Canadian Coalition for Nuclear Responsibility

Transcript of Oral Testimony by Gordon Edwards, Ph.D., CCNR President,

in opposition to the Proposed Refurbishment of the Four Darlington Nuclear Reactors

Canadian Nuclear Safety Commission
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Hope Fellowship Church
1685 Bloor Street
Courtice, Ontario

THE CHAIRMAN: The next submission is by the Canadian Coalition for Nuclear Responsibility, as outlined in CMD H13-155. And I understand that Dr. Edwards will join us through teleconference. Dr. Edwards.

DR. EDWARDS: Yes, Dr. Binder, how are you?

THE CHAIRMAN: I'm fine. How are you? Please proceed.

DR. EDWARDS: I'm fine, thank you. And I would like to thank very much the CNSC for providing this opportunity for people to come and express their views on this very important subject.

Also, if I may say so, I find the procedures over the last few days have been much more interesting and involving, and I think mutually respectful in general. That has not always been the case in the past and I'd like to compliment the CNSC for providing this opportunity for people, and for being so patient.

Basically, we all want nuclear power to be safe. Nobody wants nuclear power to malfunction or to cause damage to the environment or to people. However, it does have an enormous potential to cause damage. And ultimately the decisions are political. Society as a whole has to decide whether it is willing to take these risks and what conditions it wants to impose upon those risks.

For example, just last week in New York, the New York Energy Regulators told the power companies to develop plans to keep the lights on in case the giant Indian Point nuclear power plant is shut down. This is from newspaper accounts.

> *"New York Governor Andrew Cuomo wants the two reactors at Indian Point shut [down permanently] when their operating licenses expire in 2013 and 2015 in part because the nuclear plant is located in the New York metropolitan area, home to some 19 million people. The governor has said even the most unlikely possibility of an accident is too much in the heavily populated area."*
>
> http://tinyurl.com/ck9wyzy

So I think that we have to recognize, especially post-Fukushima, that we need sound policies guiding our energy system and the role that nuclear is going to play. And if nuclear is going to play a role, ***how*** it's going to play that role.

My biggest concern with the current plans to refurbish the Darlington reactors -- to which our organization is opposed under the current circumstances -- is, it is the first big project to extend the role of nuclear power on the Great Lakes since Fukushima. There were other projects that were [already] underway, such as the Bruce refurbishment, but this is the first real initial movement towards extending the role of nuclear power on the Great Lakes [since Fukushima].

And we do not have any specific political direction for this. There are many questions that should be addressed. Do we really want to take the risk of having nuclear plants on the Great Lakes, when we've seen the huge volumes of contaminated water that have had to be dumped into the ocean and have leaked into the soil from the Fukushima disaster?

Do we want to run even the remotest risk that this kind of spillage into the Great Lakes could occur, affecting the whole Great Lakes and the St. Lawrence River Basin possibly?

There's also the question about land contamination, because of the population density. Do we really want to have nuclear power plants [sited] so close to some of our largest population centres, and areas which are very important for our economy as well, given the fact that there is the potential for large areas of land to be uninhabitable for a considerable period of time?

I participated in a number of hearings back in the 1970s, and this is what the Select Committee on Ontario Hydro Affairs said in June of 1980, following 15 weeks of hearings in which they interviewed all kinds of experts, from the United States, from Atomic Energy of Canada Limited, from Ontario Hydro, and from others from outside the industry.

Their conclusions in *The Safety of Ontario's Nuclear Reactors*, a publication of June 1980, are:

> "It is not right to say that a catastrophic accident is impossible; […] the worst possible accident […] could involve the spread of radioactive poisons over large areas, killing thousands immediately, killing others through increasing susceptibility to cancer, risking genetic defects that could affect future generations and possibly contaminating large land areas for further habitation or cultivation."
>
> *http://www.ccnr.org/Melt_CANDU.pdf*

Now, one of the things that is distressing to people who intervene in these hearings is that they do not hear a frank admission from the CNSC staff or from the Proponent that in fact this is the fear, this is the concern; that it could in fact happen under the worst circumstances if the emergency safety systems do not all function as planned.

And that being the case, it becomes a matter of public policy as to whether it is wise to accept that risk, particularly with regard to the siting -- where precisely these reactors are located.

Dr. Binder, you, yourself, have said something similar in recent hearings. I remember back in the St. John, New Brunswick hearing [December 2011] you said that ultimately, whatever the probability is, we want to know that we can handle the worst-case situation, the so-called doomsday scenario.

And the question is, have we really addressed that as a genuine possibility? Or are the Proponent and the CNSC staff using mathematically calculated probabilities as a kind of a shield to hide behind, in terms of dealing with the worst possible accidents?

Yesterday, I heard Shawn-Patrick Stensil mention a couple of accident scenarios identified by OPG in which there would be significant offsite radiation releases. And Dr. Binder, you, yourself and one of the other Commission Members asked for a clarification as to -- how does that happen, how does the radiation get out there? And nobody gave you a straight answer on that. That bothers me. Because I think you should be able to get a straight answer to that.

