to build into their designs.

MEMBER PEREIRA: Thank you. I just wanted to confirm because this is the second intervenor that has brought up the issue about faults. In this case, it's not a fault. It's a geomagnetic linearment that might be a hazard not -- that was not considered in the assessment for Darlington. And from what you say, Mr. Howden, this is something that has already been considered in determining the hazard spectrum for Darlington; is that correct?

MR. HOWDEN: That is correct. The Geological Survey of Canada was very clear on the -- on the characterization of the zone around the Darlington station.

MEMBER PEREIRA: Thank you. Thank

you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira and Madame Beaudet. You've covered some of the questions that I was -- was wondering. So with that, now we'll go to the floor and I'll go to OPG. Do you have any questions to the intervenor?

MR. SWEETNAM: Albert Sweetnam for the record. We have no questions, but would like to offer two -- two clarifications.

CHAIRPERSON GRAHAM: Yes, yes, you may.

MR. SWEETNAM: The intervenor indicated that the -- the spill at Pickering was -- was measured at 56 becquerels per litre. Actually, it was measured at 0.56 becquerels per litre.

In addition to that, the intervenor also indicated that there would potentially be trade-offs between costs and safety in the design of the new reactors. We would like to state very clearly that both OPG and the CNSC would ensure that these reactors are fully designed to protect the safety of our workers and the general public.

CHAIRPERSON GRAHAM: Thank you for

your comments and clarification. We'll now go to CNSC. Do you have any comments or clarifications you want to bring forward?

DR. THOMPSON: Patsy Thompson for the record. We have no questions, but if I could, a clarification as well?

CHAIRPERSON GRAHAM: Proceed.

DR. THOMPSON: The intervenor made statements and it’s in other interventions as well that the risk assessments conducted are done for a healthy male working in -- in an industry. And I would like to -- to clarify that that is not the case; that the risk assessments that have been done for this project and for every other project that the CNSC has done over many years are done looking at various age groups and take into consideration characteristics that are typical of infants, young children, teenagers, and adults of both sexes.

And that the risk factors that are used to determine the risk of cancer or other diseases in relation to radiation exposures have been developed from epidemiological studies that have covered both sexes and all age groups.

This comes from -- usually the statement comes from past -- dated ICRP practices

where there was the -- the biological model to go from an exposure to -- to a dose was essentially the representation -- a computer representation and -- and metamedical, not a representation of the biology of -- of a male weighing -- with certain characteristics, height and weight. That model has long been replaced with better models for -- for both sexes, as well as for different age groups.

CHAIRPERSON GRAHAM: Thank you for your clarification. Government agencies? Any government agencies, federal or provincial, that have questions or statements with regard to this intervention? If not, we have Mr. Kalevar, who is an intervenor, and we also have another gentleman who is registered to -- or asked to ask a question. He doesn't -- he isn’t a registered participant, but if Mr. Kalevar has one question, then we'll permit the other -- other person to present a question also even though it’s not within our -- I'm bending the rules, in other words.

Mr. Kalevar, your question, please.

--- QUESTIONS BY THE INTERVENORS:

MR. KALEVAR: Yes, Chai Kalevar from Just One World. Professor Rosenberg, you made

many statements about how Tritium runs through water almost everywhere. I'm especially interested in what it does in the uterus, in the placenta, to the fetus, and if you can elaborate that?

And I would like to note here that Dr. Thompson, when she mentioned in French, she didn't mention fetuses. I think that is a starting point for life and I would like to know if she would like to include fetuses in her study also or she has missed them?

CHAIRPERSON GRAHAM: Your question is to the Chair, I presume?

MR. KALEVAR: Of course, it’s always through you. I just don’t want to --

CHAIRPERSON GRAHAM: Thank you very much.

MR. KALEVAR: -- repeat --

CHAIRPERSON GRAHAM: I will now go to -- to the Intervenor Rosenberg to answer the question, please.

MS. ROSENBERG: “The developing fetus -- a significant pathway for human harm from -- for human harm from elevated Tritium levels is via female human infants,” as Dr. Edwin Radford of the University of Pittsburgh University testified

to the parliamentary select committee of Ontario Hydro in 1980. He stated:

> “A female infant is born with all the eggs and ovas she will ever produce as a mature woman. These ova are formed during a relatively short period during her time in utero. If the building materials in utero available during that short time are defective; specifically, if available hydrogen is tritiated, an inordinately -- inordinately high percentage of her ova will incorporate that defective material. Since Tritium has a radioactive half-life of 12 years, the majority of that would have already undergone radioactive decay by the time she would enter her own reproductive years. That radioactive decay would

disproportionately disrupt her genetic material in her ova and her offspring in two different ways, by eradiating the surrounding genetic material with a very well-placed beta particle and by converting a meaningful tritium of hydrogen atom, example, in a crucial gene in the DNA code into a nonsensical helium atom, thereby causing damage."

And they go on to say:

"It is well-known that there will always be pregnant women developing children and young girls in puberty which must be taken into account."

And it used to be thought that only the dose made the poison, but it's now known that timing -- the timing of exposures can be just as important as the dose, and we know that.

In the discourse of children's health and the environment, that the smallest

amounts of radiation and/or other chemicals at the time of these what we call “windows of vulnerability”, can have a major impact on their present and future life for this reason.

And in terms of risk assessment, basically, risk assessment is permission to pollute, but it’s to pollute a particular amount.

Does it not call into question standards of any acceptable levels of radiation exposures during these extremely critical windows of rapid cellular growth when there is such a vulnerability to abhorrent growth.

CHAIRPERSON GRAHAM: Thank you very much.

Mr. Kalevar, that whole answer was in Ms. Rosenberg’s brief. If you want further clarification, it’s there word for word, and I suggest that if you’re interested further, you read the brief because -- and Ms. Rosenberg did read from her intervention.

As I said, we have Mr. Raymond Leistner, I think I’ve said that correctly, and you’re -- I’ll allow a question, sir.

MR. LEISTNER: I’d like to ask if the ---

CHAIRPERSON GRAHAM: Microphone on someone, please.

MR. LEISTNER: I'd like to ask if any radiation containment vessels are going to be constructed strong enough to withstand an intentional military attack which may or may not occur over the next 50 years, but there's no guarantee?

CHAIRPERSON GRAHAM: I'll refer that question to OPG.

(SHORT PAUSE/COURTE PAUSE)

MR. PETERS: John Peters, for the record.

The containers that we use to store used fuel at our sites are designed to international standards, tested according to those standards and comply fully with all international standards for safe storage.

As we've indicated in previous testimony, they're monitored and their safety is confirmed on an ongoing basis through routine testing and evaluations. And we do review these standards and we would comply with whatever requirements were suggested as appropriate as these containers age.

CHAIRPERSON GRAHAM: Thank you.

And, Mr. Leistner, through our in-camera sessions with regard to security, those standards are also reviewed so that cannot be discussed in public, but -- because of terrorists and so on -- but we do review those also.

So with that I'm going to declare a recess.

I want to thank Ms. Rosenberg for coming today, for giving us her views, and I want to thank all those who have participated in this.

And on behalf of the panel, a safe trip back and thank you very much for coming.

So it is now 2:30 -- or 3:30 I guess and the chair will resume at 3:45. The clock says 3:36 so it will be 3:44. Thank you.

--- Upon recessing at 15:33 p.m.

--- Upon resuming at 15:50 p.m.

CHAIRPERSON GRAHAM: Good afternoon again and welcome back.

The next intervenor we have on our records this afternoon is Mr. Richard Troy and his presentation is under PMD 11-P1.211.

Mr. Troy, welcome. The microphone is there; the button is there to start. We have

your written intervention and we welcome you here.

And the only other thing I ask is when you're asked questions each time identify yourself so that when they're transcribing the records, they know who was speaking.

Thank you very much and welcome.

---PRESENTATION BY MR. TROY:

MR. TROY: Thank you very much. My name is Richard Troy. I want to thank you for that break. I was anticipating that I'd have to speak right away and I really appreciated that break.

I'm a professional engineer and a graduate of the University of Toronto in mechanical engineering. And I've also -- so I have a B.A.Sc., Bachelor of Applied Science. I also have a Bachelor of Philosophy from a small college in the United States.

Most of my early experience was in the power -- general power industry. My first job out of University of Toronto was at Dominion Engineering in Montreal where we designed and built the hydraulic turbines for Sir Adam Beck, for English River, for all the hydraulic turbines in the Brazil and it was -- an amazing thing is that

-- that we did there with the hydraulic power. And, you know, one of the things about any -- any type of energy, is storing excess energy or storing energy that you'll need later.

And, you know, down at Niagara Falls there is a -- they have a pond up in the Height where during the night, they use the -- see, you know, the whole system is in generation.

As you know there's a prime mover, there's a motor and there's a pump. Well, so during the night when they had no need for a lot of the energy, they pump -- they turn the -- they use the pump to pump water up to the Height and then -- but during the times of peak energy, you know, five o'clock in the afternoon, then they reverse this thing and they -- and the motor -- the generator which was once a generator now becomes a motor and it drives -- it is used in the opposite direction so that they could store -- use energy when it's needed.

After working with hydraulic power, I then worked with the -- basically in what you may call the nuclear industry, and I worked for a company called the Byron Jackson Division of Borg-Warner Canada. And we made all of the pumps

for all the Canadian nuclear stations and also for Romania, you know, Lapreau, India and Pakistan and all the major ones that we know of from the CANDU system.

I was fascinated by the work there and it was -- and I believed it was very, very safe. We had an inspector from hydro -- Ontario Hydro on the site and we just -- I don't know if anybody's ever -- I guess you know something about the hardware of the CANDU system.

The pumps that we built were -- the whole -- it was a 10,000 horsepower vertical motor built by Canadian General Electric on top of our pump. And it was 42 feet in the air so they were huge, huge pumps. And the casing of the pump was made of stainless steel that came in from Sweden and the amount of inspection and repairs that went on, you know. Everything was radiographed; liquid penetrant, so many different ways that they would chip out every bit and -- so then it was -- we built very, very safe pumps and I don't think that I ever heard of any of the pumps themselves having problems. Well, of course, like technology you build -- you can build good equipment, but then you have to -- then it's put in

the hands of operators, and that's sometimes where problems may arise.

I guess I -- until recently I guess I was a proponent of nuclear energy because I knew how safe and efficient the AECL -- the heavy water systems that we used were.

And then gradually when a friend was -- talked about this panel, then I started to think more about it and some of the reservations I had, and along came the problems in Japan.

Always one of the problems that I had with the nuclear energy was it was so capital intensive. The -- all the companies that were involved in the nuclear industry they did nothing on the -- they did nothing on the cheap. We -- it was a very profitable business, and they carried on until I think it was about 1982, when they -- when the hydrocarbon industries and the nuclear industry sort of had a downturn, and so the Byron Jackson, they moved back to California. And we were laid off.

One of the personal things that really disturbed me was that in that year Forbes Magazine puts out an annual review of salaries of CEOs. And the top two were Toys 'R Us

and Federal Express. And the number three was a -- was the vice president of Byron Jackson. He made 5 -- $25 million that year, which is nothing compared with what some of the guys make these days.

But then after I retired, my pension -- I worked for 13 years, but they said, oh, well, it wasn't -- it was not regulated or certified or something until you worked there for 3 years, so -- but I now get a pension of $189 a month. That's what I get from the -- that's what's left over, the nuclear waste that that I get.

Fortunately, I'm still working -- I'm still working as an engineer, importing equipment for pipes and couplings and that, and our system in Canada of the Old Age Pension, I know you don't believe it, but I am over 65. But the Old Age Pension and the Canada Pension Plan sort of pays for the rent and the rest I have to work -- still work for.

So the fact that it's so capital intensive, and now that they're talking that, you know, $36 billion that it may cost the Darlington.

But, you know, any government -- my father was a politician, but not -- he was a politician just because they -- the party needed

somebody they knew would win. And so I have a great respect for politicians, but they have to -- you know, you go -- you know, you don't go in with a low number -- at least you go in with the lowest number possible, so 36 billion. I imagine during the hearings that people have mentioned what Pickering started, how much it started at, and what it ended up.

And, incidentally, just mentioning Pickering. Pickering Nuclear Generating Station at one point, when I was there, was the most efficient nuclear generation station in the world, they were a fantastic product and system that they developed. It's not quite that good now.

So I appreciate this review and you have a tremendous task. You've got to weigh the facts, but then you've also got to weigh the opinions, and seeing that we are a democratic country, you've got to weigh the opinions of a general -- of the general public, of engineers, of health professions, of all sorts of people, and that's -- you weigh those facts.

But then you also have to weigh the opinions of the general public because you know, like a budget, you are writing a moral

report. You've got -- it's, you know, ethics is involved in what you do, just like ethics is involved in the -- in any budget as many people must realize.

So the facts I -- the facts are handled, well, much in a -- in a better fashion than I can as regards -- radiation and human effects; the whole system of the nuclear industry.

But what I would like to just concentrate on is the -- what the average person on the street, what they think of nuclear energy and what the -- what the media talk about nuclear energy, and what the proponents or the protesters or the people who have reservations about nuclear energy.

Now, Dr. Helen Caldicott, I've seen her on the TV and I've read her -- part of her submission. I mean, she was fantastic, and how anybody could be -- not be swayed by what she said.

In fact, as a bit of an entrepreneur, I've been thinking of searching the internet to see if I could -- she mentioned about plutonium in male testicles. I've been wondering if there's any lead-lined jockey shorts around.

So the -- but the -- just picking

and choosing different comments that the OPG talked about. The project poses no credible risk. So, you know, it's -- reports at life is a matter of language and a matter of words.

When you talk about, you know, risks, you know, as -- what was his first name, MacMillan of Britain, was once the prime minister of Britain, said that life is -- we cannot live life without risks.

And we know that, for example, driving a vehicle. You can have a fantastic vehicle, a Mercedes Benz or the best BMW, whatever, but so much depends on the -- on the human person, and in the industry, on the operators, on the -- and so it's not just a matter of technology, it's a matter of human operation and that. But those were some of the risks -- risks arrive.

There was an editorial in the Toronto Star, and they mentioned, they said, yes, nuclear power is safe as long as nothing goes wrong. Well, you know, that's what happened in Japan, with so many nuclear reactors. And then the tsunami and the earthquake and they -- where they decided to build the plant, now we hear it should have been higher up. Even at the very first Mark,

the Mark I water reactors that were built by GE in the United States, they had whistleblowers in those days and three of the engineers quit because they said this Mark -- this version of the -- of our reactors is just unsafe. Well, those are the reactors that were in -- that have gone awry in Japan.

Now, there's -- you read in the paper now, there's many different people who often say as I was once a nuclear proponent and now I'm -- I would call myself a nuclear opponent or certainly a very sceptic. But the –- one of the –- in one of the newspapers, the Toronto Sun, said that nuclear is the answer. Following what didn't happen, it no longer needs to be questioned or demonized. So in other words, the opponents also are calling the nuclear industry a satanic or a demon, but –- but several –- several people, George Monibot and even Gwynn Dyer have changed their –- their tune about the –- about the safety and they –- but they –- but some of the –- the reasons that these people change their mind is because, well, you know, it could have been worse.

And –- and there was one fellow from the University of Maryland wrote in the paper

that wind, solar, and other alternatives hold great promise, but nuclear still offers the safest large-scale options around. The problem is the loss of life associated with nuclear failures gets concentrated.

So, you know, it's -- it's drive -- it's fantastic to drive a car, drive it fast as long as you go off the highway and -- and you don't even wear your seatbelt and you -- and you get killed, but -- so -- oh, I should have mentioned earlier because I -- though -- that I -- I'm a member of certain groups.

They --I'm not an official member, but just that I'm a member of an international group called Pax Christi. I'm also a member of KIROS and also the Coalition to Stop the War.

They -- there's some talk that -- that they -- the cost of the nuclear -- of the Darlington station will be, say, $36 billion. There was a time when -- when people were saying now is the time -- we should have childcare and -- for children in Ontario by the -- and in Canada, particular in Canada with the federal government. But the story always was, well, we just don't have the money. It's very good, but we just don't have

the money.

But then with the –- with the financial fiasco in the United States and in Canada, funny enough, the money was –- was quickly found. So it's –- again, it's a matter of morality, of ethics, where you –- where are you going to spend your money.

Are you going to spend the money on –- on capital projects which create a lot of profit for –- for companies, corporations, for individuals, or are you going to spend it on more –- small –- other products that benefit more people.

For instance, Canada should be in the forefront of wind turbines because we have the –- we have the steel companies. Goldman's Steel made all the –- the pipe for the TransCanada Pipeline, and –- and Stelco, which has been bought and sold to the US Steel and then shut down, we have the steel industry which could make the towers.

We have the composite and plastic and companies that can make the blades for the –- we have the manufacturing plants that could make the –- the generators, and it would provide a lot

of –- of work in the construction but also in maintenance of the –- and operation of the wind –- the wind turbines.

I've been to Alberta doing projects out there, and –- and on the top of the hill, you'd just see the –- the wind –- the wind turbines just, you know, scattered all over.

I was down at Amherstburg in –- in southwestern Ontario, and there are a lot of wind turbines down there, and then there's the odd sign on somebody's front lawn, you know, no –- no wind turbines in the lake.

I think one thing that the –- that the opponents of –- of nuclear industry have to realize is that –- that it –- being a free –- being a free society, people can come up with whatever they say, and the people that –- who are against wind turbines, they say, well, the noise is bad, the vibrations are bad, and –- but I think we have to, as you're doing, trying to get the facts, to analyze –- to analyze the facts and come up with some positive data that can –- how we can go forward with our –- with our power generation in –- in Ontario.

I think I've more or less skipped

over most of the things I –- I wanted to say. Yes, so, good.

Well, one last thing. That, you know, it's strange that –- that all of the –- the alternative sources of energy all come from nature. They're all free. There's –- you know, you got the sun. I mean, without the sun, where would we be? The sun, the wind, the water, the fact of gravity, you know that water flowing from up here goes down there, and we turn that into –- into energy. Even the rising tides, they're talking about putting the generation plants on the Bay of Fundy because it's the world's highest tides.

Or there's even talks of whale –- of wave –- of wave generation, and I was down on College Street in Toronto. I was going by this building and I saw an old, like, truck with a drilling rig on the back, and being very curious, I went and asked the guy, oh, oh, what are you drilling there for?

Oh, we're drilling –- we're drilling down. We're going for some geothermal in this building.

So, you know, then you don't have to –- you know, you talk of geothermal, and maybe

you think of –- of the hot pools in Yellowstone Park or in Iceland, but just very –- below the surface, there's the heat which can be –- and you only need a small –- small increment of temperature variation that you can use for your –- for either heating or cooling.

So with that, I'll –- I'll end, and thank you –- thank you very much.

CHAIRPERSON GRAHAM: Thank you very much, Mr. Troy, for your presentation. I'll go to questions from panel members, and, Madame Beaudet, do you have any questions?

--- QUESTIONS BY THE PANEL:

MEMBER BEAUDET: Thank you, Mr. Chairman. You have had a lot of suggestion in your presentation and your written submission about green energy and renewable. We had last week the Deputy Minister from the Ministry of Ontario, and we talked a little bit about the constraints of going to green energy rapidly, and they –- he did present some technical constraint and cost also constraints which he felt was probably the biggest challenge for them.

