INDEX



Undertakings

New Brunswick Board of Commissioners of Public Utilities

In the Matter of an application by NB Power dated January 8, 2002 in connection with a proposal for Refurbishment of its facility at Point Lepreau.

Delta Hotel, Saint John, N.B.
June 13th 2002, 9:30 a.m.

New Brunswick Board of Commissioners of Public Utilities

In the Matter of an application by NB Power dated January 8, 2002 in connection with a proposal for Refurbishment of its facility at Point Lepreau.

Delta Hotel, Saint John, N.B.
June 13th 2002, 9:30 a.m.

CHAIRMAN: David C. Nicholson, Q.C.

COMMISSIONERS: Ken F. Sollows
Jacques Dumont
H. Brian Tingley

BOARD COUNSEL: Peter MacNutt, Q.C.

BOARD SECRETARY: Lorraine Légère

.....

CHAIRMAN: Good morning, ladies and gentlemen.

Preliminary matters, Mr. Hashey?

MR. HASHEY: No, Mr. Chairman.

CHAIRMAN: Anybody else? Thank you, Mr. Thompson.

MR. HASHEY: I am sorry. I believe there are a couple of undertakings that Ms. MacFarlane can address, just to get everything on the record and cleared up as much as we can here.

CHAIRMAN: Good. Go ahead, Ms. MacFarlane.

MS. MACFARLANE: Yes. We understood there to be an undertaking from Mr. MacNutt asking for the differences in

cash flow on the Coleson Cove project between the business plan, the evidence filed here in appendix B-3, the addendum to the financial projection and the exhibit A-20 which represented the actuals for O1, 02 and the budget for 02, 03. And we have prepared a document indicating the differences in those cash flows.

CHAIRMAN: That will be A-27.

MS. MACFARLANE: So the first line represents the evidence submitted in the Coleson Cove hearing, the business plan and financial projection.

The second line would represent the figures in Appendix B-3, exhibit A-1, showing the cash flow changes from moving the project completion date from November '05 to November '94. And in fact those same figures were included in the evidence for the Coleson Cove hearing.

And the third line are the figures from exhibit A-20 which we were asked to submit, showing the actual expenditures in '01, '02 and the budgeted expenditures in '02, '03.

As I had indicated yesterday, although the project date was moved forward one year, the cash flows were somewhat backend loaded because of the change in how the project was being undertaken.

There was also a question from Mr. MacNutt, an answer

for which I would like to read into the record. On page 1388 of the transcript Mr. MacNutt asked me what the limit on shortterm borrowings was and I had indicated that subject to check I believed that it was 50 percent of total revenues. In fact I have checked that and the Board resolution indicates that temporary borrowings by the corporation from the Province of New Brunswick are authorized up to 50 percent of the previous fiscal year's total revenue of the corporation. So that includes in-province revenue and out of province revenue.

I also stated that this was a Board resolution, not an imposition by government, and I was incorrect there. It is a Board resolution. But it is also included in the Electric Power Act in Section 18-1 of the Act.

CHAIRMAN: Are those all the undertakings responses? Any of the interveners have any matters they wish to bring up? Mr. Thompson. That is number 15.

MR. THOMPSON: Mr. Chairman, yesterday afternoon --

CHAIRMAN: You better pull the mike in a bit, Mr. Thompson.

MR. THOMPSON: Yes. In response to a request by Mr. Coon the day before yesterday, NB Power filed information yesterday labelled A-25 which was a comparison of the cost between Lepreau refurbishment and new combined gas cycle. And in respect to that, I believe that I mentioned

yesterday Mr. Coon might not be in until the first of the week but he is coming in this morning. And I believe that he may like to, you know, question this panel or make a comment about that. Thank you.

CHAIRMAN: Anything else? Mr. MacNutt.

MR. MACNUTT: Thank you, Mr. Chairman.

CHAIRMAN: I would like to introduce some documents we referred to yesterday, the Business Plan and Financial Projection 2001/02-2208/09, March 2001. That was the document that was introduced in the Coleson Cove hearing. I would like it introduced as an exhibit in this hearing.

And the second document I would like to introduce into evidence in this hearing is the New Brunswick Power Corporation Annual Report 2000-2001. This will then give the Board a complete financial record of NB Power for the purposes of this hearing.

The Business Plan and Financial Projection document will be PUB-3. And the 2000-2001 Annual Report from NB Power will be PUB-4.

CHAIRMAN: Okay. Go ahead.

MR. MACNUTT: Yes.

Q. - Mr. Marshall, you would agree that there has been considerable discussion during the hearing about what might cause an increase in the costs associated with the

proposed refurbishment of Point Lepreau.

MR. MARSHALL: Yes.

Q. - Now with respect to the natural gas --

CHAIRMAN: He hadn't finished, Mr. MacNutt.

MR. MACNUTT: Pardon?

CHAIRMAN: He hadn't finished his answer.

MR. MARSHALL: Yes. There has been discussion.

Q. - Thank you. I'm sorry. Now with respect to the natural gas combined cycle plant option, what are the key variables?

MR. MARSHALL: The key variables in the gas option would be the capital cost to construct the project at I believe it is $435 million, the operating costs to operate the facility, some ongoing capital maintenance which is small and the availability and price of natural gas fuel which is the predominant cost for a combined cycle gas unit.

Q. - Now are you aware of -- that the US Department of Energy, Natural Energy Technology Laboratories, Strategic Centre for Natural Gas has expressed the opinion that the natural gas must stay below US dollar $4 per MMBTU on a sustained basis to bring about the construction of new natural gas combined cycle plants in the US?

MR. MARSHALL: I'm not aware of that, no.

Q. - Okay. Do you know what is the sustained price in

Canadian dollars per MMBTU below which it becomes attractive in the NB Power market area to construct new natural gas combined cycle plants?

MR. MARSHALL: That depends on the alternative competition in the market. I believe we submitted evidence in the Coleson Cove case that the equivalent natural gas price had to be down to around $2.05 to 10 cents US. That would be equivalent to about a little over $3 Canadian a million BTU to compete with Coleson Cove.

The price -- the evidence here with the sensitivity on gas at the $3 gas price, the $3 US price, the gas option is more economic than Lepreau.

So I would say the breakeven price on gas is probably, I would have to estimate, in the middle subject to check, probably around $3.30 US. That equates to roughly a little over $5 Canadian.

Q. - Thank you. Now besides price, what other variables militate against the construction of a new natural gas combined cycle plant in New Brunswick Power market area?

MR. MARSHALL: I think the key issue on gas is availability of gas. And the issue right now is that gas -- the gas that is currently being produced by the Sable offshore energy producers is all contracted and all used through existing contracts.

The amount of increased production is not yet proven. The increased production from the Pan Canadian wells is also I believe to be contracted to the US and is subject to an application currently before the National Energy Board to expand the pipeline and ship that gas to the US.

The production of both of those sites on the east coast is projected to run out prior to 2020. And so it is currently -- the current production is not sufficient to meet the current operation of gas perhaps longterm.

So unless there are new supplies developed on the east coast offshore, the availability of gas to do a plant is a serious issue.

Q. - What consideration in examining the NGCC option has NB Power given to the possibility of flowing gas north from the US rather than relying on Sable?

MR. MARSHALL: If you flow gas north -- and even if you take some of the gas from Sable, our discussions with producers and others who have had discussions with producers, in my understanding of the pricing of gas, is that even if you can get some of the gas from Sable you cannot get it on a net back price from Boston.

You may have to pay the full Boston price or even a premium over that in order to get the gas. So to flow gas back from Boston would be a price that would be 70 cents a

million BTU's higher than what we have in our forecast. And that is 70 cents US.

And just so that you understand that, 70 cents -- and I believe it is actually 71 1/2 today, is the firm toll on the US portion of Maritimes pipeline.

So the total cost of bringing gas differential on the pipeline toll from Boston to here is 71 cents. So the Boston market essentially is about 70 cents higher than the prices we have in our model.

Q. - Thank you. Now in your preparation of your evidence for this hearing, what have you come to understand are the problems being experienced in the New England market area that are delaying the construction or coming on line of new natural gas combined cycle plants?

MR. MARSHALL: I think the -- well, I don't know that there are any issues that are delaying projects per se coming on line in New England.

In New England initially there were proposals for as much as 25,000 megawatts of power plants. I think it is the natural competition in the marketplace that many of those projects have just not come to fruition because developers have decided they were not going to get a return on them.

The projects that were up front and committed I

believe have been constructed and have come on line.

Q. - What would happen that would cause an increase in the costs associated with the NGCC option in the analysis presented in your evidence on the present application?

MR. MARSHALL: Would you rephrase that again please?

Q. - What could happen that would cause an increases in the costs associated with the NGCC option in the analysis presented in your evidence on the present application?

MR. MARSHALL: With the cost of turbines which is the significant portion of the capital cost and subject to market forces could increase, the -- there could be delays in construction so that the IDC on the project could increase. And there could be increased costs.

And I think that is evidenced from the Bayside project which we had targeted to come on line earlier. And there were technical issues with that and delayed the in-service of that project. So those types of things could happen with a gas plant.

And then the price of gas is the key issue, that if gas had to be procured out of the Boston area the cost would be basically 70 cents US higher.

I might add one other thing with the gas, is that there is also the tremendous volatility of gas price, that if you want to contract for a firm price of gas to

guarantee the price as a price well into the future, you need to pay a premium.

Q. - Thank you. Now with respect to the NGCC option, what in your opinion is the most significant factor in its favor?

MR. MARSHALL: It is a lower capital cost option. It is what most new power plant construction is. So because of that, the gas combined cycle being the new marginal plants in the market area essentially influence the market price. So if you --

Q. - Yes.

MR. MARSHALL: There may be -- on the export side, there may be -- there is less risk that you are going to be out of the price. But then again, there is much less opportunity to make any money out of the export market if you build a gas plant. Because you are only going to have the same costs as the market.

Q. - Now with respect to this factor, what could happen that would make the NGCC the most desirable option compared to Point Lepreau refurbishment?

MR. MARSHALL: Low gas prices on a longterm stable contract.

Q. - Why do you think that there will not be a situation where this factor will be such that the NGCC plant is the most desirable option?

MR. MARSHALL: As I said, there are serious questions of

availability of gas from the east coast of Canada. And that is evidenced by the fact that the Province of New Brunswick has filed an application before the National Energy Board to review shortterm export orders of gas.

And the rationale behind that is that the current gas is all being exported out of the country and not made available to Canada through the current rules before the National Energy Board. And the Province has intervened to have those rules changed so that gas may be available to us.

So currently there is issues of gas availability of the current gas. And there are issues in the provincial evidence before the National Energy Board on the geology of the east coast, that there are serious questions to the availability of additional new gas.

So our concern is that we may not have gas available to us off the east coast. It may not be priced on a net back basis. We may have to pay Boston prices for it. If we have to pay Boston prices the economics are hindered.

Q. - Thank you. Now on a slightly different matter, I would like you to turn to exhibit A-1, appendix B2, the base gas spreadsheet.

MR. MARSHALL: Yes.

Q. - Now looking at that spreadsheet at a projected capacity

factor of 89 percent, the Point Lepreau refurbishment is shown to result in an NPV advantage over combined cycle natural gas of $234 million, is that not correct?

MR. MARSHALL: In that spreadsheet the number is $241 million.

Q. - Okay. I stand corrected. Now I want you to turn to exhibit A-1, appendix B-1, the integrated resource plan at page 31, table 4-3. I will run through that again. Appendix A-1 -- exhibit A-1, appendix B-1, integrated resource plan at page 31, table 4-3.

MR. MARSHALL: Yes.

Q. - Now on the bottom line, at a capacity factor of 80 percent.

MR. MARSHALL: Yes.

Q. - The Point Lepreau refurbishment shows an NPV advantage over combined cycle gas of 74 million, which you have corrected, it was my understanding, on June the 10th to be 126 million advantage, is that not correct?

MR. MARSHALL: No. I reference it in the transcript on June the 10th. It was corrected in responses to the first round of interrogatories to CCNB-95, I believe. So it would have been corrected back in March.

Q. - I just wanted to confirm that number. Thank you. Now I want you to go to exhibit A-1, your evidence, appendix

B-2. I think we are already there. In the -- I think we are already there. In the base case for gas the capacity factor of a gas unit is constant at 74 percent, correct?

MR. MARSHALL: Yes.

Q. - In order to compare the gas option with Point Lepreau you calculate an annual cost for replacement energy for the difference in generation of the two options. Perhaps I didn't read that correctly?

MR. MARSHALL: Is that a question?

Q. - Yes. In order to compare the gas option with Point Lepreau, you calculate an annual cost for replacement energy for the difference in generation of the two options, is that not correct?

MR. MARSHALL: Yes.

Q. - You assume the replacement energy is purchased, is that not correct?

MR. MARSHALL: No. We -- the replacement energy cost was calculated from the PROMOD runs out of the business case. The difference between having Lepreau in and out, out in the 2008, '9 time frame. So the differential cost reflects the cost of producing that energy from the NB Power system, so some of that energy would be increased operation of Coleson Cove, for instance, plus reduced export sales and the lost revenue of the export sales. So

it's a combination of those factors which determine that replacement price.

I believe that was responded to in an interrogatory as well, the methodology as to how that was calculated.

Q. - Yes. Could you point us to that please?

MR. MARSHALL: Well if you give me a minute.

Q. - Yes.

MR. MARSHALL: Let me just check. I think it is PNB-69 and supplemental 17. Let's take a look.

Q. - PNB-69 and supplemental what?

MR. MORRISON: Exhibit A-5, I believe. I believe it is PNB-65.

MR. MARSHALL: Okay. Yes. Yes, I have it. It is PNB-65. 65 (f). Page 362 of A-5.

Q. - Thank you. Now I want you to turn to exhibit A-16, slide 9. You are familiar with --

MR. MARSHALL: Yes.

Q. - You are familiar with the Kyoto protocols?

MR. MARSHALL: Yes.

Q. - Could you place on slide 19 the Kyoto protocol limits that NB Power would be faced with?

MR. MARSHALL: The -- that is still subject to negotiation and there are no defined limits as yet, depending upon the outcome of the Government of Canada's options on CO2, they

have laid out four plans. Even in those four plans they have not settled on any one and in any of those, they still have not identified specific allocations of caps or targets to sectors or industries or provinces.

So on that basis, what we did was take our number of 8.3 million tonnes which is the normalized number we have submitted to the voluntary registry -- the Voluntary Challenge Registry on CO2 and have used that as our base number.