To somebody outside the process, watching it from outside, it appears that the CNSC staff and the Proponent are basically shoulder-to-shoulder singing from the same hymn book and giving the same kind of answers.

In fact, more often than not, it seems to be CNSC staff who are explaining and even justifying things that are in the environmental assessment [for refurbishment] or the application [for licence renewal].

And one wonders -- well, gosh, where is the ***dialogue***? I mean, one would kind of think that CNSC staff, representing the public interest, would be cross-examining the Proponent and holding the Proponent's feet to the fire and saying, "How do you justify this?" But no. We find them both acting together in concert. And I think this puts the Commissioners in a very difficult position because they're really only getting one story from both parties.

CCNR is asking that the Commission recuse itself from deciding on whether to extend the lifetime of these reactors by refurbishment, pending political guidance from our political system and from our population.

I was told in the St. John, New Brunswick hearings by Dr. Binder that the CNSC does not report to the Minister of Natural Resources, but rather reports to the Parliament of Canada through the Minister of Natural Resources.

So I asked myself, "Well, what exactly ***do*** you report to the Parliament of Canada?" Should you not be reporting to the Parliament that this is an important juncture in the history of the nuclear program in Canada? And that we need clear guidance as to whether we want to continue to do certain things?

Just to give you a couple of examples, which are in the written submission.
http://www.ccnr.org/Darlington_refurb_2012.pdf

1. The high level nuclear waste problem is still not solved. And back in the seventies, when this program was launched, this research program into geological storage, it was understood that there would have to be a moratorium on new nuclear reactors unless this problem was solved. Well, it's still not solved.

Does the Parliament of Canada want to go ahead with new reactors, and refurbishing old reactors, without having even broken ground on the high level nuclear waste problem?

As we've seen in the United States, the Yucca Mountain project has been scrapped; and in fact, the U.S. Nuclear Regulatory Commission has suspended all final decisions on licensing for both new reactors and for refurbished reactors for a couple of years, pending some kind of political and regulatory resolution of this problem.

I believe that the CNSC should be reporting to the Parliament of Canada that this is a consideration that requires political direction, and that there should be a mechanism by which our democratic system can provide that direction.

2. Another example is the safe and timely dismantling of nuclear reactors at the end of their lifetime. This capability has not yet been demonstrated. As a result, even the cost of nuclear power is not really known -- because we know that the cost of dismantling these reactors is going to be very substantial, possibly much more substantial than has been estimated in the past.

And we do have a possibility of demonstrating dismantling on some of the old reactors that have been shut down for decades, like the Douglas Point reactor, the NPD reactor, the Gentilly-1 reactor in Quebec. But pending some greater knowledge about the dangers and the cost of dismantling these reactors, I don't think we should be, in good conscience, simply giving a green light to extending the lifetime [of older reactors] or allowing new ones [to be built].

3. There are more important points that I mentioned earlier about the siting of these reactors. Do we want to continue to jeopardize our largest population centres and the Great Lakes [themselves]?

4. And I'd like to mention one other issue as well. It is a generic CANDU safety issue that has been struggled with for decades. And that is the Positive Void Coefficient of Reactivity [PVCR], which means that when you have a loss of coolant accident [LOCA] you get a power surge at the same time.

For this reason we have two independent, fast-acting shutdown systems in order to try and ensure that this power surge will not get out of control. Because it is well recognized that if the reaction were not to be terminated within two seconds, you could have very serious consequences.

Well there are, as I understand it, technical means for eliminating this problem at the source by using different fuel. It's called Low Void Reactivity Fuel. The CNSC and the Proponent have decided not to do that but to live with the risk of this positive void reactivity coefficient by putting all their reliance on the mathematics of their analysis and also on the efficacy of these fast shutdown systems.

Well, I think that is again something that deserves to be considered at a political level. Does society want to insist that the problem be eliminated? Or is society willing to live with the problem hoping that these not-always-available shutdown systems will function infallibly in the case of an accident?

So in conclusion, the Canadian Coalition for Nuclear Responsibility urges the CNSC not to accept the Environmental Assessment report as a justification for authorizing the refurbishment and continued operation of the Darlington reactors -- because of fundamental unsolved problems regarding catastrophic accidents, the long-term management of irradiated nuclear fuel, the safe dismantling of defunct nuclear power reactors, and unresolved CANDU safety problems, including particularly the Positive Void Coefficient of Reactivity.

And finally, the all-important siting question. You know, people here on this side of the world often say, "My God, why would they build nuclear reactors in Japan so close to the earthquake risks, to that part of the Pacific Ocean?" Well, perhaps our grandchildren will be asking, "My God, why would people build nuclear reactors right on the Great Lakes, when it's the most precious water resource we have? Why jeopardize that? "

So that's my conclusion. Thank you, sir.

THE CHAIRMAN: Thank you. Thank you.

(APPLAUSE/APPLAUDISSEMENTS)

THE CHAIRMAN: Can we start, who wants to go? Dr. Barriault?