I'd like to hear –- you're an engineer and you've put some reflection into your

presentation. How do you see these constraints? I mean, you can have geothermal, but then it's mainly for new buildings. You can have wind power, but as far as I have seen wind power development, there's a lot of opposition also to wind power. So I'd like to hear you a little bit more –- you know, wind power is always -- not in my backyard very much -- more and more now.

So I'd like to hear more about this from you, please.

MR. TROY: Okay. Richard Troy. Thanks.

That's -- thank you very much for that.

I'm on the web a lot. And just -- just yesterday in a -- in a magazine, they mentioned that in -- in Quebec, which is -- has an abundance of hydraulic power, they've got only one -- one nuclear plant.

And we didn't build the pumps for that plant. They were built Germany by KSB.

But in Quebec, they're -- they -- TransAlta, which is a large corporation in Calgary, is going to build a 66-megawatt plant in New Richmond in the Gaspe area for $205 million.

There's also other plants in Quebec with -- so there's one where -- 99 megawatts.

So they're quite reasonable to build and quite -- you can build them a lot quicker than they can with a nuclear station.

Also, I get on the EPA, on the internet, and they, the United States, talked about getting -- having loans for -- for developing -- for fostering alternative energy. But they found that cash grants were the best.

And they -- up until -- until they -- the financial problems there, they had already -- they'd thousands of megawatts of -- 13,500 megawatts of new projects were being built in -- before -- in 2008.

And there's -- they just mentioned several projects here in Indiana, in Texas, in Washington, all in the 200 million range, so that -- that's -- it's very quick.

And compared to the 20 -- $36 billion which will double to 72 billion or something, they're very economical to construct.

MEMBER BEAUDET: Thank you, Mr. Chairman. Thank you.

CHAIRPERSON GRAHAM: Mr. Pereira?

MEMBER PEREIRA: Thank you, Mr. Chairman.

Thank you for your reflections on the options for energy generation -- power generation.

And I guess your main concern with nuclear that you raise is the capital cost and the time to build.

Is that primarily your concern?

MR. TROY: That was the trigger that decided -- you know, it's only about, you know, a few weeks ago that I -- I entered my name to come here.

That was the -- one of the triggers, but -- but, really, if I -- when I -- when I reflect and think about it and do any -- a little bit of research, which is -- you know, there's so much -- there's so much valuable research done by the -- particularly by the Pembina Institute and Greenpeace that cover -- cover all this.

But when I did the -- the more research -- and then I also -- and I reflect on the -- on the problems, that -- that, you know,

confirmed my -- my opposition to -- to nuclear power.

And my interest in -- that we should be spending the money, the brainpower -- we've got fantastic brainpower in Ontario Hydro and in AECL that we should be spending it on -- on other sizes of alternative energy.

And so that's what really solidified me as an -- as an opponent of nuclear energy.

MEMBER PEREIRA: Thank you very much. Thank you.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira.

Now, we'll go to -- from the floor.

OPG, do you have any questions for Mr. Troy?

MR. SWEETNAM: Albert Sweetnam for the record.

No questions.

But we have a small comment, if you will allow.

The intervenor has indicated several times that new nuclear would cost $36

billion.

In Ontario's long-term energy plan, it's clearly stated there that the cost -- the expected cost of the refurbishment of ten reactors -- that's six reactors at Bruce and four at Darlington plus the two new reactors at Darlington -- are estimated to cost $33 billion.

CHAIRPERSON GRAHAM: Thank you for that clarification.

CNSC, do you have any questions to Mr. Troy?

DR. THOMPSON: Patsy Thompson.

No questions. Thank you.

CHAIRPERSON GRAHAM: Government departments -- government departments -- are there any government departments?

No, I don't see any.

Mr. Troy is indicating he wants to say something.

And then I'm going to go -- I have one intervenor registered, and we'll go to that intervenor just after Mr. Troy.

MR. TROY: So can you -- you know, this is -- you say it'd be 33 billion -- 33 billion, not 36 billion.

I wish -- I wish that -- I know you don't have that kind of money, but I wish that somebody would say, this is it. This is the top.

Like, in industry, you bid on a job, and that's what it -- that's -- that's your bid, and you have to stick -- stick by that.

But then, I mean, you're saying that these -- these dollars that I have here, these $36 billion, are longer -- are no longer -- are good.

That -- I mean, the whole nuclear industry, the -- the nuclear industry would not -- would not even get started if they didn't have certain provisions.

The one major provision is that they don't have a full liability. They have to tack -- they have to put a limit on their -- on their liability because, I mean, I think it's raised -- I forget what it was before.

But I know that -- that that has to be -- no other -- no other industry, no other insurance company, is subject to that -- that sort of thing.

But nobody would invest in or build nuclear plants if it was -- if they were

liable to the full cost of -- of problems with -- with nuclear -- nuclear power.

CHAIRPERSON GRAHAM: Thank you very much, Mr. Troy, for your intervention.

Madam Frances Deverell, I believe you have registered, so the floor is yours, Madam Deverell.

--- QUESTIONS BY THE INTERVENORS:

MS. DEVERELL: Thank you very much for allowing me to ask a question, Mr. Chair.

I just wanted to ask Mr. Troy, do I understand correctly that you believe that the panel should take the employment factor into account?

In nuclear power, you say that it's very capital intensive and that there will be much more benefit to the working class and to many -- a much greater range of people if we choose another option and that they should take that as an important factor into account; is that your main -- one of your main points?

MR. TROY: Richard Troy.

Thank you very much for that question because that's exactly what I -- what I consider.

And I -- I really appreciate the work that this panel is doing.

But you have -- and what you have to -- it's a -- it's a task. It's a herculean task to take all these things into account that -- how it affects the -- the health, the welfare, the -- the -- of, you know, the whole -- the whole -- and the labour, the -- the whole gambit of -- of Canadian society, you know.

And this is a -- is an ethical moral task. It's not just an engineering task. It's not just a need that we need -- need power.

But where are we going to get the power is a -- is a -- is a moral task that you are -- that you've agreed to, and you're committed to.

And I'm sure that you will take all those things into consideration.

CHAIRPERSON GRAHAM: Thank you.

And with that, we have the next presenter coming up.

I want to, first of all, thank you, Mr. Troy, for coming today and expressing your views and providing the information you did in your intervention to the panel, and a safe trip back.

Our next intervention is from the

Canadian Unitarians for Social Justice, which is covered under PMD 11-P1.203. And I think Ms. Rao is the presenter, and the floor is yours, Ma'am.

--- PRESENTATION BY MS. RAO:

MS. RAO: Good afternoon distinguished panel members. My name is Margaret Rao and I am a board member of Canadian Unitarians for Social Justice. With me today is the Reverend Frances Deverell, President of Canadian Unitarians for Social Justice.

CUSJ is a national faith-based organization founded to actively promote Unitarian values in society at large, including respect for the interdependent web of life.

We believe actions taken regarding increasing nuclear power at Darlington will have wide ramifications across Ontario, Canada, the United States and around the world. We wish to share our concerns about the economic, environmental and military impacts of nuclear power and the overall risk to the wellbeing of our planet, both today and for future generations.

The majority of our board believes that Ontario and other provinces should not proceed with the expansion of nuclear power until there is

a full assessment of all the energy options.

Based on that assessment, we need to coordinate provincial and national energy strategies, including plans to realize real gains in energy conservation. This is the most cost-effective approach.

Plans to phase out both carbon-based fuels and nuclear reactors, while phasing in renewable options; develop a vision for a mix of many power sources from many locations, including made- in-Ontario green power; water power imports from Quebec; natural gas-fired combined heat and power plants, to name a few.

Provide the same kinds of subsidies and incentives to a range of renewable energy sources that are now provided to oil and gas and nuclear power. Develop plans to educate and involve the public on a new energy strategy for the 21st century.

The nuclear industry has certain well-known problems. Construction projects have a history of design problems, cost overruns, and high maintenance costs that result in large public debt. In Ontario we are still paying 1.8 billion a year in debt retirement for past cost overruns.

Because of the high risk, nuclear plants are insurable to a large degree by the public purse. In effect, insurance costs are a government liability and therefore a subsidy for the nuclear industry. If there is a major disaster, the public will pay for it.

We are told over and over by the nuclear industry and government that nuclear power is safe. It is simply not possible to take this position. Nobody predicted a 9.0 level earthquake in Japan. The crisis is far from over, even as we speak.

With climate change we can anticipate more frequent and unpredictable weather patterns, including severe storms such as ice storms, and severe heat waves such as the heat wave of 2003 in France where operations at 17 reactors had to be scaled back or stopped.

There is also the question of technical malfunctions. Seven Ontario nuclear reactors were shut down in 1998 as a result of safety concerns, demonstrating that this province is far from impervious to a nuclear accident.

Also human error. According to Mark Clayton in the Christian Science Monitor,

March 18th, 2011, there were 14 near misses due to slow responses in safety upgrades and poor regulatory monitoring in the United States in 2010. It was just such slack safety and maintenance practices that caused the Chernobyl disaster and the Gulf Oil Spill in 2010.

The question of cost also arises. The cost of decommissioning a single reactor after its useful operating life exceeds $2 billion. There is no demonstrated safe way of disposing of the nuclear waste of spent fuel or managing it securely for the necessary time period, possibly hundreds of thousands of years. This represents both an enormous cost and an enormous hazard.

Also uranium enrichment of used fuel leads to weapons-grade plutonium for nuclear weapons. The more nuclear power plants there are, the greater the risk of nuclear weapons and possibly war. Nuclear power plants and spent fuel storage areas are obvious targets for terrorist attacks. Spent fuel depositories are especially vulnerable to attacks.

The Darlington plants are located in the heart of a huge population area on the edge of the Great Lakes, source of drinking water for

millions of people. Its connection with the waters that feed the St. Lawrence means that the impact of a catastrophic event could easily extend to the United States, Quebec and beyond.

In their day-to-day operations, nuclear power stations emit tritium and other radioactive materials into the environment.

According to Dr. Gordon Edwards, of the Canadian Coalition for Nuclear Responsibility:

> "Tritium poses an ever-present radiological hazard to CANDU workers. It is also an environmental contaminant which pollutes the drinking water of many communities situated near CANDU reactors. In addition, atmospheric emissions of tritium are readily inhaled and absorbed directly through the skin by residents living near CANDU reactors."

End of quote. There is increasingly strong evidence linking these

emissions to childhood leukemia. Loss of plant life and fish life also results from lake-water inflows and hot water outflows.

And at the beginning of the afternoon, I was interested in hearing from one of the OPG people talking about fish survival and the acceptable standards for testing of toxicity in fish is a 50 percent survival rate. That would not apply to humans, and I feel sorry for the fish population in our Great Lakes.

According to a December 14th, 2006, report by the Pembina Institute, total greenhouse gas emissions associated with uranium mining, milling, refining, conversion and fuel fabrication in Canada, are estimated at between 240,000 and 366,000 tons of CO2 per year. If Ontario, other provinces and other areas of the world all renew their commitment to nuclear power, we will eventually face a shortage of uranium. This will result in the mining of lower and lower grades of uranium ore, leaving huge radioactive tailings to spoil the environment and degrade the quality of life for all living beings.

According to scientists, Jan Willem Storm van Leeuwen and Philip Bartlett Smith:

> “Nuclear power stations of the future will have to rely on second-grade ore which requires huge amounts of conventional energy to refine it. For each ton of poor quality uranium, some 5,000 tons of granite will have to be mined, milled and disposed of. This could rise to 10,000 tons if the quality deteriorates further.”

According to energy writer David Fleming in Prospect Magazine, “I’m a subject of rich ore depletion”.

As the need to exploit lower grade ores grows, it would be putting more energy into the process than it could extract from it. Its contribution to meeting the world’s energy needs would become negative. The so-called reliability of nuclear power would therefore rest on the growing use of fossil fuels rather than their replacement.

Nuclear power simply not economically nor environmentally sustainable. When

you include the cost of overruns, maintenance, precautionary security measures, regular inspections and the cost of dealing with decommissioning and waste management, it is not to our minds an acceptable investment of public funds.

We live in a time of major change. We have built our energy security on huge centralized mega projects. What we need from our leadership including the Joint Review Panel, is a commitment to moving us forward into a sustainable energy future. We must take into account the precautionary principle, that is, if there is doubt about the safety of an approach and the consequences of an accident could be disastrous, we must err on the side of caution and prevention. In this regard, we consider it unwise to commit to the ongoing production of nuclear waste when there is no known way to detoxify it or store it with any degree of safety.

Even though nuclear power has been operational for over 50 years, the nuclear industry has yet to determine how to safely dispose of extremely toxic radioactive materials. Moreover, what Canadian town would agree to store highly radioactive waste on their land, no matter the

assurances given to safe storage. According to the Canadian Federal Environmental Assessment Panel, Seaborn report released in March, 1998, after an eight-year intensive public process, the AECL concept in its current form for deep geological disposal does not have broad public support and does not have the required level of acceptability to be adopted as Canada's approach for managing nuclear wastes.

OPG has not evaluated or costed the long-term expenses of managing the more toxic and longer-lived radioactive wastes produced by Generation III reactors. It has also not evaluated the risks involved to the communities along transportation routes and to the workers handling the waste. This lack of evaluation does not meet the standards of the precautionary principle. It does not achieve a vision of sustainable energy for the 21st century.

In addition to waste disposal problems, we also have the radiation problem of tailing mines at mining sites. There are currently over 200 million tons of uranium tailing in Ontario and Saskatchewan. This waste remains a hazard for thousands of years and contains carcinogens such as

radium, radon gas and thorium among others. We learned at Charleboix Lake for instance that the ore at that site would be much lower grade and create a much bigger problem of radioactive tailings than first anticipated.

We also cannot ignore the threat that nuclear waste poses in terms of providing fuel for nuclear and conventional weapons. Low grade spent fuel is already being used in dirty cluster bombs. For true safety and security we need to eliminate the nuclear threat not increase it by producing this dangerous by-product. More nuclear reactors can lead directly to greater nuclear weapons proliferation. In her book, *Nuclear Power is Not the Answer*. Dr. Helen Caldicott reminds us that Canada supplied Indian with a cirrus heavy water reactor for making nuclear energy. It was this reactor that gave India the plutonium it used in its first 1974 nuclear weapons test.

One negative consequence often leads to another. A decade ago few would have expected North Korea to have developed atomic weapons. What will a nuclear armed world look like a decade from now? All of these real-- risks and problems can be eliminated if we choose to phase

out nuclear power. We are also very concerned that a huge investment in nuclear energy will preclude the possibility of a serious investment in more sustainable energy options. We can't afford both. It is an urgent priority for Ontario to invest in constructing and maintaining more energy and cost-efficient alternatives to both coal and nuclear power. The province needs to set up a financial incentive system that will encourage the initiative and creativity of Ontarians to develop and implement a greater range of energy projects, such as the Ontario Fit Program. People want to do the right thing, given the proper incentives.

We need conservation products that reduce the overall demand for power. Ontario is one of the most wasteful users of electricity in the world as was noted by Jack Gibbons, chair of the Ontario Clean Air Alliance. Ontarians can build a virtual nuclear power plant by eliminating wasteful energy use at less than one-fifth the cost of a real one.

Other energy projects being implemented successfully worldwide include the familiar ones of wind, water and solar, also biomask projects, geothermal, cogeneration which we

have in Brampton, heat pumps, tidal waves, the list goes on. Note: A recently released study, January 27, 2011, by Mark Jacobson and Mark Delucchi of Standford University, which concluded that the world could be electrically powered by alternative energy from wind, water and sunlight within 20 to 40 years.

A renewable energy strategy for Ontario is both possible and realistic. The UN Environment Program and the International Energy Agency backed renewable energy policy network for the 21st century, REN21 Project, declared that for the second year in a row the quantity of newly installed capacity of renewable energy in Europe and the U.S. outpaced that for fossil fuels and nuclear. The report suggest the same outcome is likely on a global basis this year. If Canada doesn't invest seriously in this direction, we'll miss out on the innovation, research and development and the jobs this new green sector has to offer.

Nuclear claims to have several advantages by its proponents and I will not name them all. But I do agree on one concern which we share. Proponents of nuclear energy have concerns

that we lack the political will and commitment to build a renewable energy system in time to significantly turn the world around on greenhouse gas emissions. We acknowledge this difficulty, but we have to start somewhere including educating ourselves and others on viable energy alternatives.

Given that as a province and as a country, we need a proactive energy policy to reduce greenhouse gases as quickly as possible. We need to look at our beliefs about the role of government in developing and implementing energy capacity which seems to be currently biased towards the nuclear industry. What could we do with $26 billion in the renewable energy sector?

The development of a comprehensive energy plan seems to be held up in Ontario by a stalemate situation. The question is, will we conduct a serious comprehensive and unbiased comparative analysis which includes projections of the full range of benefits and costs of new nuclear construction from cradle to grave versus those from a realistic spectrum of green energy sources and conservation.

Without an objective study, any conclusions drawn regarding the efficacy of

proceeding with a highly centralized expensive nuclear options at this point would do a great disservice to the people of Ontario. Our greatest concern is that if we invest in new nuclear reactors for Darlington, this project devour any moneys the government has to spend supporting alternative energy projects for years to come.

According to the Stop Darlington Coalition, expanding our use of green energy to replace Darlington would create thousands of decentralized jobs, save ratepayers money and end the production of radioactive waste. If we can only afford one approach, we believe it must be to accelerate the phasing in of all kinds of renewable energy. Those who argue that social change is difficult and it will take time to implement our right. This is the biggest problem facing the government. No matter which option they choose, they will have to deal with nimbyism, “Not in my backyard, please.”

If they pick the nuclear option, they will have to fight nimbyism for the location of the power plants, for the storage of waste, for the movement of waste from one area to another and so on.

If they pick the renewable energy option, they will have to fight nimbyism wherever people are concerned about the noise of large windmills, new green energy investments, inconveniences that they may experience as a result of energy conservation. It will require political will and commitment and it will require economic infrastructure that supports the direction we seek.

Whatever energy strategy is decided upon must be explained and sold to the people in a public education program. A renewable energy strategy would be based on bottom-up local initiatives rather than just top-down mega projects. Financial and technical structures and systems and incentives must be available to encourage the innovation and involvement of the people of the province. With proper government support, renewable projects should be no more expensive to the individual or businesses than other forms of power and should be competitive.

In conclusion, the Joint Review Panel has a very important role to play. We are ordinary people. We have done our best to research the facts, but you will have at your disposal a much greater range and depth of information than we

can provide.

We ask you to take the full range of costs from cradle to grave in the nuclear process into account as you assess the economic feasibility of nuclear power. We ask you to closely assess the different types of reactors proposed and look deeply into their past records for cost overruns, maintenance and repair issues, security, records of leakage and so on. The industry has a long track record of downplaying its risks.

If Germany and the rest of the world, including China, are reviewing nuclear energy and leaning towards renewable strategies, Canada must do the same or fall behind in technical -- technological innovation.

Consider seriously the precautionary principle. Are the risks really worth it? Are we willing to sacrifice future generations? What kind of a relationship do we want to have with the earth and with all species with whom we share this planet?

It is not your job to plan the energy future of Ontario. It is your job to determine if nuclear energy is a safe and cost-

effective option. It is your job to determine if it is a viable option in Ontario today.

Given the costs and risks, we ask you to say no. The nuclear industry has not found solutions to its major problems, no durable solutions. Tell the Ontario government to put its efforts into conservation and renewable energy. Do this for the sake of future generations and all living beings.