The -- in order to meet that for Kyoto, the target is a 6 percent reduction from 1990, so it would be a 6 percent reduction from the 8.3, which would be about 7.8. So the line would be for 2010 and it is an average number from 2008 to 2012, so on that chart it would apply in 2010 and it would be at 7.3 -- or 7.8 million tonnes. Again that is out projection based on our filings. That is not necessarily the outcome --

Q. - But that line is not shown on slide 9 at present?

MR. MARSHALL: No. The line on slide 9 are the Governor's and Premier's targets, which are clearly defined in the Governor's and Premier's Climate Change Action Plan Agreement from August of last year.

Q. - Thank you. I am going to ask you to turn to exhibit PUB-2. Now this is not an IR response, but this is the actual

exhibit marked PUB-2.

MR. MARSHALL: Yes, I have it.

Q. - Thank you. In this exhibit, the unit revenues by customer class are provided, is that not correct?

MR. MARSHALL: Yes.

Q. - Now for the residential category, the revenue in cents per kilowatt hour sold was 5.73 cents in 1990. For 2000 it was 7.78 cents.

MR. MARSHALL: Excuse me. I can't see that yet.

Q. - In 2000, 7.78 cents residential, column to the left.

MR. MARSHALL: Okay. On the second page? Residential 1990, 5.73?

Q. - 5.73 for 1990, yes, on page 2. Well it is marked NB Power page 5 at the top, just under the line. And then I want you to come back to page I think it might be 3. I am looking for the years ending March 31, 2000, which is the lefthand column, and it has residential --

MR. MARSHALL: Yes.

Q. - -- 7.78 cents?

MR. MARSHALL: Yes.

Q. - Are those the correct numbers?

MR. MARSHALL: Yes.

Q. - The increase over the 10 year period, in fact, was 35.8 percent, to calculate the percentage?

MR. MARSHALL: That is correct, yes.

MR. MACNUTT: Now, Mr. Chairman, I would like to mark for identification a document which provides the NB consumer price index base 1992-100 for the years 1981 to 2001. This is a document taken off the StatsCanada data base maintained by the University of Toronto. If I could just mark that document for identification. We have copies for distribution.

MR. MARSHALL: Could we have a copy please?

CHAIRMAN: That would be marked for identification 13.

Q. - And we confirm that the witness does now have copies?

MR. MARSHALL: Yes.

Q. - Thank you. Now this table, which is now marked as Id. 13, shows 1990 values as 93.3 and the 2000 value is 112.8. The increase for the 10 years in the CPI would be 20.9 percent, would you agree with that?

MR. MARSHALL: That looks -- appears to be about correct.

Q. - Thank you. The increase in residential revenue per kilowatt hour significantly exceeded the increase in CPI during the period 1990 to 2000, would you not agree?

MR. MARSHALL: The 35 percent increase is more than the 20 percent increase, yes.

Q. - Thank you. Now for this reason do you agree that it is important to consider explicitly the price of elasticity

of demand in preparing future load forecasts particularly for the residential class of customer?

MR. MARSHALL: I'm not qualified to answer that question. I believe it was the subject of the Load Forecast Hearing and Mr. Larlee is the individual to deal with it.

MR. MACNUTT: No further questions, Mr. Chairman.

CHAIRMAN: We will take five minutes, Mr. MacNutt, to allow Board counsel and staff to --

MS. MACNUTT: Thank you, Mr. Chairman.

CHAIRMAN: -- regain their seats. Okay.

(Recess - 10:15 a.m. - 10:25 a.m.)

CHAIRMAN: All right. Commissioner Sollows has some questions.

BY MR. SOLLOWS:

Q. - Yes. Thank you. Mr. Marshall, on Tuesday I think in responding to questions from Mr. Gillis, you created the impression that the net present worth analysis technique was the only way that -- legitimate way to carry out these kinds of time value of money analyses. Just to keep the record straight, you would acknowledge that annual worth analyses are completely equivalent and can be done as well?

MR. MARSHALL: I think there are other methodologies, payback, rate of return or net present value. We say that

there are issues with some of those. The net present value is the preferred and preferential way to do it.

Q. - What would be the issues in terms of an annual worth analysis versus net present worth?

MR. MARSHALL: I'm not familiar with an annual worth analysis method.

Q. - Not at all?

MR. MARSHALL: No.

Q. - Have you -- in terms of your background, have you taught engineering economics?

MR. MARSHALL: No.

Q. - No. Okay. You are familiar with an external rate of return --

MR. MARSHALL: Yes.

Q. - -- analysis? Would that be appropriate to this kind of --

MR. MARSHALL: No.

Q. - Why not?

MR. MARSHALL: The -- I believe we responded to an interrogatory to that effect. Internal rate of return --

Q. - No, no. Not internal, external. You can't use an internal rate of return because the cash flows flip. You really have to use an external rate of return, so I was wondering if you are familiar with it?

MR. MARSHALL: I'm not familiar with external rate of return.

Q. - Okay. So you aren't familiar with external rate of return analysis or annual worth analysis?

MR. MARSHALL: That's correct.

Q. - So you don't know whether or not they would apply to this kind of analysis and give an equivalent answer?

MR. MARSHALL: That's correct.

Q. - Okay. Fair enough. Your fuel cost estimates, I'm wondering where the -- your sources for the fuel cost estimate you have used in your analysis? You have projected fuel cost -- increased rates in fuel cost, I'm just wondering the sources that you have used? You must track market prices and look at historic prices and look forward?

MR. MARSHALL: Yes.

Q. - What are your sources?

MR. MARSHALL: The prices that we have used in the Coleson case and in this case are based on the NYMEX futures market as of the end of October last year, where you -- there are seven year futures prices available under NYMEX. We took the seven year futures, unbundled them because there are prices for winter, summer, for the immediate year. There are prices for two years, three years, four

years out and unbundling those you can come up with what the price -- the current forecast price is under NYMEX for 2006. That was the basis.

That was then adjusted from a NYMEX price, which is a Henry Hub area price in Louisiana to a basis differential to New York, Boston market. And then on a net back adjustment to Goldboro at the inlet to Maritimes & Northeast Pipeline. And then add the toll that we pay on Maritimes & Northeast to get the price to the plant gate.

Q. - And that is for gas?

MR. MARSHALL: Yes.

Q. - And for oil, residual oil?

MS. MACFARLANE: Those prices are based on quotations that we receive from the futures market. We got quotations both from J. Aron and from Morgan Stanley.

Q. - Yes. And those quotations are projections out the 20 or 30 years or --

MS. MACFARLANE: The figures are not available for that far out. We were able to get figures that would take us out through the period of the financial forecast, and from that period forward assumed a 1.8 percent which is basically --

Q. - Basically your inflation rate?

MS. MACFARLANE: Yes.

MR. MARSHALL: The same with gas. We got numbers for 2006 and then went on with an escalator longterm.

Q. - You are familiar with the various agencies that do longterm projections of energy prices, like the National Energy Board and the Energy Information Administration in the US?

MR. MARSHALL: Yes.

Q. - Do you reference those just to check your data against what they are predicting?

MR. MARSHALL: We looked at those but we would look more at the actual market indices prices.

Q. - So you have --

MR. MARSHALL: We rely more on the real activity in the market place and the projections of what people are willing to transact for. Yes.

We actually have cross checked the -- our information on the EIA projection of prices from the US, or that longterm gas prices they project are higher than what we actually have in the forecast. And we did do -- have Navigant Consulting review our gas price forecasts last year and they participated actually in the Generic Hearing on pricing of fuels and of the market.

Q. - So could you undertake to provide the EIA data that shows that they exceed your projections? That would be just

great.

MR. MARSHALL: Okay.

Q. - That's fine. Do you know what the current Boston price is for electric generators for natural gas roughly?

MR. MARSHALL: The current Boston price for natural gas --

Q. - For electric generators.

MR. MARSHALL: I -- electric generators in the Boston area do not reveal their specific price anymore. They are in a competitive market place and the contract price that they pay for gas is confidential and they do not provide it.

The information available simply is what is a basis price in the Boston area or in the -- and the Boston area is a little thin. Really the best data is in the New York area and you do it by taking the NYMEX prices with a Transco Zone 6 or a Tennessee M3 price differential from Henry Hub to New York. Those are the prices that determine the basis essentially of the gas in the New York, Boston area.

Q. - So do you have a rough idea of the price now in the Boston area?

MR. MARSHALL: The price now in the Boston area again, gas varies day to day. It's on a monthly basis. On a contract forward by -- for the next month. The current NYMEX price, the last time I looked last week, was I

believe around 360, subject to check. There would be a basis differential of Boston which is at this time of year is probably low. So I would say the Boston price is somewhere around maybe -- somewhere around four bucks plus or minus a dime, but that's subject to check.

Q. - Okay. And you are comfortable that historically electric generators would pay something close to that price and not -- and it would not be discounted to them for their volume or quality of customer?

MR. MARSHALL: No. Historically it would be subject to the contract terms that they would get. And the -- just on that basis, there are generators in the New England area that have contracted for gas not from the market place through NYMEX and flowing through the US on a basis differential, but if contracted for gas from Western Canadian through the Canadian system and down the Iroquois Pipeline into New England. And they have had very different pricing arrangements in some of those contracts. And they have been longterm contracts.

So the actual historical price that electrical generators have paid for gas in New England is irrelevant at this point in time.

Q. - All right. I guess I would like to direct your attention to exhibit A-1. I think it's appendix B-1, page -- it's

the integrated resources plan, page 19, table 3-5.

MR. MARSHALL: Yes.

Q. - Just so that it's clear, the levelized life cycle annual costs, including end effects for the Point Lepreau refurbishment. That apparent -- if I understand what you said yesterday correctly, that is a value that consists -- includes the cost of the project plus the cost of the project repeating at the end of life for -- but its cost inflated by 1.8 percent, is that right?

MR. MARSHALL: Yes.

Q. - And so in the case of the Point Lepreau refurbishment the implicit assumption is that you can do the refurbishment over and over and over again?

MR. MARSHALL: That's the assumption for all of the cases.

Q. - Okay. So you would agree that in the assumption -- in the case of Point Lepreau it's probably not the best one in the sense that we have already identified things that might not last for 40 or 80 years and instead -- so this number might be a little low, is that --

MR. MARSHALL: If you have -- again, I said yesterday this is simply a screening methodology to account for projects of different lives.

Q. - Okay.

MR. MARSHALL: The -- I agreed it -- because you wouldn't

just be able to retube the existing plant, likely after 25 years you may have to build a whole new plant that the costs may be different.

Q. - And so in that case would it not be better to take what you have done, the Point Lepreau CANDU-6 new one and put that at the end of the life and analyze it in that way? Would that be -- it may be a more appropriate way to deal with that number?

MR. MARSHALL: That would be more appropriate to deal with all of the cases if you know specifically what they would be replaced with at the end of the time, so, yes.

Q. - But if I understand correctly, that is the assumption in all of the other cases?

MR. MARSHALL: Yes.

Q. - So to make it more or less consistent by doing that in the Point Lepreau refurbishment case, it would make it so you could compare those numbers more appropriately?

MR. MARSHALL: Yes.

Q. - How -- would it be a great deal of difficulty for you to do that? I mean, not here and now, but as an undertaking?

MR. MARSHALL: We could do it.

Q. - Okay. Could you?

MR. MARSHALL: I don't know that it is -- we can do it.

Q. - Thank you. The other question I have in terms of

variable costs for the Point Lepreau refurbishment, what is in the variable costs? I'm sure it's somewhere in the evidence and I'm sure I have read it but I just want you to refresh my memory.

MR. MARSHALL: The only thing in the variable costs and in this table calculation --

Q. - Yes.

MR. MARSHALL: -- are fuel and irradiated fuel management are in the variable costs.

Q. - So spent fuel disposal is in it?

MR. MARSHALL: Yes.

Q. - Yes. Fair enough.

MR. MARSHALL: The spent fuel charge to collect money on an ongoing basis is in it. Now Ms. MacFarlane talked about that the amount of money we have been collecting on that were actually over -- there is more money there now than to cover it off. It's not when it occurs, it's how it's charged on a year by year basis. That's in there.

Q. - Fair enough. No, that's okay. But as long it's there in some form, I'm okay with that, yes.

MR. MARSHALL: Yes.

Q. - Okay. The same table. I'm looking at the one for combustion turbine simple gas cycle, 100 megawatt. That would be I'm assuming distillate fuels?

MR. MARSHALL: Yes.

Q. - So that would be like a peaking plant?

MR. MARSHALL: Yes.

Q. - Very likely. It has a fixed cost shown of 3.71 cents per kilowatt hour?

MR. MARSHALL: Yes.

Q. - Now I know you gave us screening curves in your direct evidence, but they are not in cents per kilowatt hour. They are in --

A. Dollars per kilowatt.

Q. - -- dollars for kilowatt year?

MR. MARSHALL: Yes.

Q. - Can you convert that for us so that we could see where that would sit?

MR. MARSHALL: Yes. That's all done in response to CCNB-79. The spreadsheets that calculate all of these numbers have all of the data laid out and all of the calculations are there.

Q. - If you could just tell me what that that would be in terms of dollars per kilowatt for the fixed cost, dollars per kilowatt year? If you could just point me to it, it would be great.

MR. MARSHALL: The fixed costs there would be equivalent to from CCNB-79 $110 a kilowatt year.

Q. - $110 per kilowatt year for the peaking gas turbine plant?

MR. MARSHALL: Yes.

Q. - Is that the same value that you used when evaluating your DSM options in terms of the value of deferral? Is that the same -- was the combustion turbine plant fixed cost at about $100 per kilowatt year or was it less than that?

MR. MARSHALL: When you -- this is a levelized cost and includes capacity, and O&M, fixed O&M costs in it, it is a levelized cost over the whole period.

For evaluating DSM, you use an escalating charge which is a deferral value of not building this power plant. So by not building it, you may defer it one year or two years or three years. You need to use an escalating stream.

Q. - So if you deferred it for -- the life here is 25 years, I think, is it -- or I forget. 25 years. So if you had a deferral -- one of your DSM options that was deferred 25 years, you would use the hundred and some dollars?

MR. MARSHALL: No, you would use the escalating stream escalating for 25 years, as in the methodology of the DSM.

Q. - And so if I had a DSM option that saved a kilowatt for 25 years, it would be worth the same as the 110 or more than or less than?

MR. MARSHALL: It should be roughly equivalent. We use the same data to evaluate the -- in the DSM hearing, I think

we laid that down, that the evaluation of a purely demand type saving was done based on the avoided cost of a CT, whereas the energy related savings were done on avoided cost of energy from a combined cycle gas unit.