MEMBER BARRIAULT: Thank you, Mr. Chairman.

The intervenor mentioned the Low Void Reactivity Fuel. I guess it begs the question, why isn't it being used in our reactors? Or is there a need for it?

MR. JAMMAL (CNSC Staff): It's Ramzi Jammal, for the record.

Let me start first by complimenting Dr. Edwards on the way he presents the information, in a manner that probably the public understands; but it's not really presenting the whole fact relating to the PCR.

The mention of the positive coefficient reactivity -- which is, as he accurately calls the generic action item -- has been raised internationally and has been closed internationally by the CNSC.

The CNSC is a signatory to the convention of nuclear safety -- and the technical debates take place by peer review, by independent -- other countries. And at the last convention of nuclear safety, the CNSC presented its action and its -- the

systematic approach and what's being done with respect to the positive coefficient reactivity -- and the issue internationally has been accepted and closed. So the PCR itself, the generic action item is a -- it's a thing that's always being raised by Dr. Edwards and it is closed internationally now.

On the specific, I will ask Dr. Rzentkowski or Dr. David Newland or actually Michel Couture -- Dr. Couture to provide the specificity with respect to the PCR. This is not a new phenomenon. We know the process.

DR. COUTURE (CNSC Staff): Thank you. Michel Couture, Director of the Physics and Fuel Division, for the record.

Short answer -- and then I'll explain a bit more -- the use of Low Void Fuel would not eliminate the fact that the CANDU has a positive void reactivity coefficient.

As Dr. Edwards has mentioned, what does it mean to have a positive cooling void reactivity coefficient? It means that if you have a Loss Of Coolant Accident [LOCA], the voiding will translate into an increase in the number of neutrons, which translates into a number increased in fissions, and therefore a power surge.

As the safety analysis demonstrates, the shutdown system will be activated. Current safety analysis demonstrates that the shutdown system will be activated and safety limits will be met.

Now the concept of the Low Void Fuel is to have, essentially, the same -- it's a 37-element bundle and a central element is -- we -- the designer introduced some neutron absorbents -- absorber materials that absorb neutrons in the central element. And in order to compensate for that, they had to increase the enrichment. So it's about 1.2 percent enrichment for the rest of the bundle.

This bundle has no effect during normal operation but if you had a Loss Of Coolant Accident, what would happen is that, like I said, the neutron population increases but now, since you have an absorbent at the centre of your bundle, these neutrons would be absorbed. So what it does is, the power surge would still be there but at a much lower rate and the shutdown system would be activated. And your safety limits would be met but with a large margin.

DR. EDWARDS: May I say something on this?

DR. COUTURE (CNSC Staff): Yes please.

DR. EDWARDS: This is exactly my point. I don't think the CNSC is an elected body. I don't think the CNSC has the right to make such decisions for the population at large. I think the CNSC should be reporting back to its political masters and saying "Look, this requires some political consideration."

This is not only a technical and scientific and engineering problem, this is a problem that could have consequences of major proportions, under the worst circumstances. So does our political system think that we want to accept a larger

risk and put most of our reliance on the shutdown systems -- which are not always even available, as I understand it? Or do we want to provide a much greater margin of safety at some extra expense, by using this type of fuel?

Now I realize this sounds like a technical question; but at some point, society itself has to be involved in these decisions. At some point, our political system has to decide: what are reasonable risks to take? and what level of reasonable risk do we want to accept?

In the past, I have asked the CNSC to recommend a national public inquiry into the future of nuclear power -- so that we can have a democratic process which will educate not only the public. I heard the other day Dr. Binder mention how disappointed he was that people are so poorly informed about nuclear power.

Well this also applies to our elected representatives. If we had a process whereby all of the benefits and all of the risk could be put on the table in a coherent and meaningful way, we would have a record to allow society, as a whole, to make certain decisions.

I don't believe it's up to the CNSC, as an unelected body, to make these decisions on behalf of society but rather, to refer back to Parliament those decisions which may have important societal repercussions ---

DR. COUTURE (CNSC Staff): Thank you.

DR. EDWARDS: --- such as whether or not to use a Low Void Reactivity Fuel.

THE CHAIRMAN: Okay, I give some reaction first from OPG and then Dr. McDill.

MR. TREMBLAY (OPG): Pierre Tremblay.

Just to get back to the matter at hand and the question that the Commission asked. I just want to make a point that, you know, the Darlington Plant and the Safety Case is assured. The plant has adequate margins. It meets all the safety requirements. We have fast acting safety systems and we meet all the requirements. And so that's an important point that we need to understand and put on the table.

In terms of Low Void Fuel and that issue, let me just ask Mark Elliott, our Chief Engineer, to talk a bit about the work we've done in this area.

MR. ELLIOTT (OPG): Mark Elliott for the record.

To go to a new type of fuel would be a major change in our design. It would require some enrichment. We've talked a lot about natural uranium fuel. So this would be a major change and when you look at the safety margins that we have, they're solid.

Every time we look at this issue, we're looking at it again from a point of view of large-break LOCA. That's an issue that has come before you before. When we've looked at that in detail, we still have significant margin.