Thank you for your time and concern for what's best for our province and our one and only planet. Thank you.

CHAIRPERSON GRAHAM: Thank you very much, Ms. Rao. I appreciate your intervention. We will now go to questions from panel members. I'll go to Mr. Pereira first.

--- QUESTIONS BY THE PANEL:

MEMBER PEREIRA: Thank you for your presentation and your review of the various aspects of the choices that Ontario has to make with respect to energy. And you correctly identified that the -- the primary driver is the energy policy and the role of government and the position this panel faces as we have a mandate on a particular proposal brought forward by the

government of Ontario with -- with Ontario Power Generation -- been given direction as to what they're supposed to do, so we face a challenge.

And -- and you correctly identify that, you know, we, in our assessment, can -- can examine the -- the information on safety, on -- on viability, on impact on the environment, and that -- that is what we will do.

As for energy policy, that is a bit outside our mandate and that is where the government of Ontario has already gone to consultations with the public and made some decisions and -- and so that remain -- that, for us, is a challenge to -- to get to that domain.

But certainly looking at -- at what is before us, just to clarify where we stand on what is before us, is we are looking at a proposal to build reactors inside a plant parameter envelope and not of any particular technology inside a plant parameter envelope, so that’s where we’re going.

And in -- in looking forward in -- in your mind, do you see the -- the challenge of going to an energy supply system -- an electrical energy supply system predominantly based on

renewable energy as being something that can be implemented easily, not only from the -- from the technical viability, but also from the social aspect, the social aspect of building large collector farms, large wind-built farms within the community?

And we now looking at the -- the reactor proposal have had the concept of cooling towers versus rejecting heat in the lake and, in the lake, there's impact on fish and so on and you made that point. So if we try and protect the fish and the public immediately says, “Oh, no, we don’t want cooling towers because they don’t look nice,” do large windmill farms look nice? Do large solar collector farms look nice? So these are the challenges we all face and -- and, you know, those who propose renewable alternatives have also got to face those challenges.

When we come to propose those, will the same intervenors or a different group of intervenors be before the -- the panel, saying that those other options also have their downside? They all have different downsides. So that is a challenge for us and for yourselves as well as you go forward.

But -- but it is important going forward that the public try and influence the policymakers, which is government. But we will do as you have correctly identified. We have certain responsibilities to look at safety, at the -- as far as the environmental assessment aspects are concerned, to look at the viability of -- of the project with respect to protection of the environment, which is our mandate, and so we will do that.

I'd like to ask you though, in -- in going to a future with renewable energy as a primary supplier of energy, what -- what challenges do you foresee? What challenges do you foresee in terms of acceptability by the public of that option?

MS. RAO: Margaret Rao. That's why I named education as being instrumental in forwarding proposals for renewable energies. And the -- the bottom up rather than the top down, getting people involved where they live, I think, is a hopeful idea; letting people know, "Oh, you can do something yourself in terms of conservation."

And in terms of solar -- example,

panels in your homes, right where you are, and we do have -- there's a Green 21 group in Toronto and there are other groups, small groups, neighbourhood groups that are very keen on doing the right thing. And so I'm hopeful when I -- when I see groups of citizens getting together and -- and coming up with solutions and then taking the next step, which would be political, and -- but it’s going to take time.

MEMBER PEREIRA: And that is -- that is a challenge.

MS. RAO: M’hm.

MEMBER PEREIRA: I think that’s the challenge that the province of Ontario seems to be facing, the challenge of replacing large amounts of energy generation capacity in a -- in a relatively short period of time. And -- and that is something that we, as we hear the interventions in this hearing and we get presentations from government departments, we see the challenges and it’s a difficult dilemma to look at the different challenges.

And certainly we -- we understand where you're coming from and we understand the concern on the part of Ontarians who are

intervening and -- and others from outside the province. And certainly in -- in looking at what we have before us, we will be considering all those points, but looking also at the challenge of, you know, what impacts can we mitigate if we are to go forward with a nuclear generation option. Thank you. Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira. Madam Beaudet?

MEMBER BEAUDET: Thank you, Mr. Chairman. I think one of the challenges also is to look at the precautionary principle which has been brought up in many submissions, not only with your representations, but also written submissions. And what I have found is there are different definitions of the precautionary principle and I think we have to base our analysis on the official one, which doesn't preclude going ahead with the project if you don't have all the science.

You have to take a prudent approach, but it doesn't mean –- you know, when you err on the side of precaution, it doesn't mean that you –- you don't allow a project to go ahead.

And many groups have brought up the ethical aspects of going down the road again of

nuclear, and I'd like to hear a bit more from you what –- what is –- because you have brought up also the aspect of ethics and of taking a precautionary approach. And I would like to hear from you a bit more on this topic, please.

MS. RAO: I think my colleague wanted to say something. Is that okay? Margaret Rao speaking.

REV. DEVERELL: Do I have to turn it on?

MS. RAO: No, it's on.

REV. DEVERELL: Somebody did it on for me. Thank you.

I would just like to say before I answer your question that I see the panel as having an opportunity to push public policy if they choose to say no to Darlington because of the risks involved and the huge costs and the lack of flexibility of public policy because of it.

I think our politicians are going to have a very difficult time making the transition. Right now, they're totally committed in one direction. I think they need a strong push, and this panel gives us an opportunity to ask for that push. It would come if you said no, which is

why I think it's really important what you're doing.

So in terms of the precautionary principle, I just can't see how you can ever mitigate all the risks. That's my problem, especially if you look at the cradle to grave, if you look at the mine tailings, and you look at the nuclear waste as well as the actual operation of the reactor.

And we've already just been told today by OPG that they will not get to zero, that that's next to impossible in terms of emissions of things into the Great Lake waters, and I'm very concerned about the Great Lake waters.

They nourish, you know, half a continent, so --

MEMBER BEAUDET: Thank you.

MS. RAO: Margaret Rao.

I just want to say, with precautionary principle, it is a life and death matter, so I'll -- life comes first and that's the bottom line.

And we know that cancer is on the increase, illnesses are on the increase and -- because there are too many toxic chemicals in our

environment in great part due to the nuclear industry.

MEMBER BEAUDET: Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Yes, thank you. I have one question.

We're always interested in who –- who was –- who different groups are representing and the numbers and so on.

And the Canadian Unitarians for Social Justice, you're speaking, I think, for Ontario more than –- in this presentation more than, say, Saskatchewan or somewhere else.

But how large a following are you, and when you present a brief like this, can we get an idea of –- you know, because get –- we get all kinds of information with regard to so many people were polled or were talked to or communicated with and so on, but your following or your group, how long –- how large would it be?

MS. RAO: Margaret Rao.

Well, Frances may be able to better crunch the numbers, but we are a rather –- not a big denomination in Canada, the largest being in Ontario, and we have approximately 400 members

of the Social Justice Organization across Canada, and I would say half –- at least 200 in Ontario.

CHAIRPERSON GRAHAM: And those 200 or half of the 400 or whatever it is, they are –- this –- their beliefs –- the beliefs of your followers that –- I mean, you're speaking for –- in plurality of your followers?

MS. RAO: Well, Margaret Rao.

I was speaking on behalf of our Board, but perhaps Frances –- it's a majority –- majority view. Others have reservations.

REV. DEVERELL: Frances Deverell, yes, we –-

MS. RAO: A minority has reservations.

REV. DEVERELL: You will never have consensus of 100 percent in a Unitarian group, no matter how big or small.

CHAIRPERSON GRAHAM: Thank you very much.

With that, I will go to the procedure that we follow and we go to the floor, and, OPG, do you have any questions or comments?

MR. SWEETNAM: Albert Sweetnam. No questions.

CHAIRPERSON GRAHAM: Then I'll go to CNSC.

DR. THOMPSON: Patsy Thompson. No questions. Thank you.

CHAIRPERSON GRAHAM: The government departments? I've asked that three times already today and I don't even see any government departments here, so I'll presume there are none.

From the floor, do we have any intervenors? Well, if we don't have any intervenor questions, thank you very much for coming.

Thank you for your presentation, and safe travels back to your destination. Thank you very much.

I am reminded or I am advised that we have a request for a brief oral statement. That brief oral statement is from Dr. Christie who is -- Dr. Alan Christie who is a biologist.

He is not registered, but always in the spirit of bending the rules a little bit so that everyone can be heard when time permits, and I say when time permits and today certainly time does permit, so you can take the microphone, I think. Either one. You can take either one.

Dr. Christie, I might remind you that this segment is generally limited to about ten minutes, so I'd ask you to adhere to that.

--- PRESENTATION BY DR. CHRISTIE:

DR. CHRISTIE: Hello. I'm on now? The reason –- I thought my approach to this presentation would be first to give you a little background on myself and then refer to the blue book, which if you don't have a copy, you're welcome to it; it will put you to sleep.

And then move on to the Darlington cooling system at the existing station, which I was involved in the –- the design of.

I have a Ph.D. from –- well, it used to be the Minister of Agriculture. I'm an OAC grad, '58, with a Masters and then a Doctorate at Perdue.

I then joined the Ontario Water Resources Commission and worked there as a research scientist for 10 years, and that turned me into a -- I then joined Ontario Hydro because I didn't want to be a civil servant, and was promptly put in charge of a very –- a multimillion dollar program at that time to investigate the biological effects of once-through cooling on the biota off the Great

Lakes. As a result, that's the blue book.

Now, I won't go into detail on that, but the program consisted of seven packages that were dealt out to consultants, and over a period of three years we looked at entrainment, thermal discharge, effects on the benthos, how to site an intake and a discharge, and various other components.

And what we learned from the exercise, though there is some mortality associated with the passage of phytoplankton, zooplankton, any fish eggs through the cooling system, the time lapse is pretty short. It's five minutes or so. It did not seem to reflect a significant effect on the population.

The one area of critical interest was fish impingement, and being an egg, it's sort of like the calf theory. You want to keep a population alive, save the cows. If you don't, you won't.

So we focused then from that program on how could we design a system –- a cooling system that would minimize fish entrapment and impingement and subsequent loss, we did this in part -- Thunder Bay is a pretty interesting

example. It's an onshore shoreline intake in the Mission River.

And you get a lot of fish sucked in. And unit 1 was wiping them out.

They were expanding to unit 2, unit 3, and we put this -- in a fish return system such that large fish could not get to the travelling screens.

And the smaller fish were lifted gently out of the water; flushed into a trough; down into a holding tank, if you will, with a Hidrostal pump, which was designed to move anchovies out of fish holes down in Chilli without marking them up; and sending them back out to the ecosystem.

As far as I know, it's still working.

I've been retired for quite a few years.

Anyways, moving on from that, of course, we had -- we're faced -- how could we come to grips with the situation at Darlington?

One of the studies or one of the consultant packages that was in the blue book was LMS from down in New York State so we could access

Oswego.

Across the lake, they have an offshore situation. And we learned something from that.

We also took into account some studies that were also done in the book, offshore at Darlington, and at the same time looked at the distribution of the fish and the reproductive strategy of the various species.

And that’s -- this little report, which is basically a summary of Fishes of Canada, but only the Ontario species. It predates the computer.

At any rate, it’s a quick and dirty way of figuring out who’s going to be where when in some ecosystem.

Most of the reproductive activity is done onshore within 5 metres depths.

Most of our discharges at that time were near shore, such as Pickering, Bruce, Lampton, Nanticoke, and so on, even Lennox.

We wanted to move the discharge off shore, and we wanted to avoid entrapment of those fish that were not too mobile. So we went for an offshore intake design.

The idea of the design actually came to me I was at an APPRIS meeting in San Diego.

Some hydraulic engineers in New England were using Gabion baskets to filter their water to the station to keep the fish out.

So I approached our civil design engineers about this, and we've looked at it.

And there's a report I have back there of the various designs.

And we also looked at all the intake designs on the Great Lakes.

And we came to the conclusion that while the gravel beds are a neat idea, you're not going to pull 152 cubic metres per second through them too easily.

So we approached it with a different strategy.

And a remnant tank left over from the sea way project in our hydraulics lab provided us with an opportunity to assess fish behaviour in relation to draw-down currents and lateral currents to simulate long shore lake trends.

We looked at various services. And an excellent fisheries biologist named Dr. Steve Griffiths carried out the work.

And we -- he had gone out and captured, if you will -- I've captured a lot of alewife. That was the main species where we were concerned about the time.

As a by-product at one time, Pickering got shut down because 124 tonnes of alewife came in and plugged the screens.

So we were concerned about alewife.

Anyways, the long or the short was we were able to establish that, though the fish encountered the draw down, capture as a function of encounter was in the order of, like, 2 percent. This seemed pretty promising compared to other intake devices.

If you look at the Bruce A device, it's 30 feet high. It's got a velocity cap, which is to counteract the vortex from the surface, and it's down roughly 10 metres.

When you get an 8-inch fish swimming into that and it's down the tunnel and into the bay. We modified the Bruce B intake with a hanging curtain of chains and ropes and some gaps about -- like this. And they've never had a problem with fish that I'm aware of.

But we -- that was a retrofit approach.

We wanted to come up with a better design, and ultimately we came up with a surface configuration much like you see now, if anybody's visited the Darlington information centre, the -- what we call the porous veneer.

Now, one of the criteria for that veneer was that the approach velocity on an average could not exceed half a foot per second or 15 centimetres per second.

And that was based on the fact that young-of-the-year alewife will move offshore when they're 5 centimetres long.

A fish can cruise at three to six body lengths quite adequately. That's the 15 centimetres. They have a burst speed of something like 12 body lengths to avoid being eaten.

So that was the criteria.

Working with Dr. Emad El Sayed (ph), who just recently retired -- he was the hydraulic modeller for this -- the project -- and Steve, we came up with a design. And there was a team of five of us, a civil engineer plus those two and myself and another gentleman from the

hydraulics department Wolfe Junkner (ph) 17:12:15. And ultimately we came up with the design of the veneer.

And the veneer is also located in a site of minimum fish activity based on our studies.

So now you have a structure which actually came in about $5 million cheaper than the Bruce intake -- was not ever a problem for installation due to storms. You just stop and go out and do it again. And it was all prefabricated within about a mile gestation site at the nearby concrete plant.

The thing is -- and I calculated it -- one, two, three, four, five -- about 80 metres across -- more like 85.

The inner portion, which is solid over the intake, vertical, and then there are three 5. -- 5-and-a-half metre modules out from that, which have a solid surface. And then you have three 5-and-half metre modules, which have gaps in them separated by concrete, 6-inch gaps, 6 inch of -- so it’s a grill. So it looks like a sewer thing.

Subsequently, they put some

crossbars across them.

This is all -- predates zebra mussels, by the way.

So that has seemingly posed a bit of a problem, but to the best of my knowledge, they've never had a fish impingement problem at Darlington.

Mind you, like I said, I've been retired for a few years.

But it was and is probably the most environmentally benign intake on the Great Lakes because of the nature of the design.

It's flushed with a bottom.

The velocity cap designs -- and I only add this -- such as at Bruce I think were principally based on a velocity cap design developed at San Onofre nuclear station in California, a very small nuclear station.

It doesn't -- it's been shut down now.

The only difference is they had side panels up on theirs so the crabs couldn't crawl in and fall down the tunnel.

So I think we achieved a unique design that has minimized the environmental aspects

that we might otherwise associate with other stations due to fish impingement, and came in more cost effectively.

The other thing we did on the cooling system design, part of which was never built, if in fact this didn't work as well, at the east end of the four bay there is a space to create a fish return system back to the lake. And I believe there is a pipe that was installed during construction to facilitate that process.

The discharge was located offshore to enhance mixing with the surface waters and minimize impingement of a heated plume on the near-shore zone, which might adversely affect reproductive behaviour in other mesothermal fish, adult fish in the vicinity. And that's what I came to talk about.

CHAIRPERSON GRAHAM: Thank you very much. As I said, the rules only allow 10 minutes. We've let you go over because we did want to hear the whole -- your whole presentation.

DR. CHRISTIE: Thank you, sir.

CHAIRPERSON GRAHAM: And thank you very much. The rules say that I can turn to my colleagues if they have any questions.

Mr. Pereira, do you have any questions to Dr. Christie?

--- QUESTIONS BY THE PANEL:

MEMBER PEREIRA: Thank you very much for your presentation.

Clearly in looking at what has been proposed for the new generating station, the similar type of design of intake and diffusers, so we recognize made of the elements that you outlined and it was good to see and to hear the origins of what -- what eventually ended up with a new design. So it was -- it was interesting. I don't have any questions because we have studied this at some -- some length and asked questions already of Ontario Power Generation on different aspects of the design. So we're quite familiar with what you spoke about. Thank you very much for that background.

DR. CHRISTIE: Okay.

CHAIRPERSON GRAHAM: Madam Beaudet, do you have any questions?

MEMBER BEAUDET: I just have one question. In the proposal, you've heard the proposal for mitigation that OPG has proposed. We're looking also at acoustic devices, and I was

wondering if -- I'm sure you probably have looked at those and I would like your comments, please.

DR. CHRISTIE: Al Christie. Mr. Chair. Along with developing the intake design we looked at ways to retrofit existing designs to minimize fish entrapment. To that end we developed a barrier net at Bruce, which I mentioned.

We also looked at strobe lights in the water, forget it. They tried an electric fence at Pickering. That works on the Rhine River, but it doesn't work on the Great Lakes. The river carries the stunned fish away, the intake pulls them in.

Anyways, what else did we look at? We ultimately came up with a system, which you've just referred to and that was the design of using acoustics. And fundamentally they consisted of a 45-gallon drum with a quarter-horse motor and an arm on a chain drive to hit the -- and it creates an acoustical reverberation in the water, which interacts with the fishes' swim bladder, which is like a balloon which they use to keep themselves.

They don't like it; they leave. And we've used it very successfully -- I believe there's one installation at Lambton.

Now, we tried it there, at one point, but we have used it on salmon rivers with BC to divert downstream migrating smelts to bypass hydro-electric generating stations. Instead of getting bass coming out below the turbines, now they're going around.

And because of Mr. Chairman's involvement with the Atlantic Salmon Fishery, we also worked with Nova Scotia Power on a river and we were able to divert the downstream migrating adult Atlantic salmon from going through the generating station. So, yeah, it -- it works.

We had hoped to pursue this to use the sound to disorganize, if you will, the protoplasm of zebra mussels. Instead of having as an alternative to using chlorination to control zebra mussel problems, and particularly in the firefighting systems at the stations, this has always been a concern. They get in there, they jam the pumps. What are you going to do?

Unfortunately the four of us that were involved in that program were kind of downsized, back about 1993, because they had the option. Retire or go to the Bruce. My wife was an education superintendent. I wasn't going to the

Bruce.

But at any rate, I don't think anything came of that, but I think it has potential to control zebra mussel. I think we could use acoustics for a lot more things than we do.

Just -- the reason I -- I want to make one additional comment. When I was an undergrad in agriculture, some go into animal husbandry, some go into agronomy, botany. I went into physics and chemistry. So I took a lot of acoustics.

MEMBER BEAUDET: Thank you. Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you very much, Mr. -- Dr. Christie, for coming tonight, and thank you for the patience. I understood you were here yesterday and we didn’t get you on the agenda, and we did get you on today and we -- we appreciate the input you’ve given us, and this Commission will certainly review your comments and the synoptics. So thank you very much and safe trip back to wherever you -- wherever you go.