Q. - Fair enough. So I just want to be sure that the basis of comparison is more or less equal and you have confirmed that, so that is fine.

One other point or I guess two other points. Your stress case, where is that referred to in the evidence in your integrated plan? It was --

MR. MARSHALL: Page 33 of appendix B-1.

Q. - Page 33, right.

MR. MARSHALL: Exhibit A-1.

Q. - Okay. And the stress case consisted of low gas prices, low export market conditions, a capital cost increase and a reduced capacity factor.

MR. MARSHALL: That is correct.

Q. - And the argument was -- it summed up saying this result is not -- is it 139 million or 13.9?

MR. MARSHALL: It was 139 and that was corrected again because the error in the reduced capacity factor carried through, that was corrected in the response to IRs and the number should be 87 million.

Q. - 87 million. But we learned yesterday that of those

four

negative events, there are really only three that are independent. So there are four events but two are related in the sense that low export sales would tend to be correlated with low natural gas prices?

MR. MARSHALL: There is some correlation between those, yes.

Q. - Okay. So in a sense, we are really talking about three independent negatives that would have to occur?

MR. MARSHALL: Yes.

Q. - Fair enough. Now one last thing, it may be for you, Mr. Marshall, or you, Ms. MacFarlane, it is my understanding that when companies are trying to make their decision as to when to replace a major asset, they do a replacement study that looks at their ongoing costs, and typically for most assets the operation and maintenance costs climb as they get older.

And at some stage you reach a point where you are spending more money than it is worth to maintain it. And you either replace it or refurbish it, as you are proposing for Lepreau?

Is that true? Have you done that study for the Point Lepreau plant, to define the date at which it should be done?

MS. MACFARLANE: In the matter of Lepreau, it is a little more complex than that in that it is not only the

incremental spending from an O&M and capital perspective to keep the plant going, but it is also the cost of outages. As we get closer and closer to 2006, the concern with the potential failure in the core of the reactor with the pressure tubes and feeder tubes is such that the concern is the regulator will be calling for more and more inspections, which will mean the plant is down more and more, so the --

Q. - The cost is higher?

MS. MACFARLANE: That's right. The bulk of the analysis of when that date would come that it was no longer valuable to run it was frankly not done on the basis of O&M and capital. It was done on the basis of the energy coming out of the plant, the length of the outages, the risk that those outages would in fact bring the capacity factor so low --

Q. - So you have done the analysis?

MS. MACFARLANE: Panel A did that analysis, yes.

Q. - Is it -- and I apologize I didn't ask them. Is it somewhere in their evidence?

MS. MACFARLANE: I don't believe it is in their evidence. I believe it is an exercise that was done in looking at the risk that in fact we could not run this plant beyond 2006.

Q. - But certainly it is a -- that analysis would be

important

from NB Power's global perspective in terms of whether or not to do this.

Is it possible that that could be filed as evidence?

MS. MACFARLANE: I'm not sure what form the analysis is in. As I say, I believe it is largely in context of the information that was put together in the presentation. If you just give me a moment in A-16.

Q. - Okay.

MS. MACFARLANE: There was a slide 55 in A-16. Slide 55 looks at the life-limiting factors. And the one of most significance of course is the second one, "Pressure tube contact and risk of blister initiation."

It is -- there is analysis behind this that looks at the specific pressure tubes at risk and pressure tubes that would need replacement, the concern about increased inspections and so on.

And it is in that context that they looked at a decreasing capacity factor in a point in time at which that decreasing capacity factor is not economic.

Q. - But it was the other panel that did this financial analysis that would be normally done on replacement of a significant asset?

MS. MACFARLANE: The other panel did the analysis around how these technical factors would affect the capacity factor.

Q. - Not the costs? I mean, these are all -- I understand capacity factor and I understand sort of the technical risks.

But it really from a business perspective comes down to costs, does it not?

MS. MACFARLANE: It certainly does. But at the same time I believe that the analysis that Panel A did was largely focused on risk, and the risk that once we got to that 2006 date, yes, there was an issue that capacity factor may decline because of increased inspections.

But the larger risk was that in fact the plant would go down at a time when NB Power would be unprepared to undertake the construction. And it would lead to a very serious problem.

Q. - And that would have a financial impact --

MS. MACFARLANE: Absolutely.

Q. - -- without question?

MS. MACFARLANE: Yes. That was --

Q. - But of course the probability is the important thing that we have to bear in mind, that large impact --

MS. MACFARLANE: That is right.

Q. - -- and multiplied by the probability.

And really what I'm getting at is where is that analysis, so that we can be comfortable that the date that

this thing has to go out of service is the date that you are saying and not a later date?

MS. MACFARLANE: That is right. And it is Panel A who did that. And I believed that that was explored in the cross-examination. But if it hasn't been to the extent that you are satisfied we can certainly provide.

Q. - I would really like to see, I mean, not so much the risk in technical analysis. That is the safety regulator's problem in a sense.

I'm looking for the financial analysis that says that the right year to plan for it based on the information we have is the outage date that you have and that it -- you know, to keep it in-service an extra year.

The cost -- the extra cost in maintenance and risk is not worth the savings of the value of deferring it that year?

MS. MACFARLANE: I will just emphasize again that the maintenance costs become almost irrelevant here. It is the cost of the plant going down and the risk of the plant going down and leaving New Brunswick without energy. That was really the key matter.

Q. - I guess I would sort of like to see the numbers --

MS. MACFARLANE: Okay.

Q. - -- is what I'm saying.

One final thing. I guess I lied. I said I had two. And there were three.

In your analysis, and it would be I think for you, Mr. Marshall, did you consider -- and I suppose following from this -- probably you did not, but I'm going to ask it just to be sure.

Did you consider stepping back from -- I understand we have already had hearings on the Coleson Cove project, and it is separate. But prior to that, did you consider the option of say converting one unit at Coleson Cove to natural gas and deferring the Point Lepreau plant a few years and then building a new generation CANDU plant maybe in 2010?

Does the modeling exercise you do sort of generate those options automatically? Or do you configure them yourself and put them through the process? And if so was that one considered?

MR. MARSHALL: The model that we use actually would generate that option inherent in the model. In the Coleson Cove evidence there were cases, and there was some controversy over it, that at high CO2 costs, when we did cases of high CO2 costs, the model selected, new CANDU nuclear units for construction in 2010. And the Province had some issue with that.

So the model does -- it has all of the inputs. What are the possible building blocks? And then it builds hundreds of expansion plans and evaluates all of them and uses a linearized -- a linear programming technique in order to rank them in order at minimal cost one to the other.

Q. - Yes. And so --

MR. MARSHALL: So it was considered.

Q. - And it is from that --

MR. MARSHALL: It would have considered. And it would be more expensive than what we have recommended.

Q. - Fair enough. And it is that program that generates these net present value numbers?

MR. MARSHALL: Yes.

Q. - What exactly is -- just for clarity here in my own mind, what exactly does that number represent, that net present value of 5' or 6 billion?

Is that the cost of running the whole NB Power system for a fixed period or --

MR. MARSHALL: In the PROVIEW models that we run we model the system from -- I think it is starting in 2001, '2. So it is the cost of running the system, dispatching all the existing generation to meet the forecast load plus export contracts plus projection of export markets as we have

done in the evidence.

The -- it will dispatch the system to meet that. We have the forecast load going out in time. The -- when we run out of capacity, that we do not meet our capacity reserve criteria, the model will then trigger a need to build new capacity.

Q. - Yes.

MR. MARSHALL: And we will then look at all of the options and look at all of the possible ways you can meet that capacity. It models this in detail out to 2020.

Q. - Right, of 20 years?

MR. MARSHALL: Then it takes the data from 2020. And it escalates that cost for another 10 years out to 2030. So it says basically the dispatch from 2020 stays the same for 10 years.

Q. - Right.

MR. MARSHALL: Does that out to 2030, takes all of those costs that are in the model, does a present value of each of those -- all of those costs all the way back to 2001, compares the difference.

The only costs not incorporated in the model are the sunk capital costs of all the existing assets on the system.

Q. - Which is sensible. I don't have a problem with that.

So I guess what was motivating my question is in one of the -- or a number of responses to the interrogatories you were asked to look at cases of longer -- moving from 25 years to 35 years for a natural gas plant life and cutting from 25 years to 20 for Lepreau.

And in that case the value of the replacement energy would have been automatically figured into that in the dispatch of the other resources, is that correct?

MR. MARSHALL: Those questions were asked relative to the screening curves and relative to table 3-4 and 3-5. So the calculations on those were done simply on levelized life cycle costs.

Q. - Okay.

MR. MARSHALL: They were not done through the detailed PROVIEW model. They were not requested to be done, so --

Q. - Okay. It is just that I -- they were reported in terms of net present values of billions. And so I assumed that they came from that.

MR. MARSHALL: Okay. Well, let me -- subject to check -- let me go back and check. There possibly may have been one done that way.

But because the model runs out to 2020 then we would have had to do an adjustment on the calculation of that for the differential life and replacement.

Q. - Could you undertake --

MR. MARSHALL: So I would have --

Q. - -- to check that?

MR. MARSHALL: Yes, I will.

Q. - Because I guess what is motivating my question there is I just looked at the numbers. And when I saw the Lepreau life cut from 25 to 20 and the natural gas going from 25 to 35, judgment in these things is difficult when we are dealing about future values.

But it seemed to me that the difference was not what I intuitively expected. So I just -- if you could check and just undertake to let us know how that was done and make sure that the energy deficit was covered some way in the numbers, it would be great.

MR. MARSHALL: Yes. One thing I might add to the -- when you look at the numbers, you say intuitively they are not what you expect.

On the gas plant, when you increase the life of the gas plant to 35 years, the levelized life cycle cost increases because the fuel cost is the predominant cost. And it escalates. It is higher in the last 10 years.

So it has a bigger impact than depreciating the capital over the life. So that is one of the factors that come out of how you look at those.

Q. - You are comfortable, based on your knowledge of the history of fuel prices, that assuming that the fuel prices will escalate is a reasonable assumption?

The reason I ask that is because I know outfits like the Energy Administration assume very slight increase rates to even flat rates for fossil energy prices over the next 20 years?

MR. MARSHALL: That may be so for coal and some fossil. I think the other factor to consider on energy prices long term is the issue of climate change and carbon dioxide emissions.

And because gas is a lower emitter there is going to -- we believe there is much more pressure on gas availability and gas pricing because of its CO2 differential that that will actually put pressure to increase gas prices more relative to other fossil fuels.

MR. SOLLOWS: And I will promise you, Mr. Chair, this is my last question.

Q. - Ms. MacFarlane, you are familiar with present worth and annual worth analysis?

MS. MACFARLANE: I'm not familiar with annual worth analysis.

Q. - No?

MS. MACFARLANE: No.

MR. SOLLOWS: That is remarkable. Anyway, thank you very much.

BY MR. DUMONT:

Q. - Yes. Looking back at table 35, power costs comparison in B-1, appendix B-1. I asked a question yesterday as to the total cent kilowatt and the levelized life cycle cost which is 5.01 cents in 2006 dollars, cents?

MR. MARSHALL: Yes.

Q. - Okay. I just want it clear in my mind. That would be the amount, the cost of power in 2006?

MR. MARSHALL: Yes.

Q. - Yes. Okay. Could you tell me what the cost of a kilowatt hour is now at Lepreau?

MR. MARSHALL: Again, subject to check, we think that the current costs that would be allocated to Lepreau would be just under 5 cents today.

Q. - Can you make it an undertaking to have the direct -- exact number for me?

MR. MARSHALL: Yes.

Q. - And that would be a levelized -- what I would like to know would the average cost since it has been on line in 1983 until now. That would be the levelized annual cost from then until now?

MR. MARSHALL: No. The way we would do it now is what is

the cost as it is charged through in rate base to the customer. So what is the actual depreciation today, interest cost on the remaining -- remaining book value fuel costs, O&M costs, add up to a cost today.

Q. - I know that. What I want to know is the cost of a kilowatt hour at Lepreau today? That is what I want to know.

MR. MARSHALL: We could do that.

Q. - Looking back to slide 66 in exhibit A-16, there was a contingency amount of 35 million there. And if you look at -- if I look at the exhibit 23 we got NBP-23 yesterday about the Point Lepreau refurbishment 24 high risks.

Now, I thought before those were 24 high costs low risks. Am I wrong here?

MS. MACFARLANE: This is Panel A evidence. But I believe these are the risks out of the Ernst & Young document. And I think Mr. Eagles said in cross-examination that these were very low probability risks.

Q. - Okay. If you look at the 35 million contingency it wouldn't take many of those, one or two or those to occur, that that 35 million would be expended. Because if I look at those, there is eight of them. There would be -- if it would occur it would be above 30 million. And there is four of them, it would be above 10 million. And there is

24 of them in all.

So it wouldn't take much to happen that 35 million -- I think that 35 million is low. It is 8 percent of the total cost.

MS. MACFARLANE: This is Panel A. But let me make an attempt here. The project team believes and the president's advisory, external advisory committee believes that there was a very thorough analysis done of the risks and a realistic probability of occurrence attached to it, the risks on exhibit A-23 were assessed to be very low probability events.

That combined with the fact that we are dealing with a project that has a largely fixed price contracts attached to it led the evaluation of the project team in consultation with AECL, in consultation with Ernst & Young and as reviewed by the president's advisory committee which is an external committee, to believe that 35 million was an reasonable contingency.

The other thing I would like to point out is that contingency is in direct cost dollars. There would also be provision both in escalation and interest during construction added to that contingency which would bring it to I believe it brings the contingency for NB Power's cost up close to 50 million.

And the other issue is that in the fixed price, firm price contracts for AECL, both for retube and refurbishment, they do have contingency within those amounts that was reviewed by the project team. And they felt confident that -- in fact it is in the June 5th transcript from Mr. White.

Mr. White indicated that in looking at the AECL fixed price -- fixed prices, our project team was interested in lesser value, but they were equally interested in whether or not the price was robust enough to able -- enable AECL to actually execute the work. Did they have sufficient contingency in their prices. And the project team evaluation was that indeed they did.

So there is 50 million for the NB Power costs. There are additional contingencies in the AECL firm price.

Q. - Okay. So that exhibit, it says, NB Power Lepreau Refurbishment 24 high risks. Now when you determine that something is high risk, what is the probability of it happening? When does it get to be a high risk or a medium risk? Or what is the probability, percentage or whatever?