So this is not an issue that affects our safety goals, as Mr. Tremblay mentioned. We meet those with margin and there's really just no reason to go to Low Void Reactivity Fuel.

THE CHAIRMAN: Thank you.

MR. ELLIOTT (OPG): Can I just make one other comment? I have to correct the intervenor about operating without shutdown systems. I've been a shift supervisor at Pickering, I've been a shift supervisor at Darlington, I've been a site Vice President, and as Chief Engineer, we would never operate a reactor with the shutdown systems unavailable. That would not happen.

THE CHAIRMAN: Okay. Dr. McDill?

MEMBER McDILL: Thank you, that addresses one of the questions I was going to ask. Dr. Edwards, where would you propose that the enrichment of the fuel be carried out?

DR. EDWARDS: Well we have no enrichment plants in Canada so it would be purchased from the United States. This was seriously considered by Bruce Power. In fact, it was even a design requirement of the proposed Advanced CANDU Reactor (ACR). The Advanced CANDU Reactor (ACR) would not even function without this kind of Low Void Reactivity Fuel.

One of the reasons for the Advanced CANDU Reactor design was precisely to move away from this positive void coefficient problem through a better fueling regime -- and through other design changes which would seriously reduce this problem. Because it ***is*** a problem.

Now with regard to the unavailability of the safety systems, there used to be published unavailability statistics on all of the safety systems, including the emergency core cooling system and the shutdown systems. I have records of these in the past.

These unavailability statistics are no longer published. And I'm wondering "Why not?" Because there are periods -- discovered after the fact -- when one or more safety system may not have been available. Not intentionally of course, or not to anyone's knowledge at the time. But later on, it is discovered that there was [a period of] unavailability of certain safety systems. Are we being told now by the Proponent that these systems are always 100 percent available? And there are no unavailability statistics at all?

THE CHAIRMAN: Just to clarify the question, there are literally hundreds of safety system. I thought we were talking about the shutdown. . . .

DR. EDWARDS: Yes, I'm talking about the shutdown systems.

THE CHAIRMAN: Right. Well, I'd be surprised if they were unavailable. Can somebody -- staff, would you ever allow for unavailability of the shutdown systems?

MR. JAMMAL (CNSC Staff): Ramzi Jammal for the record.

The answer is no. We will not allow them to operate without the availability of the shutdown systems. But I would like to counter Dr. Edwards.

He is manipulating -- a lot of the reports were after the fact. When there is a mention -- as you mentioned, there are multiple safety systems, okay? And the key element is, no reactor will be allowed to operate without the safety system is fully functional or in operations.

THE CHAIRMAN: But is there are a time when one sort of failed and then you had to do an outage?

MR. JAMMAL (CNSC Staff): Of course, that's why the reactor always goes into a shutdown state. I'll pass it on to Dr. Rzentkowski, Director General of the -- Director of Power Regular. As a matter of fact, we can pass you to Mr. Webster who's Director of the Darlington.

MR. WEBSTER (CNSC Staff): Thank you Mr. Jammal. It's Phil Webster, the Darlington Director.

Let me try to sort through the issues here. There are four special safety systems; two shutdown systems, emergency coolant injection and containment. And there are many thousands of tests every year. Essentially every shift in the station tests some part of one of the special safety systems. When a test is being performed on a shutdown system, for example on one of the channels, the channel is set to a tripped state before it's tested. So in other words, this is set to the safe direction before the test is performed. This sometimes leads to announcing it as a serious fault on another channel while the test is being performed. If there is an unavailability, especially of the ECI [Emergency Coolant Injection, otherwise known as the Emergency Core Cooling System] or the containment system -- and by unavailability, I normally refer to a loss of redundancy or perhaps a reduction in its full capability -- the rules require that to be fixed within a defined time -- often 8 hours or 24 hours -- or the station must be shut down.

So the station never operates without shutdown systems. It may operate for a very short period with a reduced availability of emergency coolants or containment. And it's not the full containment. It's often something like an airlock door seal [that has failed to inflate].

THE CHAIRMAN: So just to close this, because we should move on to other items that Dr. Edwards raised. I'd like a clear statement. Is the low void reactivity [fuel] with enriched uranium a safer system than the current existing system?

MR. COUTURE: Michel Couture, Director of Physics and Fuel Division for the record. The -- the safety if you're asking if it's safer, the experience we had so far was -- was with two channels in Bruce Power. We've never looked at the whole safety case of the Low Void Fuel, so the safety if you ask if it's more, it's safer,

we would have to look at all the implications of changing the fuel to a Low Void Fuel.

THE CHAIRMAN: Dr. Edwards seemed to indicate or at least suggest that it would be a safer system ---

MR. COUTURE (CNSC Staff): Well, like I mentioned that the -- the idea behind the Low Void Fuel is, as an absorbent, would reduce the -- the power surge. So if you ask if that -- that is safer, that would certainly accomplish that task. But you have to look at the whole thing. Do we have already enough margin? There's a whole project right now looking at the large LOCA. And we are looking at a new analysis framework because the current analysis framework has a lot of, various assumptions and they're -- like instantaneous break of large pipes. Of course, if you put that in your analysis, instantaneous breaks of large pipes, you'll have huge loss of coolant. However we're looking at fracture mechanics, probability of breaks, is this realistic, and so on.