MR. CHRISTIE: As soon as I leave here I’ll get back to Toronto because my wife just had her knee operated on.

CHAIRPERSON GRAHAM: Oh. Well, we'll wish you the very -- the very best. Thank you very much.

DR. CHRISTIE: Thank you.

CHAIRPERSON GRAHAM: Now we are going to go into some written submissions, which will be read by our call manager, Kelly McGee, and we're going to start with some -- we have them broken down in some various sectors and we'll start with PMD 11-P1 and I think it's 18 we start with. And maybe you'll give the themes as we go along.

--- WRITTEN SUBMISSIONS AND QUESTIONS BY THE PANEL:

MS. McGEE: Thank you, Mr. Chair.

The Joint Review Panel will now move to the consideration of some of the written submissions. I will identify the writer and the PMD number for each submission, and the panel members will have an opportunity to ask questions.

The first group of submission, PMD 11-P1.45 from John Mark Robertson; PMD 11-P1.99 from Walter Robbins; PMD 11-P1.143 from Siegfried Kleinau; PMD 11-P1.152 from Phyllis Creighton; PMD 11-P1.179 from Julia Morgan; and PMD 11-P1.222 from Wanda Ewachow.

CHAIRPERSON GRAHAM: Those have

been given as a group. We'll open the floor to questions from panel members on any specific one or all of them in general.

So we can start with Mr. Pereira, do you have anything on -- and if you want, I can call each one out or just identified the ones you're speaking to.

MEMBER PEREIRA: Thank you. We'll start with PMD P1.45 by Mr. Robertson, the issues he raises are concerns about cost overruns, spills that add a threat to the water supply, and renewable -- the preference to go with renewable energy, and then concerns about handling of long-lived waste.

Now, these are topics that have been addressed in a number of other previous interventions, so for me there's no further comments or questions.

The next PMD is P1.99 by Mr. Robbins. He identifies concerns about cost benefit evaluation of nuclear generation options. A preference to go with green energy choices and his point he makes is that nuclear generation is not truly green because of the carbon dioxide penalty at the mining phase and construction, and he -- he

makes that point anyway. Concern about tritium releases and the intake of tritium through air emissions and also through -- through water supplies.

The full-cycle concerns of cradle to grave and environmental impact considering the mining -- from mining all the way through to waste disposal. And then he makes the point that there's no safe dose. Again, these are issues that have been brought up in previous submissions.

The next one is P1.143 by Mr. Kleinau. He brings up issues about carbon dioxide releases in the full cycle, the nuclear power cycle, carbon dioxide from mining, leaks of contaminants to the lake from the power generation cycle, health effects of radioisotopes releases. He talks about no safe dose as well and tritium in drinking water supplies.

The next one is P1.152 for Ms. Creighton. She talks about nuclear power generation not being sustainable -- truly sustainable; cost overruns. She says it's not a green option. She talks about there being no safe dose; concern about waste; the long-lived waste, tritium releases, tritium in water supplies and

risk of major accidents.

The next one is P179, Ms. Morgan. She talks about the full cycle carbon dioxide releases; has concerns about accidents; has a preference for renewable alternatives; talks about use of smart grids to get more effective distribution of electricity. She talks about conservation as being the lowest cost option for management of power demand. And she talks about nuclear reliability, no accidents.

Now, all of these, as I mentioned are topics that have been addressed in previous submissions. And finally, Ms. Awachow (ph). She talks about nuclear power generation as not being a rational choice. She brings up ethical considerations and brings up other concerns being the cost of transport and the safety issues that arise with transport of nuclear waste and the cost -- overall cost of nuclear generation.

Again, these are issues that have been brought up before. I have no further questions on any of these PMDs. Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira, for outlining the various

interventions and their concerns. Madam Beaudet, do you have questions?

MEMBER BEAUDET: I believe I agree with my colleague's overall review of these submissions. I think with PMD 1.45, we did review a new recommendation from CNSC, recommendation number six and it would cover some of the aspects that this Mr. Robertson was worried about. And also Mrs. Julia Morgan, PMD 1.179 has -- one of her concerns is loss of aquatic habitat. And I believe that we still have certain aspects to look into that, but we will have to do when the DFO is here.

Also the recommendation -- the reviewed recommendation of number -- number six from CNSC with respect to chemicals in the lake; I think address the -- one of the concerns that -- one of the other concerns of Mrs. Morgan. And I have no other points to raise than what I underlined. Thank you.

CHAIRPERSON GRAHAM: Thank you very much, Madam Beaudet. Ms. McGee, would you go through the next batch, please.

MS. McGEE: The next group of written submissions for the panel's consideration, PMD 11-P1.18 from John R. O'Toole. PMD 11-P1.74

from Bev Oda. PMD 11-P1.82 from Joe Dickson; PMD 11-P1.113 from Peter Tabuns; PMD 11-P1.118 from Mark Holland and PMD 11-P1.208 from Wayne Arthurs.

CHAIRPERSON GRAHAM: Madam Beaudet, do you have questions with regard to these -- this round of interventions?

MEMBER BEAUDET: All of these interventions are for the project except the representative of the NDP. The reasoning for the people who are in favour as -- are in support of creation of local, regional and provincial employment. They are also in support of institutions such as the Durham University and Durham College. They only Canadian Nuclear -- you can have -- the only place in Canada where you have the Canadian program for nuclear engineering. They are also in support of Ontario's long-term energy plan.

As for the -- the submission for the NDP, they considered that there's no case made for the need of the project; it's not cost effective and it will cause serious effects to health and future generation since there is no safe solution for waste storage for thousands of years to come. These submissions are mainly opinion

submissions and I have no questions.

CHAIRPERSON GRAHAM: Thank you, Madam Beaudet. Mr. Pereira?

MEMBER PEREIRA: I have no comments or questions further to what Madam Beaudet has raised.

CHAIRPERSON GRAHAM: I also -- I've just gone through and noted all of the support, plus the one that is not. To set the record, one of them refers to refurbishment. It's not refurbishment; it's new build, but other than that I have no other questions so we'll go to the next round and Ms. McGee.

MS. McGEE: Thank you, Mr. Chair. The next group of written submissions for the panel's consideration, PMD 11-P1.115 from AECL. PMD 11-P1.124 from Ajax-Pickering Board of Trade. PMD 11-P1.146 from St. Mary's Cement Inc. and PMD 11-P1.161 from Black and McDonald.

CHAIRPERSON GRAHAM: Mr. Pereira?

MEMBER PEREIRA: Thank you, Mr. Chairman. I've got them in a slightly different order, but I'll survive. With the --

CHAIRPERSON GRAHAM: Mr. Whitby -- the other day, when they were here, they did a --

they did a written one -- not a written, but an oral presentation. I think it was last Saturday so you don't need that one.

MEMBER PEREIRA: Okay. I'll start off with Atomic Energy of Canada Limited, P1.115.

Atomic Energy of Canada support the proposal for the project. They talk about the record as safe and reliable operation of CANDU Technology in Canada and have no issues of concern for the project going forward.

The PMDP1.124 from the Ajax Pickering Board of Trade, they support the project and command Ontario Power Generation as a responsible operator who they feel can take the project forward safely.

They talk about the socioeconomic benefits to the project. That the project will bring to the community and they commend Ontario Power Generation on the consultation they've engaged in in the community.

The next one is St-Mary's Cement, P1.146, they -- they say -- they make a comment saying that nuclear power is sustainable and green. I'm not -- if they were here, I think I would ask them to talk about what they mean by when they say

it’s sustainable because certainly sustainability is a topic that this Panel is -- would like to delve more into to get a good handle on the perspectives of different intervenors on sustainability.

So when St-Mary’s Cement Inc. says that nuclear power sustainable as a neighbour of the neighbouring property, we would like to get the input.

Going on, they have a concern about the impacts in the lake, including the impacts of lake and fill. Impact on a number of aspects in the lake including a group of concerns that may be labelled as coastal processes.

So, I’m not sure, Mr. Chairman, how we could address this since I don’t believe they’re here, but I’ll just, having made that comment, leave it at that.

And I’ll go on to the next one, P1161 from Black & McDonald. They are a company who provide a lot of contract support to Ontario Power Generation at this -- facilities in Durham region. They support the project going forward and they indicate that, in their view, the new reactor project will bring a lot of socioeconomic benefits

to the region.

And other than the issues about St-Mary's Cement, Mr. Chairman, that's all I have.

CHAIRPERSON GRAHAM: Some direction here, Mr. Pereira, do you want us to go with an undertaking to St-Mary's Cement to explain or I'm not sure -- I'm not sure whether we can do undertakings with written ones?

MEMBER PEREIRA: Well, maybe we'll deliberate on that and we'll see --

CHAIRPERSON GRAHAM: We'll deliberate ourselves and go further on that.

MEMBER PEREIRA: Yeah.

CHAIRPERSON GRAHAM: Thank you very much. Madam Beaudet?

MEMBER BEAUDET: I agree with the comments of my colleague and I have no further question on this submissions.

CHAIRPERSON GRAHAM: Thank you very much and we will deliberate and report back on how we'll handle the St-Mary's Cement intervention.

We'll then go to the next round from various organizations and, Ms. McGee, would you take those, please?

MS. McGEE: Thank you, Mr. Chair.

The next group of written submissions for the Panel's consideration, PMD11-P1.78 from the East Toronto Climate Action Group. PMD11-P1.105 from Environment North. PMD11-P1.154 from National Farmers' Union Waterloo Wellington Local. PMD11-P1.160 from Bruce Peninsula Environment Group. And PMD11-P1.177 from Environmental Coaliton of PEI.

CHAIRPERSON GRAHAM: Thank you very much, Ms. McGee. Madam Beaudet, do you have questions on any of these?

MEMBER BEAUDET: For the PMD1.78, East Toronto Climate Action Group, you talk about cumulative impacts make source of energy. And I must say that all the -- these written submissions consider that for different reasons, there is no need for the project or they're against building -- against the new build.

Also, they talk of cost overruns. The responsibility of the taxpayer of *Nuclear Liabilty Act*. Nuclear is not clean energy because it has emissions to where -- in water. They refer also to the problem of nuclear waste. And that the project should be examined with -- in its full cycle of nuclear from cradle to grave.

The PMD1.154, the National Farmers' Union from Waterloo and Wellington Local, has a recommendation about establishing a protocol for routine or accidental releases, and I think we'll have to discuss also how we can get more information from them on this aspect. And that's all for this list of written submission on my part.

CHAIRPERSON GRAHAM: Thank you, Madam Beaudet. Mr. Pereira?

MEMBER PEREIRA: I don't have any further comments or questions on this group of PMDs.

CHAIRPERSON GRAHAM: My question is along the same line as Madam Beaudet's on 154, the National Farmers' Union. And my question would be to OPG.

What would your plans be with regard to establishing such a protocol or having a better -- or not having a better, I shouldn't say that or having a type of -- of information flow to the Farmers' Organization or the Farmers' -- granted this group is Waterloo Wellington, but still even in this area and for the Farmers of Ontario?

MR. SWEETNAM: Albert Sweetnam for

the record. As part of the -- as part of the project, we have an extensive outreach program to all of the stakeholders.

Anybody that's expressed an interest in the project will be part of this outreach program, so we'll receive regular information on the project. How we're going forward. Any public meetings that are being held in terms of getting a response from the communities, they would be invited to these.

CHAIRPERSON GRAHAM: They would be invited, but would you be setting up more special -- I guess what my question should be is farmers and their -- and we've heard presentations over the last while that farmers are concerned about -- in the case of an accident or so on with regard to information flow and so on, not only from the government agencies, but from the owner of the facilities themselves.

And will you have some more or less pipeline or more or less information flow that is not just set up on an ad hoc basis, but as a set up in a way that they will be able to participate on an annual basis introduced?

And I'm thinking of something

along the line of the Pickering Advisory Group or something, but this with regard to the agricultural departments -- agricultural organizations?

MR. SWEETNAM: Albert Sweetnam for the record. That's correct, we would expect to set up something similar to what we have in the -- at Pickering.

CHAIRPERSON GRAHAM: Thank you. We will then go to three -- we'll do three more and these are from educational groups. Ms. McGee?

MS. McGEE: the next three submissions for the Joint Review Panel's consideration, PMD11-P1.85 from Durham College. PMD11-P1.155 from Scientists in School. And PMD11-P1.162 from University Network of Excellence in Nuclear Engineering.

CHAIRPERSON GRAHAM: And I'll go to Mr. Pereira first on these.

MEMBER PEREIRA: Thank you, Mr. Chairman. All of these PMDs talk about Ontario Power Generation's support for education in the nuclear field. And they –- they talk about Ontario Power Generation's safety record with respect to nuclear power and protection of the environment.

And that's about it for the final

one, for the submission from University Network of Excellence in Nuclear Engineering.

If they were here, I would have asked them a question about what they might do on addressing the challenge of waste management, but that opportunity is not before us.

But other than that, I have no questions or comments on these submissions.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira.

Madam Beaudet?

MEMBER BEAUDET: I think these submissions are also very much opinion oriented talking about the safe and good operating record of OPG and how they, as an educational institution, can prepare the upcoming generations.

And I have no questions for them.

CHAIRPERSON GRAHAM: Thank you very much.

That covers some of the written submissions.

We have some more that we'll -- if time permits, we'll deal with this evening after the presenters.

If not, we'll deal with them at

another time when time -- another day when time permits.

We are adjourning for supper or lunch hour, whatever, and we'll be -- the Chair will resume at 7:00.

Thank you very much, and 7:00 we'll resume.

--- Upon recessing at 5:46 p.m.

--- Upon reconvening at 7:00 p.m.

MS. MYLES: Good evening, everyone.

My name is Debra Myles. I'm the panel co-manager.

Welcome back to -- I did say good evening, I hope, not good afternoon. Welcome back to today's second session of the Darlington new nuclear power plant project joint-review panel public hearing.

Panel secretariat staff are available at the back of the room. Please speak to Julie Bouchard if you're scheduled to make a presentation at this session, if you want the permission of the Chair to put a question to a presenter, or if you would like to have the opportunity to make a statement to the panel, and

they’re not previously registered.

Opportunities for questions or to make a brief oral statement are subject to the availability of time.

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

This evening’s agenda will begin with the International Institute of Concern for Public Health. That’s PMD, panel member document, 11-P1.226 and PMD11-P1.226(A).

Mr. Chair?

CHAIRPERSON GRAHAM: Thank you very much, Debra. And good evening, everyone.

Welcome, Ms. Tilman, and the floor is yours.

--- PRESENTATION BY MS. TILMAN AND DR. ALBRIGHT:

MS. TILMAN: Thank you very much, and good evening to everybody here.

And IICPH and Dr. Albright and I appreciate the opportunity to provide this intervention.

And I just want to say when I look around at all the binders that people have, this has certainly been a daunting task for all of us,

and I just wanted to show some of the heavy-weighted equipment that was needed to go through for the public to try to participate.

This has been very daunting for the public as well.

And we're here to present a public perspective on the Darlington proposal.

First of all, IICPH is a Canadian-based non-profit international organization. It was founded in 1984.

One of the founders is Dr. Rosalie Bertell, long known for her work on nuclear issues and in particular on health effects of low-level radiation.

And this is an excellent reference book that I would advise, if it's still in print, by Rosalie Bertell, and it is very educational.

The key principle under which the Institute operates is that a safe environment is a fundamental human right.

As to my personal background in this, I have a background in mathematics and physics and in medical biophysics, which I did at the Princess Margaret Hospital.

Pertinent to this hearing, my

research was into chemotherapy.

And at that time, at that tender age when you're doing this kind of work, I recognized very early that while emphasis was being placed on cures, like chemotherapy that I was working on, we really needed to prevent cancer. We really needed to cease the kind of operations that cause cancer.

Now, when we did this Power Point presentation, it was submitted two days prior to the earthquake in Fukushima and tsunami in Japan and the Fukushima nuclear disaster that followed.

As a result, our presentation, as it stands in the Power Point, will have some modifications to it. It's the same presentation, but we have modified our verbal description of it to a certain degree.

Within 25 years, there's been two major accidents -- I'll just go to our outline, and this isn't in it -- from nuclear power plants involving breach of containment.

The situation in Japan is dire indeed.

I was just over in Japan just prior to the earthquake myself at a unit meeting,

and when I think of what they must going through now, it's very emotional.

It's becoming more dangerous and alarming with each passing day. We don't know the extent of severity of the ultimate effects that radiation may cause on the population in the vicinity of the Fukushima-Daiichi power unit or what that will have on future generations.

We know now that essential food items, like milk and produce, are now contaminated with radioactivity.

And the plume has been detected beyond Japan.

This is a tragedy that must never be repeated, and it strengthens our conviction even further that the risks from nuclear power are not acceptable.

One accident like this is simply one too many.

Ultimately, all accidents are caused by human error, whether it's operational, design, location, et cetera.

Over the course of the hearings, we've heard that -- from OPG that the reactors, including CANDUs, are "even safer than previous

designs."

But they're not infallible. There's no guarantee of absolute safety. Any technology, such as precise and complicated as a nuclear reactor requires, can easily run into serious and unexpected problems.

So our question throughout is, why are we in Ontario pursuing this dangerous way of producing steam to generate electricity which will burden future generations with radioactive waste that lasts forever without their informed consent?

Getting to the proposal and the environmental impact statement by OPG, they're seriously riddled with uncertainties and, in our sense, flawed.

It has not given due consideration to the precautionary principle. It does not promote sustainable development. It does not address the full range of cumulative environmental impacts and the effects on human health and environment that will rise from this project and every stage in a nuclear chain, and it does not assess the full cost of the project.

Nevertheless, EI -- the OPG in its -- in its environmental impact statement has

concluded that the project will not result in any significant environmental effect and no significant adverse effects on health and safety of workers, members of the public, or non-human biota are anticipated.

We find this inconceivable that this conclusion can be drawn.

It is our view that allowing this project to be carried out will do irreversible and totally unnecessary harm to the environment health and wellbeing of millions of people now and in the future that can’t be counted for or speak for themselves.

For these reasons and many others, the panel can best fulfil its responsibility to the public by recommending that this proposal be rejected.

In our oral presentation today, we will highlight the most significant aspects of the power point slides and, as indicated, add material as time permits.

We researched the guiding principles of the EIS, and the two principles that stand out are the precautionary principle, which is quoted right from the guidelines. And the next is

the guiding principles on sustainability.

We ask the panel to consider whether the environmental impact statement provided by OPG has sufficiently or adequately addressed the complete life cycle of the project in a precautionary manner and a manner that promotes sustainability in accordance with these guiding principles.

Now I'd like to turn to the proposal. And I've been scratching my head over this since I first went through this. No specific design has been selected. We've heard that many times throughout this hearing. There's –- with that kind of uncertainty, I find it, from the public perspective, very difficult to know how to pursue in this.

We've also had the issue, what I call the two or four issue that's arisen here. This is very confusing for the public to hear on the radio, CBC for example, two proposed reactors, and I keep saying, but the EIS says up to four. I'm confused, and I wonder how confused the public is on this.

One of the issues that is concerned –- there's a little bit of order change

here –- our models that are used to make predictions on reliability and safety. For a model to be valid as a predictor of performance and safety, models must be complete, accurate, and tested against actual performance.