MS. MACFARLANE: Unfortunately, I was not involved in this exercise. But I am familiar with the Ernst & Young methodology because we use it throughout the corporation. And I can see where the term here as described as high

risk would be confusing.

What the Ernst & Young methodology does is it looks at the probability of occurrence. It also looks at the impact were that risk to occur and puts it on a graph. These would be considered items that were they to occur would have high impact. But they were assessed as items that have very low probability. So on the curve they would be in the bottom quadrant. And as I say, I can see where the title on this sheet would make it appear the exact opposite.

These are high impact issues, but low probability.

Q. - High cost, low probability?

MS. MACFARLANE: High cost, low probability risks, yes.

Q. - Thank you. Concerning the performance agreement, how would that -- like it says the market is 80 percent. Below 80 percent AECL pays NB Power, above 80 percent you pay AECL.

What would be the payment schedule? Would that be yearly, monthly?

MS. MACFARLANE: This is a reconciliation that is done annually based on NB Power's fiscal year end. And payments are made or payments are received from AECL on that annual basis.

Q. - So would it be the yearly average of the availability --

the capacity factor or the availability factor?

MS. MACFARLANE: I believe it is the capacity factor. The capacity factor of the plant -- pardon me, I believe it is if the plant is able to generate, which is the availability, that is calculated and it is based on that that the payment is either made or received.

But as Mr. Marshall pointed out yesterday, because this is base load plant and because the transmission system in NB Power is very robust, in large portions of the time the availability factor and the capacity factor are in fact the same thing.

And I should just qualify my answer here, in that I understand there is an undertaking from NB Power to clarify this issue. So my answers are subject to that clarification.

Q. - So the payment would be at year end.

MS. MACFARLANE: The payment would be after year end, yes.

Q. - I have another question for you, Ms. MacFarlane. I would like to ask you a question about the OM&A costs incurred while the plant would be shut down?

MS. MACFARLANE: Yes.

Q. - In your capacity as vice-president, have you reviewed those OM&A costs, in particular those for back log maintenance, to confirm that those expenses are correctly

represented in OM&A expenses and are not included in the capital cost of the refurbishment?

MS. MACFARLANE: I have not undertaken that review myself. Ms. McKibbon would have been responsible for that review. But I will say to you that that is a very, shall we say, a topical and important issue for us. We are very conscious of what needs to be capitalized versus what needs to be expensed. And certainly that would have been in the forefront of her mind as she did that review.

MR. DUMONT: Thank you. That will be all for me, thank you.

BY THE CHAIRMAN:

CHAIRMAN: Just a quick one. My understanding is that NB Power keeps its accounting records for seven years?

MS. MACFARLANE: That is correct. That is based on a Revenue Canada Guideline. I should clarify. I won't necessarily say we keep our accounting records for seven years. It is the supporting documentation behind that accounting record that there is a Revenue Canada Guideline for your supplier invoices, your billings that you send to customers, all of the documentation behind the numbers.

It is those documents that are destroyed on a regular scheduled basis.

CHAIRMAN: And it is my understanding that on a generating facility, your accounting records are facility specific

only in reference to capital items, not OM&A. Is that correct?

MS. MACFARLANE: That is not correct. We do keep OM&A by facility in the generation --

CHAIRMAN: I guess what I am going at is that if I remember correctly in some of the interrogatories, and correct me if I am wrong, is that it would be extremely difficult, if not impossible, for you to calculate exactly what Point Lepreau has consumed by way of dollars since it was commissioned in 1983 I guess, both in fuel costs, maintenance, operating costs and additional capital costs. Is that correct?

MS. MACFARLANE: I understood that the issue in the interrogatories where we were unable to provide the information was an identification of costs of outages. And NB Power maintains costs by facility. But we have a total for OM&A for Lepreau and it is broken down by labour, materials, et cetera.

It is not broken down by how much of it is regular maintenance, how much of it is outage maintenance. Within that how much of that outage maintenance is planned versus unplanned. That is the information that we do not keep in our accounting records in a form that was able to answer the interrogatories here.

CHAIRMAN: So then you can in following up on what Commissioner Dumont has requested, that you can -- therefore you could take the -- the capital costs of Point Lepreau plus the OM&A, et cetera from the time that it was commissioned until today. But the one thing you can't do is work in the replacement cost of power, in trying to calculate the actual costs of the production of a kilowatt hour from that plant?

MS. MACFARLANE: We may even be able to determine the replacement cost of power. Because we do know the capacity factors that that plant produced over its life.

What we wouldn't be able to do is determine during outages what was the cost of this specific replacement power for that outage. Because we don't have records of what -- what the dispatch was during that outrage. So we would have to give a proxy. And that is what we did in the interrogatories. And we would not be able to identify what the specific maintenance and capital costs for that outage were.

We can indicate what OM&A and capital for the year at Point Lepreau was. But if the plant was out for 62 days, we can't tell you what that 62 days cost us in extra maintenance or capital. It would just be the total for the year that we would have available. And that was the

difficulty in the interrogatories.

MR. MARSHALL: Just one clarification on your question, Mr. Chairman. The replacement cost of energy is not a factor in the cost of power produced by the Lepreau Plant. It is not a consideration. It is a consideration for the cost of the rest of the system. It is not a factor attributable to the cost of power from Lepreau.

CHAIRMAN: All right. I will accept that.

MR. SOLLOWS: I just want to -- could I just ask one question?

CHAIRMAN: I thought you gave an undertaking.

MR. SOLLOWS: Mr. Chairman, but you have yet to learn that I -- I should be the last one to ask questions because then when I am done I am really done. I am sorry. But as you were answering the question something occurred to me. And I am wondering if you could -- I am sure you can do it. I would just ask you as an undertaking.

The net present value benefit of the Lepreau refurbishment option, memory 240 million, whatever it is, can you convert that using an appropriate time value of money calculation to tell us how much per year that is over the 25 year life of the plant, please?

And not right now, just do it and file it, so that we would have an idea of how much per year that saving is

over the life of the project.

MR. MARSHALL: Yes.

MR. SOLLOWS: Thank you.

CHAIRMAN: Okay. I guess I will just go back and follow up with what Commissioner Dumont has asked and ask you if you could undertake to provide the Board with the -- a net present value of the cost per kilowatt hour of electricity that has been produced by Point Lepreau since it was commissioned? And I would say up to and including --

MR. SOLLOWS: Or a levelized cost.

CHAIRMAN: -- or levelized cost, right, up and including, if you are able to do this as well, when you will either refurbish it or shut it down in 2006, 2007 based upon your estimate?

MR. MARSHALL: Just to clarify. You want the costs from February 1983 to April of 2006, the actual and projected. And then you want those costs -- we can get the costs based on what they actually were. Then you want them converted into a levelized costs over that time frame. Is that correct?

CHAIRMAN: That is correct.

MR. SOLLOWS: A kilowatt hour.

CHAIRMAN: I want something that is comparable to, you know -- you are talking about a levelized life cycle

annual cost here in table 3-5 at page 19 that we have been referring to this morning. And you are talking about the fixed costs of 4.68 and variable at 34 cents, making a total cents per kilowatt hour in 2006 dollars at $5 and one cent.

I want to know what our best estimate could be as to what it has actually cost with Point Lepreau through all its trials and tribulations over the last few years up to and including 2006, 2007.

MR. MARSHALL: Mr. Chairman --

CHAIRMAN: Yes.

MR. MARSHALL: -- now because the capital was expended back in 1983 normally you would do a levelized cost over the term of that, start to the start date of that project. We could do it on a levelized cost back to 1983 forward.

To compare to this number as an alternative you would then have to escalate that cost the 25 years or so -- or 23 years up to 2006 to get a number that would compare exactly against this. Is that -- you want both numbers, then you can see the flow?

MR. SOLLOWS: 2001, 2006, it doesn't much matter. Whatever you are comfortable with. But the flows, treat them rigorously and appropriately. Bring, you know, a 1885 cash flow should be inflated appropriately by the index.

MR. MARSHALL: I could at least give a rough estimate. The number will be around eight or nine cents or 10 cents, okay. I am just going to warn you that it is going to be a big number.

MR. SOLLOWS: But we will be able to interpret it if we know that it has been done that way.

MR. MARSHALL: We will also give the actual number for this year for Mr. Dumont.

MR. SOLLOWS: And just make sure any assumptions and things like that are explicit. Thank you.

CHAIRMAN: Commissioner Dumont.

MR. DUMONT: There is another undertaking I would like. Would you please check for me -- I know that Lepreau is on outage and they are supposed to check the spindles of the turbine during this outage. Could you try and find out for me what the results of those inspections are as to the turbine spindles?

MR. SOLLOWS: Panel A --

MR. DUMONT: No. But if they can find out for me the results of that inspection --

MR. MARSHALL: We will check with Panel A and find out.

MR. DUMONT: -- do so, please. Thank you.

CHAIRMAN: Mr. Morrison.

MR. MORRISON: Mr. Chairman, would it be appropriate now to

redirect? I have two very short questions on redirect for this panel.

CHAIRMAN: Please do.

REDIRECT BY MR. MORRISON:

MR. MORRISON: The first question is to Ms. MacFarlane. Yesterday afternoon Mr. MacNutt asked you questions concerning the topic of longterm versus shortterm debt and I believe that -- well you have indicated to me that your answer probably requires some further elaboration?

MS. MACFARLANE: Thank you. Yesterday Mr. MacNutt had asked me what the increases in shortterm debt would be in '02, '03 and '02, '04 by looking at exhibit A-20. And though I said into the transcript that you can't look at shortterm debt alone, I did not go on to explain what in fact the increase in shortterm debt was. And I thought it would be helpful for the Board if I did that.

On the last page of exhibit A-20 is the consolidated statement of cash flow. And you see under the financing title, the last line, increase, decrease in shortterm indebtedness under '02, '03 is 273 million. And that is the number that Mr. MacNutt referred us to. And then he took that number and added to it the increase in shortterm indebtedness in '03, '04 and came up with 328 million and asked if that was the increase in NB Power's debt. And I

said that no you would have to look at the total.

So I would like to just explain for the Board how the statement looks. Because I must say the CICA format is convoluted at best. If we look at that document in '02, '03, going down, it would say that we have sources of funds from operations of 265 million.

And then down to subtitles we are spending 320 million. So the middle column says that we will have to borrow 40 million plus use cash, which is at the bottom, of 15 million, so our net increase in borrowing for '02, '03 is 55 million.

Now I did want to take just a moment and explain within the financing section the net borrowing is 40 million. But the numbers within here would indicate that we have very large maturities coming due in '02, '03. And the number is 829 million under debt retirements.

That amount combined with the debt retirements in the previous two years totalled 1.3 billion. That is some one-third of NB Power's debt. And that was a real concern both to NB Power and to the Province of New Brunswick that there was a large spike in our -- the duration of our debt. It mirrors a spike in the Province's borrowings as well.

So there was a real concern that because there would

be so much debt coming due in that year there would be an issue -- the Canadian market is not that liquid, there would be an issue about both price and availability.

So we began a pre-borrowing program in order to accommodate that. And we pre-borrowed longterm debt to replace what otherwise would have been shortterm debt in other years.

If you turn to the balance sheet which is two sheets forward. Or, pardon me, it is one sheet forward. And you look about two-thirds of the way down under the first column of '02, '03, current liability shortterm indebtedness, you see that there isn't any.

Well that is very unusual for NB Power. We usually keep our shortterm debt somewhere in the two to 300 million dollar range. But because we had pre-borrowed against those issues coming due in '02, '03, in fact we eliminated our shortterm debt.

So back to the statement we were looking at in '02, '03, the increase in shortterm indebtedness, what that is is just re-establishing our shortterm debt position. And as I indicated yesterday, that shortterm debt is something that allows us to float between provincial issues of longterm debt.

Our assets are largely longterm. Our financing is

therefore largely longterm. And our shortterm indebtedness is a float that takes us between those issues. Did that help?

CHAIRMAN: I wasn't having any trouble before. Anything else Mr. Morrison?

MR. MORRISON: One question to Mr. Marshall, Mr. Chairman, on redirect. On Tuesday afternoon Mr. Coon raised the issue and asked Mr. Marshall about buying back the Hydro Quebec contract. And Mr. Marshall responded that it was not economic to do so.

Mr. Marshall, can you explain why it is not economic to do so?

MR. MARSHALL: Yes. The Millbank capacity is combustion turbine capacity. If we bought it back it would help to meet the capacity obligation to have capacity to meet the winter requirement. But the energy that can be produced from the Millbank plant is very expensive energy at about $100 a megawatt hour. That is 10 cents a kilowatt hour. Compared to Lepreau which operates as a base load facility at a marginal energy cost of only $3 a megawatt hour.

So the energy, the total energy of the Lepreau plant 605 megawatts for New Brunswick in-province use has to be replaced. And it is the economics of that energy replacement which drive the basic fundamental economics of

the comparison between alternatives. It is not the amount of capacity required to meet the reserve criteria. So that is the key issue. That buying back Millbank will meet the -- help to meet a capacity demand criteria for reserve. But will not be economic in replacing Lepreau energy to supply energy to New Brunswick.

MR. MORRISON: That is all, Mr. Chairman.

CHAIRMAN: Good. Thank you. Mr. Coon, Mr. Thompson indicated that on the undertaking that NB Power complied with I guess yesterday when you weren't here, there might be a question arise in reference to that particular undertaking. Are there any that you have?

MR. COON: I have a couple.

CHAIRMAN: Number 15?

MR. COON: I do have a couple of questions, Mr. Chairman --

CHAIRMAN: Okay.

MR. COON: -- if that is all right.

CHAIRMAN: Just direct us to --

MR. COON: Yes.

CHAIRMAN: -- what exhibit or --

MR. COON: Well, what it is now I guess is Mr. Marshall's exhibit 25.

CHAIRMAN: Okay.

CROSS-EXAMINATION BY MR. COON:

Q. - Mr. Marshall, in exhibit 25 it is entitled "25-year financial commitment re build Lepreau versus new combined cycle gas generation."

These numbers you have provided, these net present value dollars are in fact not from 25 years of expenditures but from 30, isn't that correct?

MR. MARSHALL: They are taken from appendix B-2. So I guess in that case they do include the differential costs prior to 2006. So I guess you are correct. It would be 30 years.

Q. - So this exhibit needs to be corrected to 30 years.

The next question has to do with it being entitled "Financial Commitment". If we can run through the numbers here, capital cost on the rebuild Lepreau. These are net present value 2001 dollars.

You just said you have $484 million, correct?

MR. MARSHALL: Yes.