So we're -- we're looking into this. And the Low Void Fuel has been put as a -- as a possible option should this analysis cannot be supported on the strong technical basis. So the work is underway right now. There's a huge effort in the industry.

THE CHAIRMAN: So, but if you actually reach the conclusion that it is -- I'm still struck. So is it easy now to buy enriched uranium from the U.S. and ship it over to Canada if we needed to? I'm -- just hypothetically?

MR. JAMMAL (CNSC Staff): Well, I won't . . . it's Ramzi Jammal for the record . . . I won't call it, it is easier, well, it's, we will have to have the import/export agreements; but your question, "Is it safer?" The answer is going to be, "Just as safe as . . ." At minimum, it's going to be as safe as what it is right now. Otherwise we're not going to allow it to -- to be licensed. So the facility as licensed today is safe. Any new modification, enrichment or not, must be an equivalent to safety to what we currently have. The debate is it safer or not, the issue -- that's not the issue here. Is it going to be safe? It must be at minimum equal to what we currently have in safety.

So regardless of what -- what's in it or not, so the -- the composition is not the issue here is, as Dr. Couture mentioned, it is the safety case, but it must meet the safety requirements, it doesn't matter what it is.

THE CHAIRMAN: Okay, last word on this.

DR. EDWARDS: Okay, for me?

THE CHAIRMAN: No, just a second, just wait a second, staff is still --

MR. RZENTKOWSKI (CNSC Staff): Thank you very much. Greg Rzentkowski for the record, we have to realize that -- this point has been discussed this morning already. A reactor is a very complex system. It behaves in a complex way. It breaks in a complex way. We talk also about the probabilistic safety assessment.

It has to be realized that in probabilistic safety assessment we evaluate hundreds if not thousands of different initiating events.

Now this is only one accident scenario we are discussing here, a result of Positive Void Reactivity. So that's why it's very important to assess the overall safety case in a very holistic way.

It also has to be recognized that Positive Void Reactivity manifests itself also for the enriched fuel -- it manifests itself only during the over-cooling transient, not the overheating transient. So, once again, I would like to stress the fact that the overall safety case is what counts. And we have a very rigid [rigorous?] safety case right now for operating CANDU reactors.

THE CHAIRMAN: Okay.

DR. EDWARDS: As an intervenor, I find it not reassuring that the CNSC staff is not willing to say that the overall judgment regarding Low Void Reactivity Fuel has been that it would be safer. Because this is one of the selling points of the Advanced CANDU Reactor design. They were selling it on the basis that this was going to be safer, that they were going to achieve even possibly a negative reactivity coefficient -- which would mean that instead of getting a power surge, you get a slight power drop -- that would be a lot safer. So the idea that the staff is not even willing to entertain the idea that something could be safer than something else bothers me enormously. Because safety is not an absolute.

I've been involved in analyses regarding the Positive Void Coefficient of Reactivity going way back to the 1970s. It was brought up during the Porter Commission hearings in 1977-78. And every time that there has been a reanalysis which led to different results, regarding the effects of the Positive Void Reactivity Coefficient, they've always been worse for the safety case. In other words, time and again -- on several different occasions -- the CNSC staff has found that previous analyses were in fact wrong, and were not as conservative as they hoped. And that the consequences of a loss of coolant accident could be in fact considerably more challenging to the safety systems than previously thought. I believe that sheer honesty requires an admission that that is the case.

THE CHAIRMAN: Okay, staff, last word here.

MR. JAMMAL (CNSC Staff): Ramzi Jammal for the record, I'm pretty sure Dr. Edwards is -- is -- knows that every design in every reactor has a PCR factor. We have with us Dr. Rzenkowski who was the authority responsible for the review of the CR and I will pass on to Dr. Rzenkowski.

THE CHAIRMAN: No, it's a little bit -- we got to move on. Monsieur Harvey, what's your final question on this please?

MEMBER HARVEY: Just one question because all the security is based on the shutdown system, mainly on the shutdown system. So my question is, are those

systems well protected and located in such a way that any accident could not nullify or stop the operation of those systems?

MR. TREMBLAY (CNSC Staff): Pierre Tremblay for the record.

You know, the systems you are talking about are fully independent. They're located in different areas so that a common load event doesn't impact on them. So systems are very reliable. They're tested. I think Phil Webster talked about the testing regime. They're tested every day on a regular basis.

So, you know, I guess the one comment I would make is that, you know, the ACR is a completely different reactor design. So you're talking really apples and oranges here. Our -- our plants are safe. They remain safe. Should we decide to go to a different type of fuel, we would only do so after a significant analysis and looking at the implications around managing and operating a plant.