As none of the proposed ones have –- are in service, the models of them cannot be tested against their performance. Furthermore, to date, no reactor has operated for the projected lifetime. Now, I'm talking that most of the reactors have been maybe 50 years, but very few have lasted for that long.

One of the areas that is of great concern is that three of the reactor designs are proposing various levels of enriched fuel. There's no enrichment facility in Canada, so I'm not sure where that operation would go on. That's a concern.

There's enormous health effects and other issues related to enrichment plants. We know there's only one plant left in United States right now, and that's become contaminated as Superfund site in the States.

The health effects from enrichment alone are quite startling, as well as the

environmental effects, and in our written submission, there's a detailed accounting of this.

One of the puzzling things is, from what I gather, and I can be corrected, the Canadian set of Criticality Safety Standards does not exist, so I just want to point that out there.

This is a slide that has examined the 435 reactors operating. You can –- it speaks for itself, and the mean age is 25 years. So very few are out there.

This speaks to how long do they last? Now, refurbishment is touted as there may be possible refurbishments that will extend the life. I daresay that refurbishments so far have not gone exactly well and have certainly had cost overruns. I'm thinking of Lepreau in particular in Canada. So there's that determination how, and there's been accidents, too, in carrying out refurbishments.

In terms of site preparation, the first stage that is proposed, there's various effects that can occur on –- on health and environment, and they've been gone over and discussed during the hearing.

I wish to say that the emissions from dust containing toxic air pollutants and the

impact on vulnerable populations, acute and chronic, can be quite substantial. This area is part of the Windsor Quebec Corridor area, which is one of the worst air quality areas in Canada.

In this particular area, Whitby has become one of the designated hotspots for bad air. This is not far from any of these areas with the transportation activities that will occur as a result of the construction.

There was a very interesting panel discussion at the hearing on nuclear waste, and I just call it the insurmountable problem with no solution. I'm looking –- I've looked at the inventory to date based on stats that have been provided and what new –- I've also looked at what are the potential for the amounts that are yet to come if these three or four or two reactors are to be built.

I'm asking the panel, in keeping with your role and mandate to carry out environmental assessment of the complete life cycle of the project, IICPH recommends that the panel require the management of used nuclear fuel for as long as it remains hazardous to be included in the assessment.

I want to also read out what isn't on the slide, a statement that IICPH has on nuclear waste, a summary of it. Firstly, there's no safe dose of ionizing radiation. As long as our governments and nuclear industries refuse to recognize this, the health of those living and future generations to come will keep on being harmed.

DNA damage from ionizing radiation is already effecting us now and will affect unborn future generations thereafter. The only real solution for nuclear waste is to stop generating in the first place.

And now I'd like to site a quote, actually from a relative of mine, Carl Sagan. We are saying to our descendants that the wastes we leave them are their burden, their lookout, their danger because we couldn't be bothered to find a safer way to generate electricity.

Now to accidents, unforeseen events, and consequences from technical malfunctions in human error have been and are part of nuclear power. They're not like any other plants. If something goes wrong, it can cause a major disaster and result in irreversible harm to

the health and environment of thousands and millions of people an Chernobyl did, and now Fukushima as well.

One of the issues that isn't dealt with well, in our view, is the out of core criticality with spent fuel. Whenever you have enriched fuel, including the fuel fabricating plants, through transportation, and on site storage facilities, there is potential for improper spacing, high density racks, et cetera, all of which are potential for contributing to out of core criticality events.

We do not accept a statement in the Environmental Impact Statement that "An inadvertent out of core criticality event is considered not credible." I don't consider that statement credible.

And I would now like to turn –- cumulative impacts is simply in this case referring to all the cumulative impacts of the hazardous facilities on site for storing fuel and other radioactive wastes.

I would now like to turn this section over to my colleague –- sorry –- on probabilistic risk assessments.

DR. ALBRIGHT: Yes. For the record, I'm Dr. Gordon Albright. I'm a Professor Emeritus of Mathematics at York University, and my Ph.D. is in physical chemistry.

I just want to add that we believe that out of core criticality is considered not credible because such events have, in fact, occurred.

I felt it would be useful to put on the record a few basic principles of probability and ultimately of a science to help everyone here present to judge claims based on probability and on science.

There are only two scientifically valid ways to determine probabilities; mathematically, based purely on logic, and imperially, based on past experience. The probability of a serious nuclear accident cannot be determined purely by logic because it depends on such things as the probabilities of various kinds of human error, natural disasters, terrorism, et cetera, which cannot be determined by logic alone

In our limited experience there have been at least two accidents in which containment has been breached, Chernobyl and

Fukushima. So the probability of a serious accident is at least one per generation or two in 10,000 reactor years as best we can estimate it with the experience that we have. This is far greater than the estimate of one per million reactor years, the threshold specified by the CNSC for a nuclear accident scenario to be credible for consideration in an environmental assessment. This threshold has no scientific basis and it's certainly not supported by experience today.

This underlines an obvious principle of probability. If you keep on taking chances, it will only be a matter of time before you lose, so you should never risk more than you can afford to lose. The nuclear industry is clearly operating in violation of this principle and has already lost more than anyone can afford to lose at Chernobyl and probably at Fukushima as well.

The same principle applies to nuclear waste. Even the tiniest chance of escape, if we have to keep taking it for millions of years, makes it absolutely certain that it will escape with deadly consequences for the human race. This creates a moral imperative not to generate nuclear

waste in the first place.

Another basic principle of probability is that its predictions are only reliable when applied to a large number of cases. It can never guarantee the safety of a single nuclear reactor over a limited time span, but it does guarantee that over a million years, nuclear waste will escape containment if there is even the tiniest chance that it can do so. Much nuclear waste already has.

Finally, there's a very simple way for anyone to scientifically determine that a claim is false. It’s enough to show that it’s contrary to either logic or experience, which are the twin pillars of science. For example, consider the claim that nuclear power is safe. There is no way to make a nuclear disaster logically impossible. In fact, we've already experienced at least two of them, so both logic and experience show that nuclear power is not safe.

Scientific truth is determined solely by logic and experience, not by authorities or by majority vote even among scientists.

I’d now like to pass the floor back to my colleague, Anna Tilman, to discuss

Chernobyl.

MS. TILMAN: Two nights before -- sorry. Two nights before the situation in Japan, I was looking at the movie, “Battle of Chernobyl,” and came up with the animated explosion. And people have already referred to the consequences of Chernobyl.

It is the worst nuclear disaster in history, we know. Over 800,000 people were brought in for the cleanup immediately after the explosion. But in response to experts who kept concluding the adverse consequences of health were not as -- as significant as previously thought, the former U.N. secretary general, Kofi Annan, voiced another opinion. I quote:

> “Chernobyl is the word we would all like to erase from our memory. But more than seven million of our fellow human beings do not have the luxury of forgetting. They are still suffering every day as a result of what happened. The exact number of victims can never be known, but three

million children demanding treatment until 2016 and earlier represents the number of those who can be seriously ill. Their future will be deformed by it, as well as their childhood. Many will die prematurely."

Quick interjection. When I was teaching mathematics and engineering, I had a group of students who were fascinated with the mathematics beyond belief, which is always rewarding. I asked them where were they from. They said, "We're from Chernobyl." I hope my face didn't react. They were young men at the time and I often wondered, "Where are they now?"

We don't know the full effect of Fukushima and it'll take quite a while for that to unfold. We can only hope that its effects will not extend to those of the degree of Chernobyl. We don't know.

Change of topic into cumulative effects, which is a requirement of the environmental assessment. A cumulative effects approach assesses the full range of human-generated

aggregate stresses that are additive, interactive, synergistic, from multiple sources, spatial and temporal on the ecosystem over time from what is commonly referred to as cradle to grave, which is a very interesting grave in this case, and well beyond. It must also include accidents, et cetera, and all aspects of the nuclear chain.

For a project of this dimension, all effects on the ecosystem are accumulative and last for a very long time. However, the EIS was very limiting in its consideration of cumulative effects and we find that a challenge when we -- when it doesn't look at the effects from the whole chain, from obtaining the nuclear fuel all the way through to the final disposal, abandonment, and so on. Thus, the cumulative effects as carried out under the environmental assessment statement does not consider the complete life cycle.

Given the degree of certainty and various aspects of this project, it is critical that the approach to assess cumulative effects be broadened to the fullest extent in accordance with the charge to the panel.

The next issue I want to talk about is the public health and safety. Ionizing

radiation is an initiator and promoter of cancer. Radiation damage can affect any part of the cell and can interfere with many cellular processes. It's like a madman lose in a library. It causes damage to the genetic material, the very seed of our lives, which can lead to cancer, non-cancerous tumours, birth defects, hereditary illness, reduced fertility and immune disease -- system diseases. Extranuclear and extracellular effects can also contribute to final biological consequences of exposure to low dose radiation.

From a health perspective, the maximum safe dose of any ionization radiation is zero. Any other value that's been set for a safe dose is based on a degree of risk and that degree of risk is a degree that is a trade-off to be tolerated in order for an industry to exist. The limits do not make allowance for cumulative effects of doses that occur over years or generations and ignore the most vulnerable.

I'm sure you've heard of the Tritium, the carcinogen, mutagen, taratogen and developmental toxin which is easily absorbed into the body primarily through inhalation, as well as ingestion and dermal absorption. All nuclear

reactors routinely release Tritium.

In addition to Tritium, fissioning leads to releases of deadly caesium-137, strontium-90, iodine-131, 129. Caesium-137 accumulates in muscle, strontium-90 in the bone, iodines -- the two iodines I've mentioned cause thyroid cancer. Children are particularly susceptible.

In conclusion of this section, a single radionuclide can cause a lethal cancer and damage to DNA that may be carried out to future generations. There is no way -- safe dose of any radionuclide and this is confirmed by the unit that’s used the measurement of sievert, which estimates the probability that a given exposure will result in a fatal cancer, which acknowledges that human casualties are an inevitable result of releasing radionuclides.

There are no levels of casualties that are acceptable or reasonable to a population that has not chosen to accept them by giving the informed consent that scientific ethics require, nor is even a single casualty acceptable to the unfortunate individual and family that suffer from it.

Energy and climate change, I'll

say briefly, it’s not the answer to climate change because, as you see from the slide, every stage that’s involved in the nuclear cycle is never presented as part of the total picture. And there are going to be effects of climate change in time. We can't just look at it now, but we’re seeing that there are effect.

The money, right? Any nuclear reactor is a very expensive proposition requiring government subsidies, insurance guarantees, cost overruns, long lead times coupled with uncertainties as to completion dates are endemic to the industry. Many billions are needed. We don’t even know how much for decommissioning and legacy waits. The true financial cost has been hidden by extensive government subsidies, unrealistic low limits on the facilities, liability for accidents, and leaving the cost of definite waste storage and decommissioning out of pricing structures.

Discussions have been held on why are we not considering alternates. We would contend that the proposed project impedes the development of renewable alternatives. I just want to address one point here, and that is that ten plants are to be refurbished in a period of time,

ten nuclear plants. As each plant is being refurbished I strongly recommend that OPG takes the time, and the Government of Ontario to take the time to look at alternatives, clean, renewable energy with -- in stages, because you're only going to be able to refurbish them in stages. And this will allow you to close these facilities down one by one.

For the conclusion I'll turn to Dr. Gordon Albright.

DR. ALBRIGHT: Dr. Gordon Albright, for the record. We are running very short of time, so I am going to cut short our conclusions, but there are a couple of very important points that I want to make right at the start.

If OPG really believed that its proposed nuclear plants were safe, it would be willing to back this claim by accepting liability for the full cost of any accident that might happen there. Instead it is wisely refusing to risk more than it can afford to lose. So if this project goes forward it is the people of Ontario and Canada who will have to risk more than they can afford to lose. In all conscience and fairness, we don't see

how the panel can recommend that they be forced to do this. Why should the public have to take a risk that OPG is not prepared to take.

Chernobyl has clearly shown us how serious nuclear accidents can be, and what a terrible price people have to pay for them. And it could have been far worse. Only heroic human sacrifice prevented a second explosion that could have wiped out half of Europe. If that had happened we would not be discussing the construction of new nuclear plants today. Do we really have to wait for a disaster of that magnitude before we finally abandon nuclear power.

The threats from nuclear waste, we have discussed at length. Suffice it to say that future generations will have to pay an enormous price for our having generated nuclear waste, and they will get no corresponding benefit. And if all the purely monetary costs of nuclear power fully taken into account, it’s very clear that the cost of nuclear power is absolutely prohibitive. At Chernobyl and Fukushima alone it’s already cost us more than it’s worth.

And finally, I would just like to introduce a broader historical perspective on this.

The question is, why, under these circumstances, are we even considering the possibility of nuclear energy? And the answer, of course, is because we're so desperate for energy. The great historian, Arnold Toynbee has said, that a civilization enters decline and fall when it starts to resort to temporary expedience to meet its challenges instead of lasting solutions.

As Mr. Pereira pointed out this afternoon, this panel's most important mandate is to ensure an adequate energy supply for Ontario. I would just urge you to ensure for the sake of preserving our civilization, that it pursue -- they not embark on temporary expedience that become more and more dangerous and destructive, but instead look for lasting solutions. This is ultimately the only way to serve the lasting well-being of the people of Ontario. Thank you very much.

CHAIRPERSON GRAHAM: Well, thank you very much, Ms. Tilman and Mr. Albright. We start the questioning from panel members. Mr. Pereira.

--- QUESTIONS BY THE PANEL:

MEMBER PEREIRA: Thank you, Mr. Chairman. I'd like to start off by commenting on

the statement alleged -- that I am alleged to have made. I did not -- I don't believe I said that this panel's responsibility is to ensure an adequate supply energy for Ontario. This panel's mandate is to carry out an environmental assessment of the option proposed by the -- by Ontario Power Generation based on decisions made by the Ontario Ministry of Energy for an energy option. We are not making any choice, and we are not here to ensure an adequate supply of energy for Ontario. So I don't believe I said that, but anyway, let the record show what I believe I said.

So I'll go on, then, to a series of questions. And I'll start off with addressing the question of criticalities safety. And two things, 1) the out-of-core criticality, the concern over if we did go with a reactor that required enriched fuel, how would we assure safety with respect to out-of-core criticality. And related to that is a question about the fact that how we would do it given the context that there appear to be to be no criticality safety standards in Canada.

I go to the CNSC to comment on how that would be -- how those two aspects would be addressed, out-of-core criticality and the fact --

and the observation that we do not have criticality safety standards.

CHAIRPERSON GRAHAM: Mr. Howden?

MR. HOWDEN: Thank you. Barclay Howden speaking for the record.

From the standpoint of criticality standards, when the EIS was issued at that time we were using an ANSI standard, which is American National Standards Institute. But since that time the CNSC has issued its own criticality standard called RD327 Nuclear Criticality Safety. And an accompanying guidance document called GD327, Guidance for Nuclear Criticality Safety. So that -- those were issued in December and those are new that have been put out.

From the standpoint of preventing criticality, basically our regulatory requirements have been that the proponent demonstrates that criticality cannot occur or demonstrate that they can build a facility that should criticality occur out of the reactor, that it can withstand the event. So there's very specific nuclear safety requirements that they have to follow within the design and the handling of any enriched fuel.

From the standpoint of experience,

even though the nuclear power plants don't use enriched fuel, enriched uranium has been used in Canada. It's used up at the Chalk River site because NRU reactor is fuelled with low enriched uranium. So there is quite a bit of significant experience with enriched fuel within Canada, and we would apply the experience that we have from a regulatory standpoint with that facility to any proposal that a proponent would make should they choose a technology that uses enriched uranium.

MEMBER PEREIRA: Thank you. My second question concerns the use of the probabilistic approach for probabilistic risk analysis for assessing the consequences of severe accidents in the reactors being considered for this proposed project. And again, I go back to the CNSC because I believe the assessment done is based on CNSC standard RD337, so I pose that question to CNSC to explain the rationale for using the probabilistic approach the way it is done in that standard.

MR. HOWDEN: Barclay Howden speaking. I'll just provide an introduction, and then Dr. Dave Newland will respond to that. RD337 speaks about safety goals, but if we -- I think Dr.

Newland will also talk about RD310, which is safety analysis requirements, which will probably speak more to the question that you're posing. So I'll ask Dr. Newland to reply.

DR. NEWLAND: Dave Newland for the record. Yes, maybe I'll broaden the discussion out very slightly to talk about how we -- our regulatory expectations for doing safety analysis, and safety analysis can be broken down into two broad areas; accident analysis, analyses of accidents that we expect to occur so-called within the design basis, design basis accidents. And then those kinds of analyses that we do for the rarer types of events, severe accidents, which are known as probabilistic safety assessments.

So in terms of our overall guidance, there is guidance within RD337. And under that we have two other documents, RD310 for accident analysis. This sets out the requirements and S294 which sets out the requirements for doing probably safety assessments.

So in broad terms, the safety cases is based on the use of both of those. And what I would say is that in both cases, they use analytical models based on theory. Based on

empirical observations, based on data that comes from either a plant. For example, reliability data or data from specifically in controlled experiments to understand specific phenomena in order to build up an understanding of how an accident will evolve either in terms of phenomena or in terms of the probability.

And so turning specifically to the PSAs, they are mathematically based. It's a combination of understanding how you put together those probabilities to get to a -- an overall probability of a core damage frequency.

It is based both on a mathematical construction and empirical data that is based on looking at data of failures of systems and components and structures.

And I guess my final point there is, these methods, I generally believe that they are -- they're complete. They're peer reviewed. They're reviewed by us, but they're not perfect and we always take the opportunity to learn from events when they occur and we see things that perhaps we didn't anticipate exactly as we intended, so we do learn from experience and fold that in as we move forward.

MEMBER PEREIRA: Can I just follow up with you on how does this approach that you describe compare with approaches adopted in other countries, say like the United States, France, Finland?

MR. NEWLAND: Dave Newland for the record. We are a member of an international working group that looks at the application of PSAs and safety goals. We contribute to the working groups in the International Atomic Energy Agency. I think that's about it.

MEMBER PEREIRA: I would like to follow up on the same topic, the same question and go to Ontario Power Generation to talk about how this approach was applied for accident analysis, conclusions that are presented in the Environmental Impact Statement for the new reactor project?

CHAIRPERSON GRAHAM: Mr. Sweetnam?

MR. SWEETNAM: Albert Sweetnam for the record. I'll ask Dr. Jack Vecchiarelli to address this question.

DR. VECCHIARELLI: Jack Vecchiarelli for the record. In the accidents and malfunctions, technical support document, we summarized from the available vendor safety

analysis information, the core damage frequencies, large release frequencies, results from probalistic risk assessments that were conducted for licencing submissions in regulatory regimes, which are very mature. And basically we were able to infer based on those independent studies that they would meet the RD337 safety goals.

MEMBER PEREIRA: When you refer to accident analysis that were done for other regulatory regimes, what particular regulatory regimes were you referring to?

DR. VECCHIARELLI: Jack Vecchiarelli for the record. For example, in the case of the AP1000 and in the EPR, submissions to the U.S. NRC for design certification applications, as well as for the U.K.

MEMBER PEREIRA: Thank you very much. I'll go on to get some clarification on some -- a comment you made about, "No safe level of exposure -- there is no safe level of exposure of ionizing radiation." Does this apply to background radiation as well?

MS. TILMAN: There is two aspects to background radiation as you may be aware. The natural background radiation and what is sometimes

called background radiation that incorporates industrial activity over time.