Q. - And then for new combined cycle gas we have $288 million, correct?

MR. MARSHALL: Yes.

Q. - Now with respect to replacement power we have $194 million under Lepreau column. And that is for what, Mr. Marshall?

MR. MARSHALL: That is for the replacement energy during the

outage construction period to refurbish Lepreau.

Q. - Now does the $820 million labeled "replacement power" represent replacement energy during construction of the new combined cycle gas unit?

MR. MARSHALL: No. It represents the additional cost of energy that would have to be supplied if we went forward with the gas plant to have the equivalent energy that would not be provided from Lepreau, as I just explained.

Q. - This would be buying energy equivalent to a unit with a 235 megawatt or 205 megawatt capacity?

MR. MARSHALL: The amount of energy -- what we require as a financial commitment to keep the lights on in New Brunswick and supply New Brunswickers with power, we need the 605 megawatts of energy operating at energy production to supply New Brunswickers.

Q. - Now Mr. Marshall --

MR. MARSHALL: If we only do the gas price --

Q. - -- that conflicts with the evidence you have given previously which suggested we need 305 megawatts?

MR. MARSHALL: No. I come back, Mr. Coon, we are talking about energy. Energy is -- in order to compare the costs we need to compare the costs of providing the energy. The energy costs to operate a power plant and produce energy over the time frame requires capital, O&M and fuel.

In order to replace Point Lepreau, which is the issue of this hearing, we need to replace, for New Brunswick's use, 605 megawatts multiplied by a projected capacity factor which ends up being about 5 terawatt hours of energy production on an annual basis.

On the gas case, the gas plant is not capable of producing that amount of energy. So it is necessary to go and buy that energy or produce it from other sources. The $820 million is the cost of getting that additional energy so that we are comparing apples and apples.

Q. - Mr. Marshall, you would agree with me that it should not be labeled "Replacement Power" then because it is not comparable to the figure in the column under "Rebuild Lepreau"?

MR. MARSHALL: I agree. It probably should be labeled "Additional energy to make the comparisons equal."

Q. - So that should be changed to "Additional energy purchases."

And in fact if we went and built a combined cycle gas plant of 400 megawatts instead of refurbishing Point Lepreau, would we actually with certainty purchase that amount of energy?

MR. MARSHALL: First of all, I explained earlier today it is not a purchase. It is made up of increased operation of

existing facilities in the province. It is also made up of possible purchases.

But in this case the evaluations in this model are made up from data given in response to PNB-65. They are increased production of thermal resources in the province and a reduction of export sales at the lost margin of the exports.

Q. - So we would agree that it should be relabelled as something else, "Additional energy purchases", something along those lines?

MR. MARSHALL: Additional energy requirements or costs, yes.

Q. - Now under "Operating and Maintenance" we have -- well, under Lepreau we have $199 million for ongoing capital costs.

Under the combined cycle gas you have those built into the O&M budget --

MR. MARSHALL: Yes.

Q. - -- is that correct?

Now we have 1,400' and -- close to $1.5 billion in O&M costs for Lepreau. And under combined cycle gas you have $589 million.

Now when I went to appendix B-2 of exhibit A-1 of the evidence, looking down the column for O&M of the combined cycle gas, I found $139 million, isn't that correct?

MR. MARSHALL: Yes.

Q. - Thank you. And similarly with respect to fuel purchase, looking down the column for new combined cycle gas I found $980 million, not $1 billion, is that correct?

MR. MARSHALL: Just back to your O&M costs, the O&M costs on the gas unit only is 139 million. You have to also add the O&M costs for operating Lepreau from 2002 to 2006, which is 449 million. So it is the sum of those two which is the 589'.

Q. - Well, you don't have to do that. That is what you did in appendix B-2 for the purposes of the methodology you employed there to make your comparison.

But in fact the O&M costs in this table, which says new combined cycle gas, for that plant were $139 million as you answered earlier.

Now let me just finish off here. This then means, when we look in the comparison between the two columns, that the capital costs of building or rebuilding Point Lepreau are higher than the combined cycle gas unit, is that correct?

MR. MARSHALL: Yes.

Q. - And the operating costs, meaning ongoing capital costs, operating maintenance and fuel purchase costs for rebuilding Point Lepreau are higher than the combined

cycle gas option, correct?

MR. MARSHALL: Yes.

Q. - And with Point Lepreau you have radioactive waste generated, if it went forward from 2007 to 2031 or '32, which you would have to expend money to manage, correct?

MR. MARSHALL: Yes.

Q. - And with the natural gas plant you would not be generating radioactive waste that you would have to manage, correct?

MR. MARSHALL: No. But we would have to --

Q. - Thank you.

MR. MARSHALL: -- continue to manage all the existing costs from Lepreau. And we would have to do the decommissioning of the Lepreau plant sooner. So it would cost -- there is an increased cost to do that.

Q. - Well, Mr. Marshall, I mean, you have told me that it is more expensive to rebuild Point Lepreau. You have told me it is more expensive to operate a rebuilt Point Lepreau.

And you have told me that a new gas plant in lieu of Lepreau doesn't generate any radioactive waste. It would require additional waste management expenditures, correct?

MR. MARSHALL: That is correct. I have also said --

Q. - Thank you.

MR. MARSHALL: -- that those are not all of the costs that

have to be considered.

MR. COON: No further questions.

CHAIRMAN: Okay. I want to thank the panel for their participation. You are excused. We will take a short break and then I believe it would be time for intervenor evidence with AECL going first.

I'm just wondering, is there anything still out there, Mr. Hashey? We have a confidential exhibit that was distributed yesterday. And I'm just wondering does anyone wish to ask any questions in reference to that particular exhibit.

I'm just looking to see if we are going to have to have a second in-camera session at all.

Speak now or forever hold thy peace. Okay. So we don't need that then? And so there is -- we didn't mark it, Mr. Hashey. I wonder if it is necessary.

I suppose it should be put on the record, yes. Okay. Well, we will have it as a confidential exhibit. I'm wondering if the Board Secretary has got her package there.

Mr. Hashey, I don't have in front of me -- did we enter any -- that is the confidential session, did we have any exhibits marked at that time? I think we did, didn't we? Just the three of them?

MR. MACNUTT: Yes. It is my understanding all three were marked, Mr. Chairman.

CHAIRMAN: Okay. So this would be C-4 then. That is what I'm driving at.

MR. MACNUTT: Mr. Chairman, it would be -- the next number would be C-5 because the chart --

CHAIRMAN: C-5 it will be, Mr. MacNutt.

How would you characterize that exhibit, Mr. Hashey, for the sake of the Shorthand Reporter?

MR. HASHEY: I'm sorry, Mr. Chairman. I don't have a copy of that in front of me. They are in the other room.

CHAIRMAN: Oh, well, I --

MR. HASHEY: It is really -- it is titled -- and it is the extension of the earlier --

CHAIRMAN: Oh, I'm sorry. I have got it. It was not very well highlighted here. It is an integrated core removal assessment --

MR. SOLLOWS: The white one above it would probably be better.

CHAIRMAN: The Retube --

MR. SOLLOWS: PLGS Retube --

CHAIRMAN: -- Change Order.

MR. SOLLOWS: -- Change Order 1.

CHAIRMAN: Point Lepreau. All right. It is a schedule. It

is an update of the previous document, et cetera. And anyway that is exhibit C-5.

All right. We will take a five-minute recess and come back in with -- if AECL could move up to the front and present their witness.

(Short Recess)

CHAIRMAN: Mr. Miller, you have one witness, as I understand it?

MR. MILLER: That's correct, Mr. Chairman. And before I go to that witness I would like to introduce an exhibit. During the Panel A evidence Rod White read into the record a portion of an opinion that was given to AECL by the Department of Justice. And I thought it would be appropriate to have the entire opinion as part of an exhibit rather than just a portion read into the record as Mr. White has done. So I would like to tender for an exhibit.

CHAIRMAN: Has a copy been given to the intervenors and the applicant?

MR. MILLER: Not at this stage. The applicant has seen a copy.

CHAIRMAN: Well if you would pass it around, sir, so that if anybody has any objection they can make it.

MR. MILLER: And, Mr. Chairman, while that is being done I

just want to refer the Board to AECL exhibit 3, which is the affidavit of Dr. Kugler, who is the witness that we will be presenting. And AECL exhibit 2, which is the outline of Dr. Kugler's presentation which he will be following while testifying.

And this presentation was filed in accordance with the time line set by the Board at the initial prehearing conference. And there were no interrogatories received from the Board or from any of the intervenors on that.

Now Panel A testified for about five days and reviewed in detail the direct evidence of New Brunswick Power concerning the planning and proposed execution of the retubing and refurbishment project. AECL, as was explained by Panel A, is intended to be the general contractor for this project. And also as Panel A testified, utilities in Canada have generally acted as their own contractors and AECL has traditionally in Canada been a service provider for several CANDU projects.

Dr. Kugler is being presented as a witness who is able to speak to AECL's expertise as being a general contractor, which they have done overseas quite a bit. And they have managed many major projects and the title of his direct evidence is AECL's experience in managing major projects.

Dr. Kugler is currently the senior vice-president nuclear products and services and has been with AECL for -- or since 1970. So as I mentioned, he will be speaking about AECL's experience in managing major projects. And while Dr. Kugler is certainly familiar with the proposal for Point Lepreau, he does not have day to day involvement in some of the technical aspects of the project. However, we have brought some of the -- some of his staff from AECL here and if there are questions that the intervenors have or the applicant may have that pertain to technical matters, we might have to deal with them by undertaking.

So at that -- with that, I would like to go back to the exhibit and see if it can be admitted and then present Dr. Kugler.

MR. MACNUTT: Are there additional copies of the proposed exhibit being distributed? We haven't received any. I have been advised by NB Power staff that additional copies are being prepared.

CHAIRMAN: Mr. MacNutt, I can't hear you.

MR. MACNUTT: I have been advised by NB Power staff that additional copies have been made but they haven't arrived yet.

CHAIRMAN: Here they come. While those are being distributed, Mr. Miller, I just want to clear up one

thing. If Dr. Kugler wants to give a brief overview of his testimony -- yes, Mr. Miller, I want to clear this up and make sure that you understand it. If he wants to give a brief overview of his testimony, then he can do so. But the whole way this hearing process is run, is that we go with prefiled evidence of witnesses. And just because Dr. Kugler saw fit only to put in copies of a slide presentation, doesn't mean that he can go back over the whole dog gone thing.

MR. MILLER: No. And that's not the intention, Mr. Chairman.

CHAIRMAN: All right. Good. I just wanted to make absolutely certain of that.

MR. MILLER: He will be very closely following the slides, and the initial presentation should be about 20 minutes.

CHAIRMAN: That's not a brief overview. Just a minute. Number 16, Mr. Hyslop.

MR. HYSLOP: Thank you, Mr. Chairman. I have come -- I guess after seeing two or three slide shows from NB Power and the terms we have worked out that -- with their providing the exhibit a week ahead of time to intervenors a useful exercise. One of the concerns I have with this particular slide show or presentation is that the slide show presented by NB Power traditionally is intended to

identify I think the issues they expect that will be dealt with during the course of the hearing, after we have a volume of evidence and after we have several volumes of interrogatories and supplemental interrogatories.

My concern here is this statement that's going to be made as part of the presentation is probably the first time we have seen documented evidence or would be documented evidence once the transcript is available. And although I don't want to prejudge, I do raise a concern that there may well be issues that come out of these statements that parties would want to reflect on before they commenced cross-examination.

And my concern might well be that it may be necessary for some delay to get the transcript, read it and then prepare a cross-examination coming out. So I just raise it now because I do have that concern.

CHAIRMAN: Well the Board certainly as evidenced by what I just had to say has the same concern. I mean, this is just a group of slides. It's not, in my opinion, the normal prefiled evidence.

MR. MILLER: Mr. Chairman, if I may just respond to that.

CHAIRMAN: Yes, please, go ahead, Mr. Miller.

MR. MILLER: In presenting this, AECL did take some guidance from NB Power and also from myself on the matter. And

there is some challenge in the fact that the Board doesn't have published rules of procedure. And because of that it does provide the benefit of flexibility but also the detriment of an absence of some predictability.

The document that you have before you was filed with the Board in accordance with the time table and none of the intervenors nor the Board itself raised any objection at that time nor filed interrogatories asking for further information. That's not to say that Mr. -- or Dr. Kugler would be departing from this in any way. His intention is to give the overview of AECL's experience as a manger of major projects and then submit himself to cross-examination in a wide -- you know, a wide range from the intervenors and not restricted simply to the slides.

That said, if there is concern during the presentation that Dr. Kugler is not following the slides, then obviously the intervenors could speak up at that point and I would agree that it would be inappropriate and he should be staying with the slides.

CHAIRMAN: Commissioner Sollows reiterates the point that I attempted to make when I first spoke is that if he wants to give a brief summary of the evidence that's contained in those slides, then that's fine. Mr. Hyslop and I think probably most other intervenors' concern is that in

addition to what's on those slides, Dr. Kugler is going to be giving further testimony which broadens the whole thing out, and it makes it far more difficult. So, you know, a 20 minute summation is not a summation, in my opinion, of what's in the exhibit AECL-2.

Secondly, I want to defend the Board's lack of written rules and say that it gives us the flexibility that we do have that we can adapt what we want to, and we are not constrained by procedures such as the courts have where you have got to comply with all these steps or you are out of court. So I want to defend that.

And the other thing is the secretaries and Board staff are available for advice from anybody as to how to work these things. And certainly the Board is not going to look at somebody's prefiled evidence and say that's not very thorough, you had better file something that's more thorough.

MR. MILLER: No.

CHAIRMAN: As they say in court, it's your case. You know, simple as that.

Now back to that. If you want to take a moment and speak with your witness about his summation or his summary of his evidence, go ahead. Frankly, with -- particularly with the applicant being interested as it is in reference

to AECL's presentation and the intervenors, I think your cross-examination is going to bring out pretty basically everything that needs to come out anyway. So if you want to chat with your witness before you call him to see if we can keep this concise and overviewish, do so.

Any objections to AECL being able to introduce in evidence as an exhibit this letter dated May 28th, 2002, from Mr. Trotman, who is general counsel to the federal Department of Justice, to Mr. Hawryhuk, the general counsel and corporate secretary of AECL? All right. That will be given exhibit number AECL-4.

Okay. Go ahead, Mr. Miller.

MR. MILLER: Thank you, Mr. Chairman. I have consulted with Dr. Kugler and he certainly would be prepared to depart from the slides and just give a summary of his evidence, a brief summary, which would deal with the issues that are in the slides but not depart from them.