And so, and we wouldn't introduce it unless we thought it was as safe. That's the comment ---

THE CHAIRMAN: Okay, let's move on to other, Ms. Velshi.

MEMBER VELSHI: Dr. Edwards, one of the other issues you raised was the uncertainty around the dangers and cost of dismantling nuclear power plants. I will ask staff and OPG because last night we heard that decommissioning costs and plans were based on actual international experience.

And we recognize we don't exactly have that in Canada to give us specifics on that. But I wanted to confirm with you that this issue you have stands whether we refurbish or not, right?

DR. EDWARDS: Well, it does stand whether you refurbish or not. But it does affect the ultimate safety of the whole system. For example, in Quebec, we have decided not to refurbish [the Gentilly-2 reactor] -- and I believe that Ontario Power Generation has also decided not to refurbish the four Pickering B reactors -- so we are going to be facing this problem of dismantling.

Now here in Quebec, we recently heard from the chief executive of Hydro Quebec that the cost of dismantling the Gentilly 2 reactor is now estimated by him as being close to $2 billion. That is way more than what was filed by Hydro in their official documents to the CNSC, as to what they thought at that time that it would cost for dismantling Gentilly 2.

Also, what I find strange is that they say now, here in Quebec -- and also in their plan that they submitted to the CNSC -- that they would not dismantle it until they wait for 40 years for the radiation levels to decline. 40 years!

So this of course, pushes the day of reckoning way off into the future; whereas, with the refurbishment, they send people in right away.

And in large measure, you might say the refurbishment of a reactor is a kind of a mini-decommissioning [or mini-dismantling]. Because the workers are going right into the most radioactive part of the core and they're taking out of the reactor these old, highly radioactive tubes -- the pressure tubes, the calandria tubes, and so on.

So why do they have to wait 40 years for dismantling, and yet they can do the refurbishment right away? To me it doesn't seem to add up.

What I'm concerned about here is that we're talking about a very large and uncertain future cost which hasn't been factored properly into the equation.

And of course, in terms of the CNSC, the greatest problem is not so much the cost -- because that's not supposed to be your concern -- but the worker safety and the environmental safety. And where are all these thousands of truckloads of radioactive rubble going to go.

THE CHAIRMAN: Staff?

MR. ELDER (CNSC Staff): Peter Elder, for record.

So in terms of the costs of decommissioning, as we've said before, these are based on -- the estimates are based on the real cost of real projects in -- mostly in the United States. But they're -- the costs are based on the real examples of what it costs to decommission and they are updated every time there is new data available.

There is a difference and as Mr. Edwards -- what assumptions the licensee makes in their decommission plan. So if you said -- and Hydro Quebec used to say, I'm going to -- up until a few months ago -- I'm going to refurbish the plant, operate it for additional 20 years, then the time that you need the decommissioning plan is not now, it's in -- decommissioning funds is not now, it's in 20 or 25 years.

That obviously makes a difference in your cost estimates, because they do account very conservatively for growth of any money.

In terms of -- you raised in going back in; one of the things the plan also has to do and cost, is the disposal of the waste. Now again, you said in terms of what is the -- from the CNSC perspective, these are not -- there's lots of international experience on decommissioning. The radiological hazards are well-known, but in every single case, you have to go in and assess them on a case-by-case basis.

So yes, Hydro Quebec has a lot of work to do to go and assess what risks are there and how they're going to manage those risks.

THE CHAIRMAN: Did they submit a plan for decommissioning? Do they have to submit a plan for approval? I don't know where ---

MR. ELDER (CNSC Staff): Yes.

THE CHAIRMAN: --- Gordon Edwards is getting his numbers from, but I understand that those numbers have not been decided until they come up with a plan; is that not correct?

MR. ELDER (CNSC Staff): They -- what they're now is -- Hydro Quebec has given us their approach, their strategy, they have not given us a detailed plan.

So right now, all we can say is these are the numbers that Hydro Quebec is making for financial purposes. We have not seen their reanalyzed plan with their new assumptions.

THE CHAIRMAN: Okay. Ms. Velshi, that's it? Anybody else now? Some more questions?

Dr. McDill?

MEMBER McDILL: But in the normal process of developing a decommissioning plan, is it not normal to allow for a certain period between shut-down and the beginning of decommissioning? And that's on the order of several decades typically, is it not?

I'll -- maybe I should look at OPG for that, for example, with yours.

MR. TREMBLAY (OPG): Pierre Tremblay, for the record.

Yes, that's correct. And we have a -- you know, given the unique nature of the business, we do have funds set aside. We talked about this in earlier days and we have a very good idea of what the practices are globally and have worked with them.

So -– but typically, as is our plan -- and some of this is covered in the EA as required -- we'll -- the plans are to have a period of several decades before the actual physical dismantling.

We can get into more details, but that's -- you're correct.

THE CHAIRMAN: Monsieur Harvey?

MEMBER HARVEY: Dr. Edwards mentioned the document that has been presented yesterday -- the OPG document that has been presented yesterday by Mr. Stensil. It appears that the document is on internet, but could OPG table that document?