I would say that when you start looking at it at an elevated level, we don't know if there are -- it is very difficult to say we can attribute the rise in cancer exactly to that because that kind of radiation is very difficult to determine, very difficult to determine the victims.

But, yes, one could look at the fact that we have increased over natural background, over time, over industrialization the levels of ionizing radiation to which we're exposed, so the potential exists that more cancers have been created for that. Again, that's another probability argument, right?

The degree? No, we don't know. Cause and effect is hard, so therefore all you need in some cases for some of these particles is one atom to enter into your lung to cause cancer. Okay, one lung -- alpha particle is all you really need, so when you start looking at it that way, therefore there is no safe dose.

MEMBER PEREIRA: The reason I ask is because I'm trying to understand the nature of the issue here because in Canada, and I may not be

quite right on this, the background radiation levels are between two and three millisieverts depending on where you live in the country, but if you go to some other countries, you'll find background radiation levels of ten millisieverts, 15 millisieverts.

And I may be wrong, I'll -- you may have more information on this, but I'm trying to look at whether people in those countries where there is higher levels, a significantly -- at greater risk in whether they should be leaving those -- where they live and go someplace else.

MS. TILMAN: In terms of the sievert, the sieverts are a complicated unit to express dose level and I think it's one that we always have trouble wrapping our heads around, but it's a probabilistic risk model, as well, which assigns a Q factor, which depending on whether it's an alpha-neutron and so on.

So it's a level to say, okay, where do we set those kind of levels? What risks are we willing to tolerate? What risks are acceptable? So it is a trade-off.

If -- it's hard for me to say from countries that there may be more, what is that

extra dose do to -- is it fallout? Is it extra -- you know, is it the cosmic radiation and so on? It's hard for me to say what may be there.

It's hard to say on an individual basis whether one will get cancer or will not. There is your probability too and there is your genetic makeup. There is -- it's so complicated and so I can't answer that with any kind of certainty to be honest with you.

I just fear that we know that there is enough out there. I mean, there's -- it just takes that little bit. There is now an effect that's being looked at called the bystander effect where near -- it's not just the nucleus of a cell that will be affected, but other parts can be affected.

You just need to do a little scrambling of that DNA. And you don't know at what point, at what generation that effect will manifest itself, if it does, because the DNA has lots of elements that -- you know, that are not active, others are. You don't know. And that's why we can't risk increasing the level.

The other problem too is, it's mystifying. Radiological compounds are not subject

to the same safety levels even for workers that are -- that are set for other non-radiological, toxicalic exposures. Why is that? And I would like an answer to that?

DR. ALBRIGHT: I would also like to comment, if I may, one problem with the way that radiological doses are assessed typically is that they're based entirely on external radiation.

When a radionuclide becomes really deadly, as Ms. Tilman indicated, is when it enters the body. Then a single atom can have a lethal effect and this is the basis for our contention, that there is, in fact, no safe dose when you take internalization of radionuclides into account. An alpha emission outside the body is generally harmless, but inside the body it can be lethal.

So I think it's very important to have standards that take into account radionuclides that enter the body and not just radionuclides that give off radiation outside the body. When you look at it from this point of view, that a single atom can have a lethal effect, and as you know, in a kilogram of nuclear waste there's an absolutely astronomical number of atoms, six times ten to the 23rd I'm sure you're familiar. It's Avogadro's

number. That's how many atoms you have in, say, in a quarter of a kilogram of plutonium. That's an awful lot of potential lethal doses if that plutonium is -- enters a human body.

This is why we feel that releasing radionuclides into the environment is absolutely certain to cause human casualties both in terms of health and in terms of lives even if -- and not only that, in the case of plutonium, these casualties occur for millions of years and will add up to an enormous number.

This is -- this is regardless of the fact that the particular victims can't be identified and can't be counted and can't necessarily even be measured statistically. But nevertheless they're there and they're there in very, very, very large numbers over the millions of years that this radioactive material remains dangerous.

So I think that needs to be very clearly taken into account and it can't be by radiation standards that only look at external radiation and its effect on the human body.

MEMBER PEREIRA: Thank you. Well, this helps me understand better, this very

categorical statement, no save level of -- there's no safe level of exposure to ionizing radiation is somewhat qualified by different -- consideration of a different aspect. But this is a very categorical statement. Thank you.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira. Madam Beaudet?

MEMBER BEAUDET: Thank you, Mr. Chairman. I would like to look at the topic -- one of the topics you have raised which is cumulative effects. And your proposal is to include all activities from cradle to grave and also not to confine the study area, I presume to Darlington, but to include also where mining is done, et cetera.

In Canada the -- CEAA has a very definite definition of cumulative effects and it's not necessarily what you're talking about here on page 15. You would have cumulative effects if you have different projects at different times, but in the same region. Like, for instance, we could look at the cumulative effect on Round Whitefish with Pickering existing and Darlington and new Darlington, but most probably in your domain there is -- it's not called additive, but cumulative dose

and I presume in the health science you would use cumulative effect, but in a different way than we use it for in environmental assessment.

However, after saying that, I'd like to go to CNSC and in their PMD 1.3, on page 122, because they do refer here what you could qualify as addictive effect. They do refer here also -- it starts on page 119, as cumulative radiation dose, but here I think we refer to the cumulative in a different context as if you were doing environmental assessment of cumulative effects on the terrestrial environment or the aquatic environment.

And on page 122, the last paragraph you say that the staff found that the proponent did not demonstrate adherence to the equivalent dose limits for members of the public, although the effective dose limits for members of the public were not specifically mentioned in the EIS, OPG has indicated that they intend to meet all regulatory requirements.

From all the presentations that we have received in the last few days about cumulative health effects in brackets, I'd like CNSC to explain to me, because there's no recommendation

for this section, where the panel now is supposed to go. Still the ALARA principle; what would apply here; what do you recommend?

CHAIRPERSON GRAHAM: Dr. Thompson will you address Madam Beaudet's question and clarification, please.

DR. THOMPSON: Patsy Thompson for the record. The -- in the EIS, the doses for members of the public, which is the -- the topic of page 122, were assessed taking into consideration all radionuclides and all exposure pathways and a dose was calculated which -- the highest dose to a one-year old living on a dairy farm was the highest dose calculated for members of the public. And if I remember well, it's about five microsieverts.

And the statement is to the effect that although the public dose limit wasn't specified as such, the fact that doses are very low for the CNSC means that the intent of the regulations will be met and that dose is -- will be kept ALARA because they're predicted very, very much below the public dose limit.

MEMBER BEAUDET: Thank you. I would like some comments from you first on how you see cumulative effect assessment is -- has to

progress? I think we all agree in terms of studying environmental effects, but -- so I'd like to hear your comments about that because you do propose something here different. And then also I would like you to, if you have some comments from the answer of CNSC, please?

MS. TILMAN: First of all, I was quite astonished, let's say, if I were to look at it from a public perspective with no knowledge of environmental assessment which can be the case, I was quite surprised to look at the shortcomings in there because I've been working on a lot of chemicals other than this, and a lot of situations where we think of cumulative; we keep stressing the need more and more to go into the cumulative effects and to look at all aspects from, as we say in this case, cradle to grave. I mean, in time too and in space, and Dr. Robert Gibson, from the University of Waterloo has done quite a bit of work on environmental assessment and the need to improve the cumulative assessment impact aspects of EAs including -- including Mr. Dunker and Greenwich which are also experts in this area. I'm not, but I know that intuitively when we talk about cumulative impacts we are looking at the whole

range. If we omit that range and limit it to just one aspect, that's not cumulative. Cumulative is over time; it's not just an additive. It's synergistic and so and it's what aspect are you bringing in? What is involved in bringing a nuclear power plant or even preparing the site, in order to build a plant? I mean, you have to have a rationale for that. What's involved in that whole process and what's involved what's that process goes to completion? What's involved after? That's cumulative. And we certainly recommend that the panel take the widest approach to the cumulative impacts and if there's deficiencies in the EA, which there might very well be in this aspect, that needs to be looked at. But for the panel we recommend that you look at the widest aspect possible.

I don't know if that answers your questions, Madam Beaudet.

MEMBER BEAUDET: No. I think it does.

But I think we would have to change the guidelines.

MS. TILMAN: It can be done.

MEMBER BEAUDET: Thank you.

Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you, Madam Beaudet.

I just have one question.

And I know it's gone through -- we've gone through this before, but I think it's on page 6 of your presentation with regard to -- no, page 9, I should say, with regard to the PPE and regarding what design is chosen.

And what I -- I guess what I ask OPG is, regardless of the design chosen, is -- will the site accommodate if the NWMO is not decided or if the -- barring nothing else being decided about storage of waste, will the site -- and I've asked you this, but for the benefit of the presenter tonight, will the site accommodate for the life -- for the 60 years and on all of the waste that will be produced by any of the four reactors that -- and of the four designs that may be chosen, can it all be stored onsite for the entire life of the site and in perpetuity?

MR. SWEETNAM: Albert Sweetnam for the record.

We confirm that irregardless of the design chosen, if any of the four designs are

chosen, the site will accommodate all of the fuel waste at the site for the full 60 years of the life cycle.

CHAIRPERSON GRAHAM: And if there was another design, it would still have to fit within this parameter; is that correct?

MR. SWEETNAM: Albert Sweetnam for the record.

If there was another design, it would have to fit within the PPE approach, which includes the fact that all of the waste has to be able to be stored on the site for the duration of its life.

CHAIRPERSON GRAHAM: Thank you.

Okay. That is the presentation -- no, that’s the question.

Mr. Pereira, do you have anything else?

Madam Beaudet?

If that is the case then, we will go to the procedure that we’ve followed.

OPG, do you have any questions to the intervenor tonight?

MR. SWEETNAM: Albert Sweetnam for the record.

No questions.

CHAIRPERSON GRAHAM: CNSC, do you have any questions or comments?

DR. THOMPSON: Patsy Thompson for the record.

No comments and no questions. Thank you.

CHAIRPERSON GRAHAM: Thank you.

Government participants?

And I don’t think there’s any. There weren’t any this afternoon.

So then we will go to intervenors, and do we have any intervenors?

If we don’t -- you don’t have any?

Yes. I guess, Mr. Kalevar, good evening. One question and -- a question, please.

--- QUESTIONS BY THE INTERVENORS:

MR. KALEVAR: With all due respect, sir, Mr. Chairman, through you, could I bring to your attention some news item that has come to my attention?

CHAIRPERSON GRAHAM: Bring a news item?

MR. KALEVAR: Yes.

CHAIRPERSON GRAHAM: Well --

MR. KALEVAR: I think --

CHAIRPERSON GRAHAM: -- I think maybe --

MR. KALEVAR: In Japan -- it's about what is happening in Japan.

CHAIRPERSON GRAHAM: Would you put your question, please?

MR. KALEVAR: Yes, okay. The president of TEPCO, he has been hospitalized because of fatigue and high blood pressure. And the Chairman has taken over, and he has ordered the four plants at Daiichi decommissioned as of now.

And the residents within 20 kilometres will not be able to return for several weeks.

Now, they have also ordered that regular emergency drills will take place in that area.

My question now is, has OPG ever conducted any emergency drill around Pickering, Darlington, or Bruce covering 10 or 20 kilometres?

CHAIRPERSON GRAHAM: I believe we've had that question answered on several occasions, sir, so I will refrain from taking it at this time because I -- it has been -- there have

been talks of emergency preparedness. We went through this on numerous occasions and so on, so --

MR. KALEVAR: We are actually talking of drill in which citizens leave their homes and get out in some time frame work. I don't think I have heard of anything like that happening.

Paperwork is not legwork. We are talking of legwork of citizens.

CHAIRPERSON GRAHAM: Mr. Kalevar, that was answered the other day. Scenarios were worked out. Physically, it was told, there wasn't. You knew that. That was here the other day. And those scenarios -- so I'm going to say that's all the question I'm taking for you tonight. Thank you very -- on this subject.

Thank you.

UNKNOWN SPEAKER: Mr. Chair?

CHAIRPERSON GRAHAM: Now, I will go to Ms. Tilman for final comment before we go to another presenter.

DR. ALBRIGHT: Thank you very much.

It's Dr. Gordon Albright for the record.

I just wanted to respond very

briefly to the comments from CNSC on probability.

Just reiterating what we said in our presentation that, first of all, a mathematical model to be valid has to be complete and accurate.

Ideally, it should also be tested against actual experience.

As the intervenor from CNSC acknowledged, nuclear accident is something that can have very complex causes. It's impossible to construct any model that would take them all into account, let alone determine the probabilities of all of them sufficiently, accurately to give a reliable prediction.

And even if it could provide an accurate probability, as I said in my presentation, probabilities only apply reliably to large numbers of cases and not to a single nuclear reactor over a limited period of time.

If this were not so, then nobody would ever win Lotto 6/49 because the odds against it are one in 14 million.

And the -- the fact that people do win Lotto 6/49 shows that in any individual case, anything can happen even if the probability is extremely low.

The probability of one in 14 million is what enables the lottery to continue to function because it guarantees that over a very, very large number of cases, the lottery is not going to lose money.

So I just want to make it clear that probabilistic considerations cannot, in any way, guarantee the safety of a nuclear plant.

CHAIRPERSON GRAHAM: Thank you very much for your observation.

We have a bit of -- we have a bit of communications problems, a delay in our messages coming up.

And there was one other presenter -- one other intervenor that wanted to put a question.

Kathleen Cooper of CELA, I apologize because we didn’t get that message, but please provide your question.

MS. COOPER: Thanks very much.

For the record, Kathleen Cooper, Canadian Environmental Law Association.

It was because I was -- something you said right at the very end, but your question -- that’s why it took me so long -- or it was --

didn’t get over there to ask the question.

You asked, Mr. Chairman, about storage of nuclear waste onsite for the 60-year lifespan of the reactor -- the four proposed reactors.

You also said, can it -- you said, can it be stored onsite and in perpetuity?

The answer was about the 60 years.

I would be very interested to know what the answer would be to the second half of your question, in perpetuity.

CHAIRPERSON GRAHAM: Mr. Sweetnam?

MR. SWEETNAM: Albert Sweetnam for the record.

As we indicated, I think it was, yesterday evening, we would carefully go through an ageing management cycle with regards to the waste that was stored onsite, and we would ensure that if any of the containers, the dry cask, that store the waste deteriorated in any way, they would be unloaded and reloaded into new dry casks. And this would continue on in perpetuity.

CHAIRPERSON GRAHAM: Thank you.

And with that, Ms. Tilman, and, Dr. Albright, thank you very much for coming

tonight.

Thank you for your presentation. We will now move into the second presenter of the evening or intervenor of the evening, who is Angela Bischoff, and it's under PMD 11-P1.120.

MS. BISCHOFF: I can just step in?

CHAIRPERSON GRAHAM: Good evening.

MS. BISCHOFF: Thank you.

CHAIRPERSON GRAHAM: The floor is yours.

--- PRESENTATION BY MS. BISCHOFF:

MS. BISCHOFF: Good evening, and thank you to all the panel and participants in the audience, and to our online viewers. Thank you for hearing my presentation today.

My name is Angela Bischoff, I work with the Ontario Clean Air Alliance. We are a coalition of health and environmental organizations; save the communities, municipalities, utilities, unions, corporations and individuals working for cleaner air through a coal phase-out and a shift to a renewable energy future.

I organized an event last night at a club in downtown Toronto called Nuclear in the Spotlight. One hundred people came out to learn

what's happening now in Fukushima, to share our fears, and quite literally to celebrate the end of the nuclear age.

We learned about how the industry and governments lied to us following the Chernobyl catastrophe, and how they're downplaying the risks associated with Fukushima. We learned about the contamination of the Pacific Ocean bordering Japan, and how there is no safe dosage of radiation, meaning that supposedly diluting toxic radioactive elements in the ocean or in the atmosphere is of no consolation. And we learned that private investors worldwide are pulling their investments out of nuclear projects. And governments around the world are now questioning their continued massive subsidization of new nuclear projects.

Meanwhile, here in Ontario, our government continues in its dogged commitment for 50 percent nuclear, which of course means that green technologies will be relegated to the sidelines, capped. There will be little place on the grid for renewables to grow. This would explain why there's been no public assessment of alternatives to the proposed Darlington new build project. Politics is trumping precaution and

economics.

Usually an environmental assessments, need and alternatives are included in the process, but not here. I find this unacceptable. With that I'm going to proceed to speak to issues of cost and alternatives. I will assert that this project is not about providing Ontarians with cost effective, clean, electricity supply, but rather it's a desperate attempt to save Canada's nuclear industry.

First to project costs. In the '60s through the '90s, Ontario Hydro's profits from its water and fossil power generating stations subsidized the losses of its nuclear reactors. In fact, the cost of producing nuclear electricity was seven times that of producing water power. In '99, as a result of the cost overruns and poor performance of its nuclear reactors, Ontario Hydro was broken up into five companies. All of its generation assets were transferred to OPG. However, in order to keep OPG solvent, $19.4 billion of Ontario Hydro's debt or unfunded liabilities associated with electricity generation facilities, was transferred to Ontario Electricity Financial Corporation and Agency of the Government

of Ontario, as stranded debt or unfunded liability.

Since ’99, Ontario consumers and taxpayers have paid almost 20 billion to service that debt of 19.4 billion, yet we still owe 15 billion. So this is not proven a good financial investment.

OPG is now proposing to rebuild reactors at its Darlington Nuclear Station. According to OPG the Darlington rebuild will have a capital cost of 8.5 to $14 billion, but every nuclear -- every nuclear project in Ontario’s history has gone over budget. On average the real costs of Ontario’s nuclear projects have been 2.5 times greater than the original cost estimates. Therefore if history repeats itself, the real cost of the Darlington rebuild will be 21 to $35 billion, or 19 to 37 cents per kilowatt hour.

Furthermore, and the reason of these hearings, of course, the cost of the proposed new build projects at Darlington came in at 26 billion for two reactors. Now we’re looking at potentially four. This gave the energy minister sticker shock, and the procurement process was postponed.

The provincial government then

passed the buck to the federal government, asking them for subsidies. In other words, Premier McGuinty is asking taxpayers in Vancouver and Halifax to subsidize new nuclear reactors in Ontario. To their credit, the Harper government hasn't budged on this request. Indeed they've taken it a step further and put AECL up for sale, of which there are no bidders. The future of AECL is at stake with this new build project. And that's why I say politics is trumping precaution.

So I'd like to look at alternatives now. Fortunately there are numerous less costly, less risky, and more sustainable ways to meet our electricity needs. By reducing our demand for grid supplied electricity, energy efficiency investments will make it easier for us to obtain 100 percent of our grid supplied electricity from renewable sources.

Since the summer of '06, our peak demand for electricity has fallen by 7 percent, and is forecast to fall by a further 6 percent in 2011. Nevertheless, our electricity consumption per person is 35 percent higher than New York State's, and therefore we still have a huge untapped energy efficiency potential, which we must aggressively

pursue. At a cost of 2.3 to 4.6 cents per kilowatt hour, energy conservation and efficiency are a bargain.

On the supply side, the lowest cost option to meet our electricity needs is to simply stop wasting natural gas. Virtually every home, building and factory in Ontario uses natural gas to provide just one service, namely heat. It is much more efficient to use these same molecules of natural gas to simultaneously produce two services, heat and electricity. This is what combined heat and power plants do.