CHAIRMAN: That would be appreciated. Call him.

DR. KUGLER sworn.

DIRECT EXAMINATION BY MR. MILLER:

DR. KUGLER: Thank you, Mr. Chairman. The intent of my presentation was to present AECL's experience in managing major projects. It was on the basis of this experience that we felt confident to propose to NB Power to do the

refurbishment and the retubing work on the basis of a firm price as well as a guaranteed schedule, and enter into a longterm performance agreement.

Our experience, as Mr. Miller mentioned, in managing large projects as a general contractor is largely confined to our off-shore projects, because in Canada the utilities generally prefer to be their own general contractor. Many of them have in-house engineering and construction experience and are often capable to do that themselves.

Off-shore we were asked by various clients from Argentina to Korea to China to undertake major projects on a turnkey basis, which means we are the designer, we supply the equipment, we manage construction, we train and we ultimately perform commissioning, and start the construction and then turn it over to the customer.

We did this type of work in Argentina in the '70s. We did this type of work in Korea in the '70s and early '80s. Again in Korea throughout the 1990s.

We did those jobs on a firm price basis and took schedule risk. The variance after bidding on a firm price basis was extremely low in the case of the Wolsong-2 project in Korea for example. The nominal value of the project responsibilities we had was of the order $500 million worth, and we came in with a variance I believe of

less than .01 percent. By variance I mean any change orders that may have been requested after the project was contracted.

On Wolsong 3 and 4 similarly I think our variance was much less than that, less that .01 percent for a project that in Canadian dollar equivalent was about 650 million plus an additional Korean scope of the order of $250 million where we managed Korean subcontractors and suppliers.

Our largest project to date is the Qinshan project in China which is currently still underway. We started the project in 1997 and expect to finish it next year. Again on a firm price schedule we undertook obligations worth about 2.1 billion dollars including Canadian scope, US scope, Japanese scope as well as some Korean scope. We are on schedule today after a little more than five years into the schedule. The total schedule for the first unit to completion is 72 months and we are precisely on schedule today and we are within budget, and the variance to date again is less than .1 percent of the firm price. And it was a firm fixed price in that sense including escalation. We took risk on escalation as well.

Beyond these large turnkey jobs we also provide services to operating plants so that we can respond to

their needs for emergency repair for routine operation support and maintenance support. As an example, just yesterday Bruce power encountered a problem with damage to a tube. By the way, it's in the press today. And we were able to mobilize people immediately, send them to the site. They may require a tube replacement, although that has not been determined yet.

It's this type of experience that we have developed over the years that gives us confidence to undertake the project with NB Power as we have contracted with them.

Thank you.

CHAIRMAN: Thank you, Doctor. Any other direct that you think is necessary at this time, Mr. Miller?

MR. MILLER: Well I would just like Dr. Kugler to confirm the status of Atomic Energy of Canada in relation to the federal crown.

DR. KUGLER: I believe the issue is AECL's obligation being those of the crown. Yes. AECL is a federal crown corporation constituted under federal Financial Administration Act. We are an agent crown corporation, and therefore any obligations that we undertake we do so on behalf of the Crown.

MR. MILLER: Thank you. That's all.

CHAIRMAN: It's been a long time since we have had

intervenor evidence and I'm just trying to remember whether the applicant does cross first. I think that's probably the --

MR. HASHEY: You ruled earlier that the applicant -- or I believe in discussion -- the applicant would go last. Maybe this is the time to clarify. I mean --

CHAIRMAN: It certainly is, Mr. Hashey.

MR. HASHEY: I can also make the point, you know, there has been some discussion and mention of friendly intervention. Obviously we are very supportive of AECL and through our own evidence have suggested that they are the right party to be involved in this project. I wouldn't expect that you would let me try to build up their credibility any more than you would let Mr. Coon try to deal with Mr. Adams' credibility, you know, and I know you have made a comment during the course of the hearing concerning friendly intervention.

Unless there is a clarifying point that involved NB Power arising out of the evidence which I -- sorry -- out of the cross-examination -- I would suggest that we would probably not have cross-examination, trying to keep this process at a high level, rather than get it down to throwing softballs at each other. And hopefully that's what we would be doing here. You know, until we know what

questions are going to be asked, if they do affect NB Power, I would ask for the right to question, but at the conclusion, but not try to bolster a case per se.

CHAIRMAN: Thank you, Mr. Hashey. Any intervenors have any difficulty with proceeding in the fashion that Mr. Hashey has just suggested?

MR. MILLER: I have no problems with it.

CHAIRMAN: Mr. Hyslop.

MR. HYSLOP: Thank you, Mr. Chairman. We have no difficulty, as Mr. Hashey has suggested, but just again for clarification, in the event of friendly intervenor questioning, would the -- the principle I think in court is if you have a friendly witness you are only allowed to ask direct questions and not -- would that be the limitation you would envision on the nature of questioning?

CHAIRMAN: I'm not going to pre-rule on that, Mr. Hyslop.

MR. HYSLOP: Okay.

CHAIRMAN: But I certainly am aware of what you have just stated.

MR. HYSLOP: Thank you.

CHAIRMAN: All right. Normally we have that table -- well no, it's your witness --

MR. MORRISON: Do you want us to go home?

CHAIRMAN: Yes, you can go home, Mr. Morrison.

What I suggest to you, Mr. Miller, if you wouldn't mind, is just to move over a seat. And then if necessary and you want to address the Board, you can borrow the mike back from whoever is doing the cross at that time. Would that be okay?

Okay. The first --

MR. MILLER: Mr. Chairman, if I may, just before we --

CHAIRMAN: Yes.

MR. MILLER: -- do that. This was filed as the evidence -- this is AECL-2 which --

CHAIRMAN: Yes.

MR. MILLER: -- I'm holding.

And I have just asked Mr. Lockhart to circulate a bound version of it to the intervenors so they will have it for their purposes of cross-examination.

I just wanted to ensure that was acceptable to the Board.

CHAIRMAN: Yes. That is fine, as far as we are concerned.

All right. Then the first cross would be by Canadian Unitarians for Social Justice. Ms. Flatt, any questions?

MS. FLATT: Yes, Mr. Chair.

CHAIRMAN: Okay. If you would like to move up to mike 13 then.

MS. FLATT: Thank you, Mr. Chair and Dr. Kugler.

CROSS-EXAMINATION BY MS. FLATT:

Q. - To start with, upon reviewing your evidence, AECL-2, I do notice that you have extensive experience internationally in nuclear power plants.

So I would like to be able to review the possible high cost risks that have been talked about on exhibit A-23 to see if I can get a little bit more depth in your experience with these issues.

DR. KUGLER: Should I be looking at exhibit A-23?

Q. - I suppose that would be appropriate.

DR. KUGLER: I'm sorry. I'm not familiar with the filing system or the indexing system. I may need some help.

CHAIRMAN: Actually, Ms. Flatt, normally the cross examiner will have one that he or she can provide to the witness in a case like this. However --

MS. FLATT: Thank you, Mr. Chair.

DR. KUGLER: I have exhibit A-23 in front of me now.

Q. - Thank you. The first section of high cost risks are under the heading "Licencing".

Has AECL had experience working with CNSC?

DR. KUGLER: Yes, we have.

Q. - Do you work with the CNSC on all projects that you are involved with in Canada?

DR. KUGLER: We are not a licencee for the nuclear power plants ourselves. And therefore the direct interaction is between the licencee, which would be the utility, and the regulator.

We support the licencees in their technical applications. We perform a lot of the analysis. We present analysis in front of CNSC staff. But the direct licence application is made by the licencee.

Q. - Thank you. In your experience elsewhere in the world has the CNSC been involved in any of your projects?

DR. KUGLER: They have been involved in the context of providing consultation to foreign regulators.

Q. - Have any of the foreign regulators or the CNSC in Canada identified any of these possible licencing requirements as a requirement that needs to be implemented for the projects that you have been involved with?

DR. KUGLER: I can't identify any specific ones as having been raised by foreign regulators. The process in designing and building nuclear power plants offshore usually requires that we demonstrate that the design would be licencable in Canada.

And this provides assurance to our foreign customers that they are getting a design that is safe as it would be if it were built in Canada.

In consultation with the CNSC the foreign regulators often question whether or not the design and the safety analysis performed by us is in fact licenceable. And they often receive an opinion from the CNSC.

But clearly the CNSC does not have any jurisdiction in other countries. It simply is a consultant in that case.

Q. - Going back to my question, have the foreign regulators ever identified any of these licencing requirements that would need to be implemented in their projects in foreign countries that you have been involved with?

DR. KUGLER: As I read these licencing, so-called licencing risks as they are referred to, these appear to be perhaps additional requirements that may be raised.

And I did not -- I'm not aware of any of these particular ones having been raised by foreign regulators.

Q. - Okay. Thank you. Under the heading "Technical", upon examination of the Point Lepreau evidence, have you also examined these technical high cost risks?

DR. KUGLER: We have in the context of the condition assessment which we performed jointly with NB Power have addressed these various issues from time to time.

And at the end of the day we came to a conclusion that the tasks that we have identified in the refurbishment contracts as requiring refurbishment, we judged those to

be the ones that we ought to do.

And we recognize that there is a small probability of additional risks. But in our judgment we decided that these would not be addressed at this time.

Q. - Have you over the course of your work in the international work that you have great experience in, have any of these technical issues come up?

DR. KUGLER: They have come up in the sense that inspections are performed as a matter of course from time to time. For example, if I look at the second risk there, "Main turbine inspection could reveal cracked spindles", I'm personally not aware of whether or not any of the turbine inspections on offshore CANDUs have revealed cracked spindles.

But from time to time during inspections, equipment is identified as requiring additional refurbishment or maintenance. So these kinds of issues do arise as a matter of course.

And in this particular instance I think the decision was made that inspection would be performed. And the inspection may reveal that additional refurbishment needs to be done.

It is in that context that yes, in our offshore CANDUs as well, it is quite normal to do inspections on various

equipment. And if the inspection reveals that certain things have to be done then the decision is made at that time.

Q. - However, you would consider these particular issues improbable, very low risk?

DR. KUGLER: Yes. Had they been otherwise we would have probably agreed with NB Power to perform them as part of the refurbishment work.

Q. - Okay. Under the heading "Project Management" have you been party to examination of these possible project management risks?

DR. KUGLER: Yes. And it is for that reason that we -- and we recognize NB Power's risk if there were scheduled delays.

And for that reason we agreed to assume a considerable risk on guaranteeing the schedule for the refurbishment work. And we have done similarly on some of our offshore projects as well.

Q. - Have you ever experienced these issues occurring on your offshore projects?

DR. KUGLER: Yes. We have guaranteed the schedule for the current project that we are performing in China. The contract specifically went into effect in February '97.

We guaranteed to the client that the plant would be up

at full power and in service precisely 72 months after contract effective date for the first unit and 81 months for the second unit.

And similar as we have agreed with NB Power, we would be paying liquidated damages if the plant were late and if lateness were due to our fault.

Q. - Thank you. Finally under the heading "Contractor", how many project delays have you experienced that have been accommodated through contracts with owners?

DR. KUGLER: The most recent projects in Korea, in China -- the Korean reactor, specifically Wolsong 2, we were precisely on schedule. The contract was signed in December 1990. The plant was to be in service in June of 1997. It came in ahead of schedule in fact.

Wolsong 3 and 4, the contract was signed in September 1992. And the two units were to be in service in June '98 and June '99 respectively. They also came in on schedule.

And as I mentioned we currently have similar schedule guarantees on our project in China. And we expect to be on schedule as well.

Q. - So your answer is none?

DR. KUGLER: What was your precise question?

Q. - How many project delays have you experienced that you have entered into these contracts and it has been

accommodated for?

DR. KUGLER: We have not experienced project delays where we were the main contractor, where the delay was due to our nonperformance, put it that way.

We have not had to pay liquidated damages as a result of project delay or any of the turnkey or any of the projects where we had a scheduled risk.

Q. - And that is the case in Canada as well?

DR. KUGLER: In Canada we have not been in a position of where we had been asked to accept scheduled risk on the total project.

When we do various projects, let's say an engineering project, we may be asked to take scheduled risk on delivering specific engineering documents or deliverables. I do not recall us having paid liquidated damages on any of these jobs.

But as I mentioned before, we have not had comprehensive project risk on any work that we have done in Canada, because the utilities have chosen to be their own general contractor.

In fact the Refurbishment Project with Point Lepreau, on Point Lepreau would be the first such undertaking in Canada. And it is simply -- it has been a utility preference, put it that way. We would have been prepared

to enter into comprehensive project undertakings.

In fact three years ago or so we offered to Ontario Power Generation to undertake the refurbishment of the Pickering A units on a firm price scheduled risk basis. We formed a consortium. We made a proposal. OPG decided not to do it that way. They decided to be their own project manager.

Q. - For the contracts -- for the work that you have done on plants internationally and within Canada that you haven't gone into contract for schedules, how many of those projects have experienced delays?

DR. KUGLER: There are many, many projects. It is hard to be precise. I think the best way I can sum it up is that we have not been in a position where we were assessed liquidated damages by our client.

And while there may have been project delays, if they had been caused by us, I'm sure our various clients would have assessed us with liquidated damages. But to my knowledge we have not had to pay liquidated damages.

Q. - What do you consider "caused by us" to mean?

DR. KUGLER: Well, there are various parties involved in large projects, all sorts of contractors, all sorts of parties. And there needs to be a lot of interfacing between the different parties.

And occasionally one party may cause a delay, but that does not mean the other party is therefore penalized because of it.

Q. - So just to get a little bit of a clearer picture of your answer, there are many, many projects that you are involved with that you have not agreed in any way at all that there should be a schedule that would be adhered to and some of those projects, due to no fault of your own, have experienced delays?

DR. KUGLER: Yes. For example the Pickering A refurbishment which OPG is currently performing has been delayed by their own admission.

We are a participant in that project. We have not been accused of having caused the delay. There are many other parties involved in that project as well.

Q. - Thank you. Are you familiar with NB Power's case for refurbishing Lepreau, Point Lepreau? I just want to be clear on what questions that I'm able to ask you.

DR. KUGLER: I'm familiar in general, yes. We have been a participant with NB Power in establishing the case. If you are referring to a specific document I'm not -- I do not know what you are referring to.

Q. - No. Of course. I'm interested in looking at just some general concepts that have been introduced by NB Power and

looking at them.

First of all the concept of nuclear power as clean energy. There has been a lot of evidence introduced, different slides, and parts of the evidence that have stated that NB Power is a very good option due to the fact it is clean.