MR. TREMBLAY (OPG): Pierre Tremblay, for the record.

Yes, we can. We will do so.

MEMBER HARVEY: Thank you.

DR. EDWARDS: Would that be on the website then, could I access it?

MR. TREMBLAY (OPG): Pierre Tremblay, for the record.

It's already available on the website.

DR. EDWARDS: Okay.

THE CHAIRMAN: Okay. You know, sometimes in the mountain of data that's available, can somebody find the document? Because we want to make sure that this document that was the centre of discussion yesterday, as discussed by Greenpeace, is available. We would like to know where you can find it. All right?

DR. EDWARDS: May I also say that I will send something to the Commission. Because it's been challenged, this question of the unavailability of the safety systems, including the shutdown systems -- I have statistics from the past showing on a yearly basis, for the different reactors, the unavailability of the four primary safety systems -- which are the emergency coolant injection [ECCS], the containment [CONT], and the two fast shutdown systems, SDS-1 and SDS-2. I will send those to the Commission through Dr. Binder.

http://ccnr.org/ Safety_System_Memo_2012.pdf

I'm puzzled as to why those statistics are no longer available. They used to be published all the time.

MEMBER McDILL: Can we get a comment on that from staff, please? I think that's a critical thing for the community to . . .

MR. WEBSTER (CNSC Staff): Sure, it's Phil Webster, for the record.

As the Commissioner is aware, we have a regulatory document, S-99, that requires certain things to be reported by the licensees to the Commission.

One of those things is an annual reliability report that includes the unavailability, the actual past and the predicted future unavailabilities of the four special safety systems.

DR. EDWARDS: Oh, all four of them! Okay! So there ***are*** unavailabilities!

You see, the reason why this is important is that, in the probabilistic safety analysis, you have to assign a probability for a safety system failing. And that probability has to be measured against actual performance.

So if you're going to say that a safety system will fail only once every 100 reactor years, or once every 1,000 reactor years, or whatever, then you have to be able to verify that against the actual record. That's why you need to have these unavailability numbers. Without the unavailability numbers you cannot really test the realism of the probability calculations.

MR. WEBSTER (CNSC Staff): Phil Webster, again, for the record.

Yes, absolutely. That's why they are measured by the licensees and reported to the regulator. And we have our annual report on the safety performance of the nuclear power stations. And what we report in there -- and I can't be too clear on the specifics -- is where systems have been unavailable. The Darlington ---

DR.EDWARDS: Oh.

MR. WEBSTER (CNSC Staff): --- special safety systems, all four, have to meet a target of 10 to the minus 3 -- that is they must be ---

DR. EDWARDS: Right.

MR. WEBSTER (CNSC Staff): --- unavailable, less than one one-thousandth of the time.

THE CHAIRMAN: And those reports -- he keeps making [the claim that] the reports were published and they're not published now. Are they still published? What are we talking about there?

MR.WEBSTER (CNSC Staff): The reports are publicly available.

DR.EDWARDS: And it does list the percentage of unavailability? The measured percentage of unavailability of each of the four safety systems?

MR.WEBSTER (CNSC Staff): It's Phil Webster, for the record.

I don't have any with me, but the practice has been to calculate the actual past unavailability and then predict the future unavailability.

THE CHAIRMAN: OPG, do you know if they are available?

MR. TREMBLAY (OPG): Pierre Tremblay, for the record.

I think we report this to the CNSC on a quarterly basis as well, so all of this information is available.

THE CHAIRMAN: And yes, we'll check. We'll -- I guess -- could you check and let us know?

MR. TREMBLAY (OPG): Pierre Tremblay, for the record.

DR. EDWARDS: Do that because ---

THE CHAIRMAN: Please check and then let us know, okay?

MR. TREMBLAY (OPG): Pierre Tremblay, for the record.

I just wanted to be clear on the request you've made and the information.

There are actually two documents that are relevant to the discussion yesterday. The first is the report in question, in terms of the results and the probabilities. And the second report is a technical basis for selection of the reactor accidents for the Darlington environmental assessment. And both of those documents will be made available to support this discussion.

THE CHAIRMAN: Okay, thank you.

Dr. McDill?

MEMBER McDILL: Maybe OPG did comment on the comment just made by staff on what Dr. Edwards was asking you -- you were talking back and forth -- but perhaps it's been clear. Maybe it's been answered by staff.

THE CHAIRMAN: Anybody else?

Okay, you know you keep mentioning the political route. And I agree with you. I don't know if you heard the statement that in terms of the big energy policy, you heard there's a big debate now politically whether Canada should have an energy policy.

We are not going to deal with this. I don't know which government will deal with this but it is not the mandate of this Commission.

Same thing with the Ontario government future about the energy mix. They have whole different agency, it's called the OPA [Ontario Power Authority]. They have the Ministry of Energy. And it's going be the Ontario government who decide this.

Our mandate is very clearly specified in legislation, and we are just following our legislative responsibility. And I got to tell you that if you want some of those -- again, review of the whole nuclear [issue] -- you should approach Ministers. They are the people who report to Parliament on policy issues, not on administrative legislative issues.