Combined heat and power plants can have an overall energy efficiency of 80 to 90 percent as compared to 33 percent for a nuclear reactor, and as a result of their very high efficiency, combined heat and power plants can meet our electricity needs at a cost of approximately 6 cents per kilowatt hour. That is less than a third the cost of a new or rebuilt nuclear reactor.

In terms of renewable electricity, Ontario's lowest cost source of renewable electricity is water imports from the province of Quebec. Last year Hydro Quebec's exports to the US exceeded the total output of our Pickering Nuclear

Generating Station, however our inputs from Quebec were miniscule. And this just doesn't make sense.

Now, there's two important facts to note with respect to Hydro Quebec's electricity exports. First, in 2009, the average price of Quebec's export sales was 6.5 percent -- or sorry, 6.5 cents per kilowatt hour. Second, according to the *National Energy Board Act* Ontario has the right to import electricity from Quebec at the same price that the Americans are now paying, therefore it doesn't make sense to invest tens of billions of dollars in nuclear power, when we can import renewable electricity from Quebec at less than one-third the cost.

I'd like to draw your attention to a report that I circulated previously to you all. It's called Powerful Options: A Review of Ontario's Options for Replacing Aging Nuclear Plants. And it is a report that our organization, the Ontario Clean Air Alliance, produced. It's from 2009.

So what we -- what we came up with here is -- so what we're discussing is that over the next 12 years Ontario needs to replace 60 billion kilowatt hours of electricity produced by

nuclear generators that will reach the end of their productive lives in the next decade. So we need to replace that electricity by 2021.

So we analysed how we could replace that 60 billion kilowatts of hour. What we came up with is that by reducing or decreasing our electricity demand through conservation and efficiency efforts, we could eliminate the need to replace 47 percent of that nuclear power generation that will have reached the end of its service life by 2021. So we could achieve half of that generation just through conservation.

Then we're proposing wind power integrated with Hydro Quebec's water power, so that would produce a base load power. So wind power integrated with Hydro Quebec's hydroelectricity generate –- hydroelectric generation resources has the potential to provide Ontario with sufficient, firm, reliable, renewable electricity to replace 100 percent of the end of service life nuclear power generation by 2021.

And finally, natural gas combined heat and power plants, they could also provide 100 percent of our required replacement power by 2021. So there are many options, plentiful, and they're

all much cheaper as I stated earlier.

Combined heat and power was 6 cents a kilowatt hour, water and wind combined was 9 to 13 cents a kilowatt hour, and new nuclear at this point stands at about 21 cents per kilowatt hour.

So we have plenty of alternative ways to meet our –- our electrical needs without building new nuclear plants.

So to conclude, if approved, this nuclear new build project will lock Ontario into nuclear relied –- nuclear reliance for decades denying us the swift and necessary transition to the renewable energy age that this era of climate change and declining resources demands.

The proposed project should not proceed without a full public review and assessment of all project costs against other energy options. And for all these reasons, I request that OPG's proposal to build additional reactors at the Darlington site be rejected. Thank you all for your time.

CHAIRPERSON GRAHAM: Thank you, Ms. Bischoff. We will now go to questions from the floor –- or from the panel, I should say, pardon

me. And, Madame Beaudet.

--- QUESTIONS BY THE PANEL:

MEMBER BEAUDET: Thank you, Mr. Chairman.

We had last week the Deputy Minister of the Ministry of Energy, and he has explained some of the constraints they have in changing the policy with respect to the base load and other needs that can, as you mentioned, be compensated for peak hours, for instance, from natural gas.

The input from Quebec, because the interconnection didn't exist, now it is completed and this is a new –- I can't find the word in English here -- "une nouvelle donne". It's a new addition to what you had when the consultation was done on the mix plan.

We've seen this proposal in many of the submissions, especially the written submissions, and I'd like to know –- I don't know if you took part in the consultation initially with the long-term energy plan, if the import of power from Quebec was discussed at that time?

MS. BISCHOFF: I'm sorry. I wasn't participating in that at the time, and I

really don't know.

MEMBER BEAUDET: Okay. I thought you'd say I'm too young.

MS. BISCHOFF: I'd be happy to find out for you.

MEMBER BEAUDET: Yes, please.

CHAIRPERSON GRAHAM: Is that an undertaking?

MEMBER BEAUDET: Yes, please. I'd like to have a feeling --

CHAIRPERSON GRAHAM: Pardon me, Madame Beaudet, that would have to be an Undertaking Number 46 -- 47, and that will be for Ms. Bischoff to provide the information.

When could you have that for?

MS. BISCHOFF: I think I could have that tomorrow.

CHAIRPERSON GRAHAM: Okay. If you could supply that to the secretariat --

MS. BISCHOFF: Mmhmm.

CHAIRPERSON GRAHAM: -- and we'll put it on the agenda, then, as an item for the next day, which is Saturday and see if -- and if not, then just to give you that extra day.

MS. BISCHOFF: Okay.

CHAIRPERSON GRAHAM: Okay.

MEMBER BEAUDET: If it was proposed by the government, we can check on the internet on their site, but what I would like to know, if the groups that did participate suggested such an option?

MS. BISCHOFF: My –- our group, the Ontario Clean Air Alliance, has been participating all along in those proceedings.

MEMBER BEAUDET: Okay.

MS. BISCHOFF: So the Chair of my alliance would –- would know the answer. That's why I know I can provide it tomorrow.

MEMBER BEAUDET: Very good. The other point is you –- of course you talk a lot about costs and cost overruns and we've had many, many submissions on this subject, and I'd like –- we did discuss with the Ontario Power Generation the subject a few days ago, and you did provide what the cost overrun history was for Darlington.

We have in the appendix to this submission here a document called the Darlington Rebuild Consumer Protection Plan, and on page –- hmm, no page. In the appendix A, there's a table there that illustrates the –- Ontario's history of

nuclear cost overruns.

Now, what I'd –- I'd like to know is whenever there's some overrun, I mean, I'm pretty sure your corporation, you do the post-mortem of what has happened, I'd like to know, what is the percentage in the overruns when you –- you choose, for instance, a technology. When you come –- you design units, what is accountable to –- to the vendor that, you know, he will tell you –- you –- he can do anything. I mean, he can have his compliance to the regulations, but of course it's always an added cost.

And I think it would be interesting to see what is the percentage of the amount in the overrun cost that can be allocated to all the different standards and regulations that you have to follow. I don't know if you can look at that, but I'm sure when –- you know, in the debriefings, you must sort of have an idea of why this project or that project costs so much.

I know you did explain that sometimes political decisions have taken –- is a factor because, you know, the decision has to –- has made you wait and then, you know, you lose your team, et cetera, but just to know, what is the cost

or the overrun cost if you have –- there has to be some addition to the proposal that you first received, that the government has given you to build.

The other thing is I'd like to know also if the retrofits would be accountable in what you call cost overruns.

MR. SWEETNAM: Albert Sweetnam for the record. I'll address the last part of the question first, retrofits. Retrofits would not be part of –- of overruns. They would be addressed through operations, normal operations. As we address the requirements of the regulators, those regulations change. That would be carried as part of the operational budget.

If you –- if you're designing a new plant, it's –- since one hasn't been done recently, it would be quite difficult for us to be able to say what changes as a result of regulations would be associated with overruns. We have those numbers for Darlington. If you're interested in those, I can provide a percentage of what percentage of the Darlington overrun was attributable to changes made by the regulator if that's of interest to you.

MEMBER BEAUDET: Yes. And I think one example, for instance, if –- I think that there's one reactor design that doesn't meet the 500 metre limit, and then I think it's 105 metres, and, of course, they have to design the plan to make it to 500. Would such a requirement be –- the costs be allocated to you, or would it have to be on the –- the burden on the vendor?

MR. SWEETNAM: Albert Sweetnam for the record. Any requirement to meet something that we already know, so a known regulation, a known commitment to the CEAA, a known commitment in the license to prepare a site would be encompassed in the overall contract and would be the responsibility of the vendor. Anything that's new that comes up after we sign a contract would be the government's responsibility or OPG's responsibility and would contribute to an overrun out of the -- would eat a part of the contingency that we've allowed within the contract.

MEMBER BEAUDET: Thank you. Thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Just for clarification, Madam Beaudet, do you want an undertaking for the -- that Mr.

Sweetnam -- okay.

That would be Undertaking number 48 from OPG. Timeframe, please?

MR. SWEETNAM: Albert Sweetnam, for the record.

Would Monday be acceptable?

CHAIRPERSON GRAHAM: Yes, indicate that Monday would be satisfactory.

Very good.

Mr. Pereira?

MEMBER PEREIRA: Thank you, Mr. Chairman. Just one question. In your presentation, you talked about a number of alternatives, and is my understanding correct that you're talking about the combination of conservation, gas with combined heat and power and imports from Quebec, hydroelectric power and wind? Would that be --

MS. BISCHOFF: Yeah, that's what we're proposing.

MEMBER BEAUDET: That would be the mix -- thank you.

CHAIRPERSON GRAHAM: I just have one question, and it's in your present -- in your presentation. You had mentioned with regard to

natural gas and we had some figures that natural gas did produce some environmental effects. Do you still support the use of natural gas versus other types of energy-producing methods?

MS. BISCHOFF: We support CHB as a transition fuel to 100 percent renewable electricity grid, so we're proposing --

CHAIRPERSON GRAHAM: As a transition fuel; that's what you're saying?

MS. BISCHOFF: Yeah.

CHAIRPERSON GRAHAM: Okay. Thank you. All right, we will now go to the floor and the first on the floor is going to be OPG. Do you have any questions to Ms. Bischoff?

MR. SWEETNAM: Albert Sweetnam for the record. No questions, but just two clarifications. And the intervenors talked about the energy mix for Ontario, I'm not going to speak to that. I'll only speak to the new build aspects of what was said.

A couple of numbers that were thrown out there was -- one was 8.5 to 14 billion for the rebuilding of the Darlington units. That is not an accurate number. The number that is actually being put out into the media is between

six and ten billion dollars for the refurbishment of those four units.

The other thing that was said was that it would cost 26 billion dollars for two new units at Darlington. Again, this is a number that got into the media in 2009 and a couple of days after it got into the media, there was an immediate retraction by the procurement arm of the Ontario Government, Infrastructure Ontario that clearly stated that this number was incorrect and no number has ever been provided to the media, so that number of 26 billion dollars for two new units in Ontario is an inaccurate and incorrect number.

CHAIRPERSON GRAHAM: Thank you very much. CNSC, do you have any questions?

DR. THOMPSON: Patsy Thompson. No questions. Thank you.

CHAIRPERSON GRAHAM: Thank you. Government -- which there are none. Intervenors, I understand we have two. We're having some problems in getting communications back. Ms. McGee, would you go to the mic and just tell us who you have and then we'll cut it off at that for tonight, please?

MS. McGEE: Two questions. The first from Mr. Kalevar and the second from Ms.

Tilman.

CHAIRPERSON GRAHAM: Thank you. Mr. Kalevar, you have the first question.

--- QUESTIONS BY THE INTERVENORS:

MR. KALEVAR: Thank you, Mr. Chairman. Chai Kalevar from Just One World. My question is through you to the presenter. We just heard that the four nuclear plants in Japan have been decommissioned after their meltdown.

Would you prefer that Ontario decommission its plants after or before meltdown?

CHAIRPERSON GRAHAM: Would you turn on the mic and identify yourself if you are answering that?

MS. BISCHOFF: Do I press this?

CHAIRPERSON GRAHAM: Yes.

MS. BISCHOFF: Angela Bischoff through the Chair to Mr. Kalevar.

I would prefer that they shut them all down now -- well, actually what I would prefer is that they close them down when they come to the end of their useful lives and replace them with integrated combination of renewables, CHP and energy efficiency.

CHAIRPERSON GRAHAM: Thank you for

that. Ms. Tilman, you have the other question.

MS. TILMAN: My question actually is to OPG on the costs. I'm not sure what the costs are. I have not seen any protective figure, but there was an article in the Globe's business section that due to the issues at Fukushima, more safety measures would have to be put into the proposed -- any new reactors.

And I wonder if OPG has been busy trying to at least figure out what to expect in the future because we're riddled with the costs still from Darlington?

CHAIRPERSON GRAHAM: OPG, do you want to respond?

MR. SWEETNAM: Albert Sweetnam for the record. It's much too early in the situation that's evolving in Japan to determine what the lessons learned will be. OPG is fully tied into the international network associated with nuclear operators. And as time progresses, we will learn from whatever lessons have been learned in Japan.

And if the industry feels that there are certain things that need to be done to plans to improve the safety, we will do this in conjunction with the CNSC. Again, keeping safety

to the public and safety to the workers is our foremost priority.

CHAIRPERSON GRAHAM: Thank you. And with that, Ms. Bischoff, thank you very much for coming tonight and giving us your views and your intervention.

MS. BISCHOFF: Thank you.

CHAIRPERSON GRAHAM: We now have the next participant is -- who's registered to make an oral statement and only Panel members will be able to ask questions of the oral statement. And that person is Ms. Lister -- Lester, I'm sorry. And, Ms. Lester, the floor is yours.

--- PRESENTATION BY MS. LESTER:

MS. LESTER: Greetings. Here we go. Greetings to the Panel and to the audience members. My name is Carrie Lester from Toronto. I am Ogemawahj, which is the Bearfoot Onondaga from Six Nations.

In regards to nuclear energy, as simply a human being on this planet, my Mother Earth, your Mother Earth, I'm going to address the burden of truth as it applies to our health, all of our health.

So my health, the health of my

family and friends, the health of your relations and my relations; the health of the soil, the air, the water in and around Lake Ontario where I live, where my ancestors on my mother's side have lived for thousands of years.

(SPEAKING IN NATIVE LANGUAGE)

That is my name, my clan and my nation.

There was a time when there was no cancer here, no cancer sickness here on Turtle Island. It arrived with the settling of the newcomers and their need to do things faster and better and more efficiently, but this thinking was attached from the connection to Mother Earth.

With the continued industrialization of this land as it was being practiced on the other side of the world. Toxic waste has infiltrated our world from so many different sources, that we here in an urban setting find it difficult to be able to pinpoint exactly where each industrial toxin has come from and what each toxin will do to us.

However the people from places like Fort Chipewyan, Alberta, they know exactly where their cancerous poisons are coming from and

we know that is the tar sands.

Recently I attended a funeral -- well, no, not one funeral, it was two funerals in one day for friends of mine who I had got to know through my children, through their school and their after-school activities.

And after attending both funerals, I discovered that there were two other funerals that very same day from the same neighbourhood.

I also learned of three other deaths of parents who I'd only known briefly before, but who had also died recently within those past two years. And all of them were parents in their late forties and early fifties, my age. And their children were in their late teens and early twenties. They had all died from cancer.

They had all raised their families in the same neighbourhood for those 20 years. This was not in Clarington or Bowmanville or Darlington. It was in Toronto. And it had become an industrial -- an industrial -- well, an industrial area during the Second World War, but since then had become a rather prestigious neighbourhood with many teardown bungalows and two-storey million-dollar homes.

Just before hearing of these deaths of these friends, I had attended a film screening and a book launch of Sandra Steingraber's story called "Living Downstream," which, if you're not familiar with, is a story of, in general, how we're all now living downstream from many pollutants and, in particular, Sandra's story of her survival with cancer and wondering when it will all come to get her again.

It's a story of discovery for Sandra as she begins to question her cancer and other cancers in her neighbourhood and the neighbouring states and finally that of America and Canada, and then as it applies through any community throughout the world.

I had also been to another book launch right after the "Living Downstream" film and book launch. This one was called "Seasick," and it was about the condition of the earth's ocean, the one ocean that is surrounding us, and what we have done to the lifeblood of our mother, the earth.

One of the daughters of my friend who had died posted a message on her Facebook, asking everyone who had been affected by cancer in one way or another to pass on her message of hope,

hope for a cure to come this year so that nobody else has to die from cancer, from how she had seen her mother’s body ravaged with this cancer. And she posted that to all her contacts on her Facebook.

But I responded by saying, “Well, it’s -- it’s not so much that a cure is needed, although that would be nice. It’s that we must stop the lifestyle that’s producing this cancer.” We've contaminated our mother earth so horribly in these 150 or so years of the billions of years that this world has been in existence.

The industrial, chemical, technological revolutions have got us to this point. The toxins are everywhere now, but not just in our water, in our air and the land. And the cosmetics that we buy to put on our skin, the hygiene products, our clothes, our bedding, paints, plastics, toys, baby products, et cetera, a cure will not take away these toxins burdening our bodies.

So this was the point in which in my talk I was going to list a series of facts about the nuclear industry, but that’s all been done. There's more brilliant experts that you've listened

to this past week and a half and that you will be listening to. I'm not an expert. I don't have all the stats in my head.

I was going to talk about, as was talked about many times tonight, radiation and ionizing radiation being a carcinogen, meaning that it damages our DNA; that Tritium is a radioactive isotope of hydrogen and is a waste product in the nuclear industry; and Canada’s allowable levels for Tritium are quite a bit higher than in other countries and it’s like 7,000 becquerels compared to 100 becquerels in the -- in the E.U. and 740 becquerels per litre in the U.S.A., but all those things, as I said, you already know. You have your own panel of dispassionate, according to me, engineering experts. And you've been hearing from the passionate public for this past week and a half, individuals like myself and non-governmental organizations who just want to see -- want you to -- sorry -- who just want you all to see where all of this horrible experiment has gone wrong. It doesn't matter how many allowable becquerels or millisieverts of this or that is in our water or air or our soil. What matters is that we just stop

putting it there. There is no safe allowable level of radiation, period.

We've been contaminating our mother earth with this cancerous element ever since engineers and physicists first learned how to split that atom. And what was it the experts said at the time when they saw what they had done? And to quote from Paul MacKay's book called "Atomic Accomplice, "Einstein said that the unleashed atom has changed everything, save our mode of thinking and, thus, we drift toward unparalleled catastrophe." And Oppenheimer had said, "Now, I become deaf, shatterer of worlds," and his munitions expert who wired the detonators for the trinity bomb said, "Now, we're all just sons of bitches."

So what should I talk about here instead, instead of these facts and figures? Well, how about we move on from here? How about as Angela was talking about and many others, that we move our direction and discussion toward how much radiation are we willing to subsidize and its industry that will contaminate our family and friends with -- that it will contaminate our family and friends with to a -- to a lifestyle without

consequences -- or sorry -- with such consequences? How about if we talk about renewable energy sources and reducing our consumption of energy and becoming more energy efficient?

We are creative, brilliant beings. We can do this. We don't have to destroy our mother earth in the process. People have come up with plans to have 100 percent renewable energy grid by the year 2027 and that's probably about the time a brand new reactor would take to be built and be up and running, but it would be far less costly in financial costs and in the cost of living organisms.

So who are all these people? Well, as I said, Angela from the OCAA, the Ontario Clean Air Alliance; people from Greenpeace; from the Pembina Institute. We have this technology. We have the creativity to combine all these different energy systems; solar, wind, combined heat and power, our own hydroelectric, plus imports from Quebec.

I work at a school, an elementary school. I'm a special needs assistant. And when I sit in on the science lessons and the topic comes to living things in grade 6, the curriculum states

that there are living and non-living things, as biotic and abiotic, and this is what they teach the children, and that’s the problem.