I would like to explore that a little further, if I may with you, as I do understand that you are familiar with many different aspects of nuclear power. In particular --

CHAIRMAN: Ms. Flatt, I'm going to interrupt and just simply say this is probably a good time to take our lunch break. And I'm going to think about your line of questioning too, as to whether or not that in particular is relevant to this particular proceeding.

But I will make a ruling. And I will let you tell me what you think when we come back from lunch, which we will try and do at 1:30 today if we can.

(Recess - 12:30 p.m. - 1:30 p.m.)

CHAIRMAN: Good afternoon. Any preliminary matters. Mr. Adams?

MR. ADAMS: Mr. Chairman.

CHAIRMAN: That is number 15.

MR. ADAMS: I would like to address the panel with a

scheduling matter. Because of prior commitments I can't be available on Monday. And we are getting on in the day.

I understand from speaking with Mr. Miller that his witness can appear up until mid-afternoon on Monday. I wonder if there might be some opportunity to just shuffle the schedule to accommodate?

CHAIRMAN: Okay. Any of the parties got anything to say on that?

MR. HASHEY: I am happy to deal with Mr. Adams on Tuesday. That is not a problem at all.

CHAIRMAN: I am taking it from that Mr. Hashey that you want to continue on with this witness then?

MR. HASHEY: Oh, I am certainly not prepared to proceed with the cross this afternoon if that is where -- what is being suggested of Mr. Adams.

Yes. I would like to hear what this witness has to say in many aspects of the matter, and maybe save some time on Mr. Adams as well.

CHAIRMAN: With frankness, I was very hopeful that we would conclude with this witness, which may not be possible, and get Mr. Adams on this afternoon if we can, rather than him having to make arrangements to fly back down from Toronto. Anyway, we will see what we can do.

Certainly, as we get closer to the end of the day, Mr.

Adams, we will see what is unfolding at that time I guess.

MR. MILLER: If I --

CHAIRMAN: Yes. Go ahead. 13 that is -- we are back on 13 now. Okay.

MR. MILLER: I did have that conversation with Mr. Adams and just -- we are certainly prepared to abide by whatever the Board directs as far as timing.

Dr. Kugler is scheduled to fly to the U.K. on Monday night and is on the stand now. We had brought up scheduling with the Board earlier and were advised to have our witnesses present when -- when they were going to be called. And we had Dr. Kugler come down for that.

As I say, if the schedule could be done to accommodate Mr. Adams but not disadvantage Dr. Kugler from getting on his flight, we would certainly be prepared to go along with whatever the Board suggests.

CHAIRMAN: Okay. Let's go around the room then and see what the parties have to say concerning it, anybody wants to have an input into this. Because Mr. Hashey has made -- is indicating he doesn't want to do the cross this afternoon. But how about you, Ms. Flatt, any problems with rearranging the cross so that Mr. Adams can get in and out today?

MS. FLATT: I will be almost finished my line of questioning

for the doctor immediately, very quick. Beside that I will not be available Tuesday as we will be next door doing a workshop on how to change public policy. So ironically.

CHAIRMAN: I will not comment on that. Okay. Any of the objectors have any -- or intervenors rather have any problem with switching it around so that Mr. Adams can get on this afternoon? Mr. Hyslop?

MR. HYSLOP: Mr. Chairman, I would tend to support Mr. Hashey's -- to be able to prepare a cross-examination. Having said that I also fully anticipate based on the conservation with my colleague it is unlikely we will finish with Dr. Kugler this afternoon. And if we go into Monday, he has accommodated us once, and if he has to catch a flight to the United Kingdom late in the day Monday, my thoughts would be that we tend to stay with Dr. Kugler. And if he has to come back Monday, at least he is assured of getting out and then going from there. That would be my thoughts.

I think -- I usually have not been siding with Mr. Hashey. I know how important it is to be able to prepare cross-examination properly. And I would respect his right to be able to do that.

CHAIRMAN: All right. The Board will take that under

advisement at the time of our next break. Okay.

Now Ms. Flatt, when we broke for lunch you had asked a question that on the face of it appeared to me to be dealing with environmental matters. And as you are aware, and I have said many times before, we are the economic regulator and if it is an environmental series of questions that you are going to ask, then that is better in the environmental assessment review process than it is here.

Having said that you can go ahead and put your questions and we will see how they turn out.

MS. FLATT: Thank you, Mr. Chair. I have actually been advised to not go with my line of questions. However, I would like to state that as it was in the evidence that the CO2 was an issue and the money that I would just like to get one question out on that issue and leave it at that.

CHAIRMAN: Go ahead.

Q. - Doctor, are you aware of the nuclear fuel cycle?

DR. KUGLER: Yes, I am.

Q. - And are you aware that during that cycle it is necessary to burn fossil fuels?

DR. KUGLER: Fossil fuels may be burned to produce some of the materials that are used in the production of nuclear

power, taking the whole fuel cycling in account. When there isn't a total nuclear, let's say electricity generation, yes some fossil fuels may have to be burned.

Q. - Thank you. I would like to address the issue of the canflex fuel switchover that is slated for later on in this project. Would you be able to give me an idea of what canflex fuel is?

DR. KUGLER: I think you are referring to the possibility of introducing canflex fuel in the latter stages of the period of performance after the refurbishment.

Canflex fuel is an improved fuel. It can operate at higher power levels. It has better heat transfer characteristics and would conceivably avoid potential derating of the plant towards the end of life when heat transfer characteristics may become limiting.

Q. - I am just trying to find in the slide show. I heard you say a possibility that that will happen?

DR. KUGLER: Yes. It is not necessary. But it may -- it is one of the considerations that I think NB Power has undertaken.

Q. - Yes. In 2020 it is actually assumed -- is an assumed canflex fuel switch over. Are you at all familiar with the cost difference in canflex fuel?

DR. KUGLER: There would be a small difference in cost, yes.

I don't know precisely what it would be. But it would not factor in a significant way into the cost of electricity generation because of the cost of fuel being a very small component of the cost of electricity generation.

Q. - Yes. I do understand that $5 million was entered in evidence, the actual cost of the fuel switch over. Is there another reason at all why you might use canflex fuel, the canflex fuel technology?

DR. KUGLER: We have developed this fuel over many years, mostly in anticipation that we may wish to go to other fuel cycles. One may be the use of slightly enriched uranium rather than natural uranium, which we plan to do in our next generation advanced CANDU reactor. And canflex fuel bundle would be a much better carrier of that type of fuel.

Q. - Are you aware of the Mox program?

DR. KUGLER: Yes, I am.

Q. - Would the canflex fuel carrier make the Mox fuel program, would it enable the Mox fuel program to start up?

DR. KUGLER: Canflex would probably be the preferred fuel bundle for the Mox fuel. It is not essential. But it probably would have some characteristics that would make it more desirable to use as a fuel.

Q. - Currently have you worked at all with the Mox fuel

program?

DR. KUGLER: Yes. We are currently testing Mox fuel in our research reactor at Chalk River.

Q. - I would like to just quickly go back to the canflex fuel that you are planning on using at Lepreau or that is being planned to be used at Lepreau.

I am interested in possibly discuss -- having you discuss the increased proliferation risks that might be involved using canflex fuel?

CHAIRMAN: I am sorry, Ms. Flatt. Try another line.

Q. - Would there be any economic cost to using the canflex fuel were there to be any environmental health or proliferation risks?

DR. KUGLER: I am not aware of any. I think we are proceeding on the basis that canflex fuel will have advantages. And while the actual canflex fuel may cost a little more, it is -- the only reason that it would be used is because ultimately it would save in costs by allowing operation at higher power. And also generate less waste in the process.

Q. - I would like to ask you if AECL currently and in the past have received government money for the running of AECL above $100 million annually?

DR. KUGLER: Yes. As a crown corporation we have dual

mandate. One is a public policy mandate. The other is a commercial mandate.

The public policy mandate basically requires us to manage Canada's nuclear platform. By that I mean doing nuclear R & D, looking after the waste. And we inherited waste from the war years. When we were formed as a crown corporation, about 80 percent of the waste that we currently have on our research sites were created to prior to us becoming a crown corporation.

Q. - I am sorry, Doctor. That was not my question. I appreciate your answer. However my question was, do you receive above $100,000 a year?

DR. KUGLER: We receive a little over a 100 million a year.

Q. - 100 million.

DR. KUGLER: For public policy program, not for our commercial programs.

Q. - So were the subsidies taken away or cut back from the government, would you be able to continue working as a business?

DR. KUGLER: I wouldn't call it a subsidy. These are costs of performing the nuclear platform activities that we do on behalf of the Canadian government. And we have to have these costs covered because they are obligations that were undertaken on behalf of the government.

Q. - Have you done any financial models that would look at the possibility of not being able to have the amount of money that you usually get $100 million at the moment and be able to still do the job that is intended of you?

DR. KUGLER: I think the federal government recognizes that the cost of managing these liabilities, these wastes from the early years as well as performing R & D on behalf of Canada, we operate Canada's national nuclear laboratory, these costs are there. And the federal government has agreed to continue funding those.

Q. - Thank you. It was noted in Rod White's cross that a significant amount of money, 10's of millions of dollars is being paid to you to you to build equipment to able you to retube. Would you consider this a form of subsidy at all?

DR. KUGLER: No, not at all. This is a matter of commercial undertaking. We are being asked to perform certain services and design and procure, manufacture certain equipment and tools. And those have values, those services and those tools. And NB Power has agreed to compensate us accordingly.

MS. FLATT: Thank you.

CHAIRMAN: Mr. Campbell, does the City have any questions? He is not here. So obviously it doesn't. Mr. Coon?

MR. THOMPSON: We have a few questions.

CHAIRMAN: Okay. Would you like to come up and take mike number 13?

CROSS-EXAMINATION BY MR. THOMPSON:

Q. - Dr. Kugler, we were wondering if Atomic Energy Canada Limited has any other commercial scale reactor, full Calandria retubing projects in the works or has done any, has carried out in the past other than Lepreau. Is this the first?

DR. KUGLER: We were involved in the retubing of the Pickering A reactors in the 1980s. We provided technical support. We were not the general contractor as is contemplated our role to be for New Brunswick Power.

We have installed fuel channels on entire reactors, in three CANDU reactors, albeit I recognize it is not precisely the same. But we installed all fuel channels in the Cernavoda 2 reactor in Romania as well as in the two reactors in China.

The techniques are very similar. But the difference would be that in the refurbishment of Point Lepreau we would be working in a radioactive environment. And more precautions have to be taken. It will go slower than it does in a new reactor. But we have done that. Therefore the tooling, the procedures are in many respects the same.

We have also installed a full core of Calandria tubes on both reactors in China. We have removed --

Q. - Just a moment. What I asked you was if you had done any retubing of Calandria tubes --

DR. KUGLER: Yes. We have --

Q. - -- full retubing jobs of Calandria tubes --

DR. KUGLER: We have --

Q. - -- in a commercial sized reactor?

DR. KUGLER: Yes. We have removed individual Calandria tubes. We have removed pressure tubes. We have installed them.

Q. - Individual tubes? But have you --

DR. KUGLER: Yes.

Q. - -- done a full Calandria tube replacement in a commercial sized reactor anywhere?

DR. KUGLER: No, we have not.

Q. - Has anyone else, any other corporation done one in a CANDU reactor?

DR. KUGLER: India has replaced fuel channels in one of its reactors. I'm not sure whether they replaced Calandria tubes.

Q. - Are these -- is the Indian reactor a heavy water moderated CANDU reactor?

DR. KUGLER: Yes, yes. It is the second reactor built in

India.

Q. - You are familiar with that operation in any way?

DR. KUGLER: Only what I have read in the trade journals.

Q. - Yes.

DR. KUGLER: We were not directly involved.

Q. - So you have no technical information on that, no experience with it?

DR. KUGLER: No.

Q. - Okay. So really what you are planning to do at Lepreau then is something new in doing a complete job there?

DR. KUGLER: It is new in the sense of the way it is being done in its entirety. If you break up the job into its specific tasks it is not new because they have been done.

Q. - We were shown some video here during I guess the cross-examination of -- or the presentation and cross-examination of Panel A from NB Power which showed the use of some new tools and that sort of thing which were being developed to do this.

Are you familiar with those tools and the process?

DR. KUGLER: In general but not in detail.

Q. - It was mentioned that there was -- at the present time that there was one tool constructed and tested. Are you familiar with that?

DR. KUGLER: I don't know what you are referring to, no.

Q. - One of the tools for removing the tubes?

DR. KUGLER: It is possible. We are building mockups in our facilities to test the procedures. And it is quite possible that we have built one of these tools because we need them for testing purposes.

Q. - Also in the presentation some risks I guess were identified or possible risks. And one risk that was identified, and although I guess it was assumed by the testimony by the panel members that it had a low probability of happening, but what if during the removal of the Calandria tubes with one of these pieces of machinery, if something happened, there was a breakage of some kind of the tube or equipment or something and the Calandria tube fell into the reactor vessel, what would be the result of that?

Would there be any further damage in collateral damage to other tubes or to, you know, other appendages such as these nozzles, these moderator nozzles going into the reactor core or to the reactor core? Could there be damage?

DR. KUGLER: You are asking me a very technical question. I can only give you an opinion. I'm confident that our people will be anticipating such situations and safeguarding against them.

We have extensive experience in building robots and remote handling tools. All of the tubes will be removed. The Calandria will be empty virtually, and --

Q. - Well, would there be damage? Would there be damage, further damage if that were to occur inside of the reactor, if a tube were to fall?

DR. KUGLER: There isn't a lot -- there isn't a lot left after you remove all the tubes.

Q. - But early in the process, if there was a fall of a reactor -- or sorry, a Calandria tube into the reactor vessel, would there be -- would damage occur?

DR. KUGLER: It could damage other tubes. But they would all be removed.

Q. - Well, okay. It could damage other tubes. Would there be other things in the reactor core that it could damage?

DR. KUGLER: There are other components inside the reactor. I couldn't speak to the specifics. If damage were to occur, I'm confident that we would develop the tooling to mitigate that damage.

Q. - Yes. But if that tubing --

CHAIRMAN: Just a minute. Doctor, if you don't know then simply say, I'm sorry, I don't know.

DR. KUGLER: That is good counsel, Mr. Chairman. I don't know.

CHAIRMAN: I'm trying to get through this afternoon, that is all.

Q. - You mentioned that equipment would be developed to deal with that. But does it take time to develop equipment?

DR. KUGLER: In general it does.