So I'm not going to argue with you whether it should be done or should not be done. It's just that we are not the vehicle for doing it.

But thank you for the comment. And actually, you have the last word here, Dr. Edwards.

DR. EDWARDS: Thank you very much.

Well, although energy policy is a provincial responsibility, nuclear policy is a federal responsibility. There are also [potential] effects of nuclear power offshore, for example the effects on the United States in the event of a major accident. This would not be confined to one country very likely. We're not like Japan; we're not an island.

So I do think that you have major political policy considerations [here]. My fundamental point is that these decisions about safety are not just technical and scientific, but they do involve judgments. And I don't think the CNSC has really got a mandate from the population of Canada to make those judgments on their behalf.

I do believe that it is civic duty of all citizens to report when something really needs to get a proper policy attention.

And since the CNSC says that it reports to Parliament, I'd like to know: "What does it report to Parliament?" If there's anything that should be reported to Parliament, it is that there should be some Parliamentary concern about coming up with some kind of system for reviewing Canada's policy on nuclear power. Because frankly, it never passes through the minds of most of the politicians in Ottawa. It's not an issue.

And I do believe that it's up to the CNSC. I think that the politicians in Ottawa and political representatives around, even in the provinces, depend heavily on CNSC's judgment. I think that at some point the CNSC should be saying, "Look, we can make the best technical and scientific judgment, but when it comes to policy decisions it's really a political matter. And we need to get the guidance from the policy makers. We're not going to set those standards. We're not going to set those guidelines."

THE CHAIRMAN: I think we are in agreement. It's just what a definition of policy is where we -- sort of differ.

The moment you mention the word policy, Ministers don't want to hear from me. The policy domain is their responsibility. What they're looking for from us is, you know, to administer our role in legislation. That means if Ministers and government decide to build a nuclear facility, CNSC makes sure it's done safely. That's it. That's all.

And, you know, we are not going to go into discussion of any policy issues associated with whether we should build or not, et cetera.

So that's the difference. And I encourage you -- that if you feel strongly about -- that require fundamental a new -- I don't know -- task force group et cetera, Commission [of Inquiry], you need to talk to the political ministers, either provincial [or federal].

The new government in Quebec did not phone me up and say "Do you think we should stop the decommissioning [sic] of Gentilly-2?" They decide on their own, all by themself. They didn't ask technical advice from us.

And I am sure that the government of Ontario will not phone me and ask, "What do you think about whether we should refurbish or not refurbish?"

So I'm just trying to tell you that if you want those issues to be addressed -- they're not going to be addressed by us. Dr. McDill?

DR. EDWARDS: Thank you, Dr. Binder.

I just would like to say that the shoe's on the other foot; it's not a question of the government asking you what should be the policy. It's on the contrary, you asking the government what should be the policy. They're the policy makers.

And just as we heard at the beginning of my presentation, New York Governor Andrew Cuomo has decided that he thinks that it's inappropriate to have nuclear power plants operating so close to the New York metropolitan area. That's not a regulatory thing, that's something that comes from the political level.

THE CHAIRMAN: Absolutely.

DR. EDWARDS: And this is what I'm really talking about. I'm saying that there a lot of policy matters which are in effect being made by the CNSC without an elected

mandate. Because they're deciding what level of risk Canadians should be willing to accept with regard to Positive Void Coefficient and so on.

THE CHAIRMAN: Dr. McDill?

DR. EDWARDS: Thank you very much for your ---

THE CHAIRMAN: Don't go away, you're going to have the last word, but somebody wanted to ask a question.

MEMBER McDILL: Dr. Edwards, one thing that we can do, and that we have done in the "Reasons for Decision", is to make clear the opinion of the population that we have spoken to or have spoken to us. That is often sent out through the Reasons for Decision.

THE CHAIRMAN: And you -- some of the argument that's put in there will be mentioned in proceedings and decisions.

So okay, now you have the last word.

DR. EDWARDS: Well, again, I would like to congratulate the CNSC for performing a very valuable service in terms of making these hearings available, and making the records available -- putting information on the internet; opening up these discussions in such a way that they become understandable to more people. And I encourage you to continue in that vein.

I do find that there is a real perception problem. When people look at these proceedings they see, rightly or wrongly, the CNSC staff and the Proponent as being virtually indistinguishable. They give the same answers. They don't seem to be two different parties, but rather one party, shoulder-to-shoulder, saying the same thing.

And I think this is a perceptual problem which is going to seriously impede the credibility of the functioning of the Commission in the public's eyes.

THE CHAIRMAN: Okay, thank you. Thank you.

(APPLAUSE/APPLAUDISSEMENTS)

DR. EDWARDS: Thank you.

Link to CCNR's written submission opposing the proposed refurbishment:
http://www.ccnr.org/Darlington_refurb_2012.pdf

Link to CCNR's Memo on the unavailability of CANDU Safety Systems:
http://www.ccnr.org/Safety_System_Memo_2012.pdf