Indigenous cultures around mother earth state that there are no non-living things. Everything has life, everything has spirit. To think otherwise allows people to disregard the very soil, air and water of our mother, this planet earth, and contaminate her and everything on her and in her and around her. I always point this out to the students. The students are our future, but we are their present. And they take direction from us and trust us to do responsible and ethical things.

Mother earth is not a static, stable being. She's continually moving and reshaping herself. She thrusts and writhes and twists and, if I may say so, she farts and she belches and she vomits and that’s the volcanoes and the earthquakes and tsunamis. She needs to breathe and stretch and grow. Confining her in cement and asphalt, drilling into her to remove her organs and her blood and her oils and lubricants is the death of us all. She is fighting back at our brainless and thoughtless control that we've -- that too many

of us thought we had over her. She quakes and trembles continuously all over.

A large seismic eruption may not happen here in ten or 20 or even 50 years. It may take a hundred, 200, 500, but this radioactive waste is here forever and it is a ticking time bomb. Even if we stop using nuclear energy all over the world right now, we still have the horrible effects of what we have built up so far, the thousands of tons of radioactive contamination that have been stored at over the 500 or so nuclear plants around the world, and that’s still a problem. It wouldn't take much for those containers to be breached by any number of mother earth’s bodily functions, not to mention the decay of the containers themselves over time.

Nuclear energy is a dangerous and expensive way to boil water and to generate steam. We need to wake up and stop this nonsense, stop funding the destruction of our planet, stop funding the death of your family and your friends and your ancestors. Thank you.

CHAIRPERSON GRAHAM: Thank you very much, Ms. Lester. We will now proceed to questions and only questions from the panel

members. No other questions are permitted according to the rules and, Mr. Pereira, do you have a question?

MEMBER PEREIRA: No, thank you for your presentation. I don’t have any questions.

CHAIRPERSON GRAHAM: Thank you, Mr. Pereira. Madam Beaudet?

MEMBER BEAUDET: Thank you very much for your presentation. I have no questions.

CHAIRPERSON GRAHAM: I thank you also for coming and giving your sincere oral presentation and wish you a safe trip back to your home. With that I’m going to declare a 15-minute break and the chair will resume at nine o'clock according to that clock, and about 9:02 according to mine. So nine o'clock according to this.

---Upon recessing at 20:48 p.m.

---Upon resuming at 21:02 p.m.

CHAIRPERSON GRAHAM: Good evening, ladies and gentlemen, again. Welcome back. Everyone take their seats. Just a couple of procedural announcements. We only are going to have one more presentation tonight and that is Janet McNeill. And before I welcome Janet or Ms. McNeill, I want to say that the Rabinovitch

presentation under PMD 11-P1.194 will not be tonight. I don't think that presenter is here and the other one being done by telephone conference will also be rescheduled and that's 1.189 from Nuclear Information and Resource Services. So we'll only do the one more and that is being presented tonight by Janet McNeill under PMD 11-P1.171. Ms. McNeill the floor is yours and welcome.

--- PRESENTATION BY MS. McNEILL:

MS. McNEILL: Okay. I'm not very good with microphones so is this okay? Okay. First of all I kind of want to say that I don't feel as though I have anything to say after the previous presentation because she expressed very eloquently a lot of what I believe and feel, but I went to all this trouble so I'll go ahead and say what I have to say.

Members of the Joint Review Panel, OPG and CNSC staff and fellow members of the public. I appreciate the opportunity to make this presentation to the Darlington new build Joint Review Panel. As I laid out in the outline I submitted in February, my presentation will consist of the following: Introductory remarks; comments

on the limitations of the review process; comments on projected costs and overall economics of this project; nuclear fuel chain issues and implications, issues of public trust and concluding remarks.

One, introductory remarks. I've been an environmental activist for more than 20 years now. I'm also a former long-time resident of Durham Region and spent most of my life -- my adult life in Durham Region and the Greater Toronto Area. It was never my intent to become involved in nuclear issues and I'll explain in a moment why I did.

Most of my years of activism have been focused on waste, pesticides, cancer prevention and climate change initiatives. It's relevant that I am a mother. Concern for my children's future began even before they were born naturally enough and the threats to their futures seem to have multiplied exponentially.

Now that they are adults who might like to have children of their own one day, I have the motivation to keep on working on environmental issues, even though sometimes I'd like to just stop and pull the covers over my head the way so many

ordinary people seem to do.

I've been thinking for a couple of days now about panel member, Madam Beaudet's question to Mark Mattson, Lake Ontario Waterkeeper's president, about reaching ordinary people in this process. For sure I am one of the ordinary people in the sense that unlike to many of my brilliant colleagues who have spoken at this hearing, I'm not a technical person. I don't really have a clue how nuclear energy and nuclear power plants work. I'm not scientifically-minded and I'm not mathematically-minded either. I could never engage with an engineer about technical matters involving reactors and most of the CNSC staff could silence me pretty quickly with their jargon. I know this.

But here's the thing, although I'm not technical I do have an ear for language and I can still see pretty well. I can often tell when I'm being deceived and I can spot when an emperor isn't wearing any clothes. I often recall that Jane Jacobs, internationally known for her work on urban issues, once said:

"Always be prepared to believe that experts are

stupid. They very often are."

I'm a big believer in telling the truth and in drawing attention to elephants in the room. This doesn't always make me popular of course. Sometimes we humans are pretty invested in leaving those elephants alone, whether on big scary matters like nuclear energy or the small ones in our personal lives. As regards telling the truth, I recalled that Maggie Kuhn, founder of the Gray Panthers, once said, *"Speak your mind even when your voice shakes,"* so that's what I'm trying to do. Sometimes my voice does shake -- I had written in here, it may very well be shaking now, but I'm doing okay, I think.

But if we human beings are going to keep on living on this planet, something I'm less and less convinced is going to be possible in the long term, I think more and more of us are going to need to start telling the truth.

Now, as to how and why I became involved in nuclear issues. After 24 years in Durham Region I moved to Deep River for six years. Friends I made in Renfrew Country told me about the little company in Pembroke that makes glow in the

dark products using tritium from CANDU reactors. The things I learned about the tritium pollution in air and groundwater in Pembroke shocked me deeply. That's what motivated me to start attending Canadian Nuclear Safety Commission hearings. It's been very illuminating.

Two, the limitations of this review process. The limitations of this process have been covered quite brilliantly by other intervenors, Lake Ontario Waterkeeper, Northwatch, the International Institute of Concern for Public Health, Green Peace and others.

I would like to call attention to the document called, *"Public Hearing Procedures."* It's this one, no file or document number, that states in Section 1, *"Background Information,"* that:

> *"The proposal is for the site preparation, construction, operation, decommissioning and abandonment of up to four new nuclear reactors."*

Et cetera, et cetera. The use of the word abandonment certainly sends up a red flag for me. I'm not sure how we can reasonably talk about

abandoning nuclear reactors whose contaminants and waste will remain radioactive and dangerous for thousands and thousands of years. As far as I'm aware, the nuclear industry has no real experience in the safe decommissioning of used up nuclear plants. The use of the word abandonment is a bit shocking to me for sure.

In Section 2 of that same document, under roll of the panel, it refers to this environmental assessment of the complete lifecycle of the project. Again, I'm not sure how we can be properly said to assess the complete lifestyle of a -- lifecycle of a project whose carrying out involves the creation of dangerous wastes that will remain dangerous, not just for my grandchildren's grandchildren, but for their grandchildren's grandchildren's grandchildren and perhaps well beyond that. It seems a little preposterous then to me to make this claim about the lifecycle of the project.

There are other aspects of this plan for new nuclear reactors that I have trouble buying into, bounding scenarios, multiple technology approach, credible accident scenarios. The language all sounds more than a little absurd

to me. It sounds like fancy jargon that intends not to illuminate or tell the truth, but to do quite the opposite, to cover up and obscure the truth.

I doubt very much that the BP oil spill or the current nuclear crisis in Japan would be classified as credible accident scenarios. Unfortunately, that doesn't mean they didn't happen. As one of the Aboriginal speakers said on Monday, the unthinkable does indeed happen.

I felt quite often during this hearing process that Alice in the story of *Alice in Wonderland*, I must have fallen down a rabbit hole. Some of the testimony I hear puts me in mind of the Mad Hatter's tea party. OPG testimony on Tuesday about their ability to safeguard dangerous nuclear wastes for hundreds of thousands of years is an excellent case in point. I am not in the slightest reassured. In fact, OPG's staff members seeming inability to really get their heads around the really, really long-term storage challenge is frankly sobering and even downright scary to me. The statement was made, *"We are learning as we're going along."* This is not something that would reassure the public a great deal I think. I recall

that a previous intervenor, Dr. Fairlie, called on the nuclear industry to demonstrate humility not hubris at this most extraordinary time considering the escalating nuclear crisis in Japan. Given the current nuclear crisis this whole panel experience seems almost surreal. I doubt that I'm alone in feeling this sensation.

As for the failure of the process to properly investigate non-nuclear alternatives, I'm reminded of Thomas Alva Edison, father of the light bulb, who said:

> "I'd put my money on the sun and solar energy. What a source of power. I hope we don't have to wait until oil and coal run out before we tackle that."

Of course, Edison very likely had no idea we'd come up with the madness of nuclear energy.

3. Comments on the projected costs and overall economics of this project. Many intervenors have my now made comments on this as well. I do not recall how many millions of dollars of over budget the first generation of reactors at

Darlington came in at. I do recall that an engineer friend of mine once said that if the money spent building the Darlington reactors had been put into solar panels for all the houses in Durham Region, Darlington wouldn't have been needed. This friend is a nuclear engineer, by the way.

How many millions of dollars over budget are all the current nuclear refurbishment projects? Some mindboggling number that truly does boggle the mind so much that we ordinary people lay it aside almost casually and forget about it. We've heard it so many times before, and yet it's genuinely scandalous, really, isn't it.

I also wonder how it is possible for OPG to give any realistic estimate of the cost for decommissioning reactors when, from what I gather, decommissioning nuclear facilities is not exactly proven technology.

Finally, I want to register my frustration that if all the money that's been spent on this project had been put into research and implementation of conservation and efficiency measures, which have been known about for decades now, after all, and renewable energy sources, a great many more jobs would have been created, and

they would be sustainable jobs.

The money that is being spent to conduct this hearing process would very likely fund a really efficient environmental non-governmental organization for years. So much waste of human energy, psychic potential and our hard-earned tax dollars, it's enough to make a person weep.

Nuclear fuel chain issues and implications: I'm aware that you've chosen not to consider the entire nuclear fuel chain to be an integral part of your deliberations, but talking about building new nuclear reactors and failing to consider the rest of the stages involved is kind of like saying we're going to undertake to protect fetus's from fetal alcohol syndrome without bothering to talk to the fetus's mothers about giving up drinking.

Dave Kraft, director of Nuclear Energy Information Service has said,

> "Authorizing construction of new nuclear reactors without first constructing a radioactive waste disposal facility is like authorizing construction of a new Sears

Tower without bathrooms."

The nuclear fuel chain is very problematic, to put it very mildly. Human health and the environment are damaged at every turn. It is not precautionary at any point, and simply claiming it is so, will never make it so. The biggest single problem with the nuclear fuel chain, it seems to me, is the waste that will be created and left for future generations to manage. It seems to me we have a moral duty as human beings to behave in such a way that future generations will be possible. A duty many of us are really only paying lip service to, I'd say.

We heard Dr. Caldicott speak last week about the damage to children in the wake of the Chernobyl disaster. We all know that there will be vast damage to the as yet unborn in the wake of the current Japanese nuclear disaster. I wonder about the possibility for future generations to survive at all, considering the overwhelming burden of nuclear pollution that already exists, never mind the bizarre notion of creating yet more.

We cannot properly deal with the wastes that have already been created. As has been pointed out by Mr. Kamps from Beyond Nuclear, 29

years after passage of the *Nuclear Waste Policy Act*, 36 years after the repository search began, 54 years into commercial nuclear power, and 69 years after Fermi first split the atom during the Manhattan Project, the US still has no safe, sound, permanent storage plan for high-level nuclear wastes. Nor, as we all know, does Canada.

In my opinion, put very simply, nuclear energy is immoral. I believe we have a moral duty to stop messing with it.

Issues of Public Trust: We know that the public does not trust the nuclear industry. We didn't before Chernobyl, and we haven't since then. We didn't before the accident in Japan, and of course, we do so even less now. I'm not sure that this matters much to the nuclear industry or to our governments. There seem to be forces at work here that I don't really understand. I do believe, though, that one problem is an engineering mindset that is not serving us well.

I've had some interesting encounters with engineers in the past few years. Some of them have said things that have blown my mind. One who used to work at the Chalk River nuclear facility expressed surprise that it had

become clear that the ocean could not withstand all of humanities assaults on it, all the pollution we have dumped in it, and continue to dump in it. I was taken aback, he was serious. He thought we could go on and on and on using our precious water bodies as dumping grounds.

Another engineer, two actually, outright denied what the retired radioactive steam generators at the Bruce Power Plant contain. It was pretty much a “please don’t confuse me with the facts” conversation. The piece of paper I was showing them had information that had been provided by OPG, but these engineers were sure they knew better. Hear no evil, see no evil, speak no evil. This is a very dangerous mindset.

The nuclear industry seems to damage people at every stage along the way. People who live near uranium mines get sick. I don't know if any of you are familiar with this book by Lorraine Rekmans about that issue.

Bodies of water are destroyed forever. Workers at the Bruce were recently exposed to radiation. Nuclear accidents happen and the public is lied to about the extent of the damage. A previous speaker at this hearing, one of

the articulate First Nations speakers on Monday said, “No one is listening to us. We have good reason not to trust the nuclear industry.”

Concluding remarks: I have amended my remarks since I first wrote them. I was feeling pretty angry when I wrote my first draft. Now we have another nuclear disaster and now we have an opportunity to make this a watershed moment in human history. It may very well be too late to save us, but it seems to me we ought to at least try.

I haven’t done a lot of stints in the corporate world in my working life. I do still have a powerful memory of one meeting I was part of in my last corporate role. I sat looking around the room at all the very bright and energetic people who were in the room, and who were really working their butts off on the project we were engaged in. Well above and beyond the call of duty for sure. I thought, holy smokes, wouldn’t it be amazing if we could harness all the energy of all these brilliant minds to do the things that really need to be done to fix up the planet.

And I had been having that thought again here during the past days of hearings.

There's a real us and them mentality at work here. It's adversarial and it sure doesn't help us solve problems. Last year I read an amazing book called *Country of my Skull: Guilt, Sorry, and the Limits of Forgiveness in the New South Africa*, about the Truth and Reconciliation Commission.

I recall from time to time when I'm not feeling angry about what a mess things are, and wondering about and blaming who is responsible for all these messes, that we really are all in this together, and that keeping on with the us and them dynamic isn't going to take us anywhere any of us really want to go. I can't help but wish we'd use this time now in the wake of this horrendous Fukushima nuclear disaster to put our minds to a little truth and reconciliation. Put all our bright minds together and find solutions, not keep making more and more problems.

I'm terribly naïve, I know that. We environmental activists are idealists. I guess somebody has to do it. Einstein, as we all know, said, "Nuclear power is one hell of a way to boil water." He also said,

> "The world is a dangerous place to live, not because of

the people who are evil, but because of the people who don’t do anything about it.”

Well, I have no expectation that this panel will actually decide to put a halt to this project, that is what I very much hope you will do.

Earlier this week, on Monday, after I left the day’s hearing here, I went down to the gate at the Darlington generating station where I looked at the plaque on the monument that was erected by the Nuclear Awareness Project Group in 1989. The group put a time capsule in the ground and then put up a monument over top of it. The plaque reads,

“In our every deliberation we must consider the impact of our decisions on the next seven generations.”

From the Great Law of the Hau de no sau nee Six Nations Iroquis Confederacy. This monument marks the opening of the Darlington Nuclear Generating Station.

“We do no inherit the earth from our ancestors. We

borrow it from our children. The time capsule contained herein shall be opened after seven generations in the 2129."

The capsule contains information reflecting the debate on nuclear technology.

"Our children shall judge us. It is surely so."

Thank you.

CHAIRPERSON GRAHAM: Thank you very much, Ms. McNeill. I appreciate your intervention.

And we'll start off with Madam Beaudet.

--- QUESTIONS BY THE PANEL:

MEMBER BEAUDET: Thank you, Mr. Chairman.

I think the last presentations were very well done in terms of presenting opinions.

For us, our work, we listen to people, but we ask questions usually if there's clarification to be made.

With respect to your presentation,

there’s one clarification on my part, not one that I would require from you, is about, as a panel, why we didn’t look at the mining industry.

When a panel is formed -- and I -- this was brought up also with Greenpeace -- the guidelines in the agreement have been signed -- have been finalized and signed.

There’s a draft agreement and a draft guidelines that was table -- in 2008. And the public had a chance for over a period of one year to comment.

Whatever comments are integrated, we don’t know. We arrive, and everything in this respect has been decided.

I have no further question.

CHAIRPERSON GRAHAM: Ms. McNeill?

MS. MCNEILL: Well, I think -- I think Angela Bischoff gave you some excellent -- gave some excellent information.

And I think it’s been -- I think it’s been made quite clear that the alternatives would get us there and that we need to stop this industry.

Like I said, we’ve made more waste than we -- we can’t -- we can’t deal with what

we've already created, so we really can't do anymore.

I would love to leave with you each a copy of this brochure. This is from the group Beyond Nuclear. Mr. Kamps was here the other day.

I only actually saw this brochure this morning for this time and read it on the GO Train, and I would like to leave copies for whoever would like -- you know, CNSC staff, the panel, OPG staff. It's excellent.

And that's about all I have to say.

CHAIRPERSON GRAHAM: Thank you.

Those -- if you just leave them with the secretariat at the back, she'll -- the secretariat will make sure that anyone that wants them, along with the panel, will get them.

Madam Beaudet, do you have anything else?

MEMBER BEAUDET: No, thank you, Mr. Chairman.

CHAIRPERSON GRAHAM: Thank you.

Mr. Pereira?

MEMBER PEREIRA: No, thank you. I

don’t have any comments.

CHAIRPERSON GRAHAM: Then, OPG, do you have any comments or questions?

MR. SWEETNAM: Albert Sweetnam.

No questions.

CHAIRPERSON GRAHAM: CNSC, do you have any questions?

DR. THOMPSON: Patsy Thompson.

Similarly, no questions. Thank you.

CHAIRPERSON GRAHAM: Again, I’ll call on governments, which -- I don’t see any.

Then we will go to interventions from the floor.

Are there any questions? Any from the floor?

Ms. McGee, do you -- do you have any?

No, you don’t have any. Well, that’s fine. Thank you very much.

Ms. McNeill, thank you very much for coming tonight. Thank you for your intervention and safe travels on your way home. Thank you very much.

With that, as I’d said, the

Rabinovitch presentation is not -- the Rabinovitch presenter is not available.

And the one by telephone conference on Nuclear Information and Resource Services is going to be set over to another date which will be announced by the Secretariat.

With that, I would say that we're going to adjourn to 9:00 a.m. tomorrow morning.

Thank you very much.

Do you have any comments, co-manager?

Thank you very much, everyone, for again spending this evening with us.

Adjourned.

--- Upon adjourning at 9:25 p.m./

L'audience est ajournée à 21h25

C E R T I F I C A T I O N

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