Q. - We were told by the former panel that this was the only piece of equipment, the tool to remove these channels.

Now if this accident were to occur where a tube was dropped into the reactor core, would -- how long would it take to develop equipment to retrieve this from, you know, an unnormal position in the reactor core, perhaps when there was still other tubes and components there? How long would it take?

DR. KUGLER: I don't know.

Q. - You don't know. Are you aware of anyone with AECL that has looked at this? I don't want you to presume that someone may have.

But are you aware, you know, whether they have examined this risk and have a plan for that?

DR. KUGLER: That is part of the scope of the work that we plan to undertake, to look at various scenarios.

Q. - Could you present -- could you present information? Could you present information here on that, something that we can look at to see what is being done there, to see if

anything is being done about that?

DR. KUGLER: I do not know whether we have pertinent information on file today. But I'm certain that we will be producing that in due course as we are planning for the project.

Q. - In building this initial piece of equipment to remove the tubing through the reactor, we were I believe, if my memory serve me correct, told that it would cost about $10 million to build this removal tool.

In respect to other equipment that might -- more specialized equipment which apparently hasn't been built or designed yet to remove something from the reactor that might occur in this kind of an accident situation that I suggested, would you envision that it would take a similar amount of money and some time to develop that piece of equipment?

DR. KUGLER: I can't answer that particular question. I'm not aware of what tool you are referring to when you speak of $10 million.

There are many deliverables and many tools that will be prepared. I don't have a breakdown for each individual tool.

Q. - Since you don't have the answers I won't pursue this particular matter any further.

But other than to request that any information be filed, you know, that may exist from Atomic Energy of Canada Limited regarding, you know, what they are doing now to build specialized tools to deal with this kind of a situation of an object being dropped into the reactor core and requiring removal, particularly in scenarios that involve other tubes still being in the reactor, and also some information about how long it might take to develop this tool if it is needed or if one is going to be predeveloped ahead of time. Also the cost that a delay time in recovering an object from an accident like that might take.

I know that I'm asking for information that you are not aware of. But obviously if someone is planning a retubing job, the first one they are ever doing, and they haven't had experience, and things happen -- I mean, we were told by the former panel that it was a low probability.

But the exploding of the Space Shuttle was a low probability. The "Titanic" was a low probability. Failure of the Canadarm was a low probability.

CHAIRMAN: Mr. Thompson, get to the point.

MR. THOMPSON: Fine. Okay.

Q. - We would like to have information filed on that, the

information I requested --

CHAIRMAN: Just so --

Q. - -- if it exists?

CHAIRMAN: -- AECL knows what you are asking for, I think we have to be specific. Perhaps before the afternoon is over you could go back to the transcript concerning examination of Panel A.

Because I believe that a number of questions were put to Panel A concerning this work that AECL has been doing, and the mockups and/or actual equipment that you are referring to.

So that you could then tell the witness and AECL exactly what you want them to get for you.

MR. THOMPSON: I can tell you exactly right now.

CHAIRMAN: Well, you have been trying. And I can't follow it.

MR. THOMPSON: Okay.

CHAIRMAN: But you are talking about a piece of equipment.

And this witness -- it is unfair because --

MR. THOMPSON: He is not aware.

CHAIRMAN: -- he is not aware.

MR. THOMPSON: Sure.

CHAIRMAN: So if you can find the name of it. And I do believe, if my memory serves me --

MR. THOMPSON: Well, I don't believe it has a name. Because it wasn't identified that that piece of equipment, you know, had been developed yet or it wasn't stated what the name.

What I'm asking is is there work under way to develop a plan for dealing with that accident scenario and a piece of equipment that would deal with the problem?

CHAIRMAN: All right. So you are talking about the particular scenario that you had described of a Calandria tube dropping down into the --

MR. THOMPSON: That is correct.

CHAIRMAN: -- vessel?

MR. THOMPSON: That is correct.

CHAIRMAN: Okay. And what has been done?

MR. THOMPSON: What is being planned as a contingency for that event.

CHAIRMAN: All right.

MR. THOMPSON: Thank you.

CHAIRMAN: That is fine. Thank you.

Q. - I notice in your evidence that there is a lot of information about projects that AECL has been involved with as a contractor overseas in foreign countries. And just looking at the list of sort of countries there, I'm looking at page 5 of the evidence of the slide

presentation, pictorial presentation in this case I guess, anyhow it mentions India, Pakistan, Argentina, Korea, Romania and China. Are there any others?

DR. KUGLER: These are the only countries where we built power reactors. We have built a research reactor in Taiwan.

Q. - Okay. I notice at the top in India and Pakistan they are sort of noted together there and people have been quite leery I have heard in the news lately about a nuclear connection between the two. Is there any formal nuclear connection other than the weapons connection? I mean any particular -- any particular connection in the reactor or the reactors in those countries?

DR. KUGLER: Not really. Those reactors were built in the '60s and early '70s, and we -- because of government policy we were asked not to continue to collaborate with either of those countries after 1976 and we have not done so except for specific safety related reasons, and there have been very few of those.

Q. - Why were you asked to do that by the government?

DR. KUGLER: It was government policy.

Q. - Do you know the background?

CHAIRMAN: Mr. Thompson, I don't understand where we are going on this.

Q. - Okay. The -- in respect to -- again -- well let's use Pakistan for instance. During the former testimony I guess there were a number of risks identified, financial risks for the refurbishment of Lepreau and one of them would be a regulatory risk, I guess demands made by regulators. What are the regulators like in some of these countries? What are those agencies like, those regulatory agencies? Are they -- have you had problems with them? Are they similar to the Canadian Nuclear Safety Commission?

DR. KUGLER: In recent years, and I'm speaking of the last 20 years rather than 30 or 40 years, the projects that we have undertaken abroad required that the project be licensable in the country of origin, that's the general term, which in this case means licensable in Canada. The regulators, some of them were more or less familiar with Canadian practices. They had in general become familiar with other countries practices as well as their own, as well as the international Atomic Energy's, and of the agency's practices. And from time to time consulted with Canadian regulators simply to compare notes. But the regulators in each country have the jurisdiction of regulating and licencing their own plants.

Q. - If we -- you mentioned -- well let's start -- I'm having

difficulty with the page number, I have to look at the next page, it's sort of blackened. I guess we are looking at page 13 of the evidence.

DR. KUGLER: You would be looking at the page Romania.

Q. - Yes, Romania. And you have had a project there?

DR. KUGLER: Yes.

Q. - And what has been the nature of that project?

A. The most recent project was on Cernavoda 1, a contract which we entered into in 1991, to complete the reactor on behalf of the client. They had tried on their own for many years and ran into difficulty, and we formed a consortium with an Italian partner and completed the plant in 1996.

Q. - This is this reactor that we see in the foreground in the picture?

DR. KUGLER: Yes. That's Cernavoda 1. Cernavoda 2 is currently under construction. We signed a contract last year to do that. And we are doing some preliminary work. Before the project is fully mobilized we have to arrange financing and that's currently underway.

Q. - I see in the picture some other structures there. What are those structures?

DR. KUGLER: The Romanians had initially planned to build five reactors. The last three that you see there are

virtually empty. The reactor building had been built but there is no equipment in it yet. The plan is -- in fact the Romanians have just declared their intent to complete units 3 and 4 as well. Unit 5 remains to be decided.

Q. - When was the construction of these reactors started?

DR. KUGLER: In the early '80s.

Q. - So how many years has it taken, or did it take -- I see that it was in service in 1996, the first of these reactors. How long did it take to complete that reactor?

DR. KUGLER: I don't recall the precise date when it was started. Under the earlier contracts the Romanians bought our design and they intended to complete it on their own. We had relatively little involvement after the initial transfer of the design and the training of some of their staff. The major problems and difficulties they ran into was largely financing. They ran out of money.

Q. - So the construction was stalled in turn because there wasn't enough money to --

DR. KUGLER: It proceeded very slowly. They tried to do it using their own means, mostly Canadian -- sorry -- Romanian materials, and they had difficulty doing it on their own and for that reason they asked us to help them again in '90, '91 after their revolution in 1989.

Q. - So it was a financial problem and not a technical

problem?

DR. KUGLER: To a large extent it's a financial problem, yes.

Q. - Were there technical problems as well?

DR. KUGLER: Some of the work they had performed we had to redo when we resumed.

Q. - Were you there at the time? I don't mean you personally, although I guess I could ask that question too, but were there AECL people at the site from the start of construction?

DR. KUGLER: I don't recall. If there were there weren't many. There may have been one or two representatives. But the Romanians were dealing directly with many Canadian equipment suppliers in those days. We did not have a substantive project management role until 1990, '91.

Q. - Did you have a full-time presence there during -- from the start?

DR. KUGLER: I really don't know.

Q. - No. Did some of these -- I'm just I guess asking in some of these countries where you have done construction outside of Canada, we could go back to the list for the countries, but what are the working standards there like? Are there safety standards and that sort of thing in those countries which have delayed or have the potential

to

delay progress?

DR. KUGLER: China is probably a good case in point. It's the most recent and current project. The Chinese have very little experience in nuclear construction. They have had some. Albeit it's a large country and while they have experience in one region, in provinces in the south, they didn't have experience -- that much experience where we are building. We trained their staff, we used our own quality assurance procedures, we supervised them. The construction companies responded very quickly and I think the net result is demonstrated by the fact that we are on schedule after more than five years into the project.

Q. - If I were to suggest to you that the regulatory climate in some of those countries, and the standards in those countries and -- which require certain

things to be done before work can be carried out, may be weaker than they are in New Brunswick or in Canada, would you agree that that was the case in some of those countries?

DR. KUGLER: These countries are very aware of the broader global industry and the standards throughout the world. The International Atomic Energy Agency in particular has influence in all of these countries. They all are members of the World Association of Nuclear Operators which was

brought into being after the Three Mile Island accident in

the US in 1979. They are extremely conscious of the value of the asset, they wish to protect it. I see every much as -- much of an effort being made by these utilities as you are.

Q. - But that's not the question I asked you. That's not the question I asked you. The question I asked you was if I were to suggest that the regulatory climate in those countries, or some of those countries, might be perhaps weaker, or would be perhaps weaker than it is in Canada, and the standards in those countries were less in respect to protecting workers and worker safety, the ability to carry on work, work could go ahead easier without regulation in those countries, would you agree or would you disagree?

DR. KUGLER: I disagree because we are in charge there. We insist on the same safety practices as we would in Canada. The codes and standards -- our Canadian codes and standards that we apply, we have ceased work, we have in fact put in place stop work orders from time to time when we felt that the practices weren't being followed to the letter.

I think the evidence is there that proves --

Q. - Can you name a situation where that has occurred?

MR. MILLER: Mr. Chairman, if the questioner is cutting off

the answers because I think he doesn't like the answers he is getting, not because he is moving along to another question, I just ask that he -- that the witness be given the opportunity to complete his answer before the next question is asked.

CHAIRMAN: That's certainly in the circumstances is an appropriate request. Mr. Thompson, will you get where you are going with this line, please.

MR. THOMPSON: Yes, Mr. Chairman. The question -- I guess what I am trying to find out, again not being a lawyer, what I'm trying to find out here, there was a major risk identified -- well actually two major risks, one a major and the other one I guess a risk -- one was that the regulators might request or require improvements or changes which would slow down the Lepreau refurbishment, the second being a concern about labour continuity on the site, and this agreement where the work would proceed without disruption. And we have evidence from Atomic Energy Canada, a lot of evidence here, about construction of reactors in I guess countries in what some people might refer to as third world countries which some people like myself in the Conservation Council might presume where these kind of standards, you know, were weaker and didn't exist, and I'm trying to flesh out if that's the case, if

that's advantageous to quickly moving ahead and cheaply moving ahead with construction projects that corporations, more particularly AECL, might do in those types of countries which might, you know, be slower and more difficult to do given better standards of safety enforcement by nuclear regulatory organization in Canada and labour laws, unions, safety measures, et cetera. Am I being clear.

CHAIRMAN: Maybe, Mr. Thompson, you would like to ask the witness to comment on what you just said.

MR. THOMPSON: Well if the witness would like.

DR. KUGLER: As I said earlier, we require the same practices to be put in place as we would in Canada. We have issued stop work orders. You were on the verge of asking whether we actually have done that. Yes, we have done that. And at the end of the day I think the experience demonstrated we built the reactors in Korea. One has been operating for close to 20 years and it has a lifetime capacity factor of 85 percent. It's managed very well. It's getting good ratings from WANA, the international watchdog, and I have no hesitation in saying that we believe these plants are built well and are being operated well.

Q. - One other question I have and then I will leave this

subject. In respect to those countries listed, and we can look at the list again, I guess, if you don't know specifically, but I guess I will ask my question in a more general way. Have there been labour unions involved in construction at each of these foreign sites.

DR. KUGLER: Yes. In Romania there are labour unions as well and from time to time we have encountered a strike on the work site.

Q. - Were there labour unions involved in these other countries as well that are listed here? China?

DR. KUGLER: No, I believe not.

Q. - Korea?

DR. KUGLER: Yes.

Q. - India and Pakistan?

DR. KUGLER: I haven't been there for a long time. I can't really comment.

Q. - Okay. Thank you. In respect to Canada, what reactor projects, I guess, for other parties other than yourself, utilities and others, are you working on now, you have agreements or contracts for?

DR. KUGLER: In Canada do what we refer to largely as services work, which means operating -- supporting the operation and maintenance of the currently operating CANDU reactors. Annually, we probably have about 400 or 500

different purchase orders or contracts, some of them are smaller, some of them are bigger. Our larger contracts currently are with Ontario Power Generation for the refurbishment of the Pickering A reactors. We are doing some work also for Bruce Power in the refurbishment of the Bruce A reactors. We have many, many contracts and many purchase orders under which we are currently performing work for the utilities in Canada.

Q. - How is the current refurbishment of the Pickering reactor? How has that progressed? How is it going? Is it on schedule?

DR. KUGLER: I believe OPG would accept that it is behind schedule, behind the schedule they had initially set.

Q. - How much behind schedule?

DR. KUGLER: I can't comment. I don't know what their original schedule actually was. But they have admitted in public in front of the CNSC that they have fallen behind some of the targets they had set for themselves.

Q. - This is not the first time with this Pickering reactor that there has been a refurbishment, although probably the refurbishment I understand has not been the same in both cases, but these reactors were refurbished by the replacement of fuel tubes back in the 1980s, weren't they?

DR. KUGLER: Correct.

Q. - And how did those reactors perform after that? What were their performance levels? Are you aware of the performance levels of those reactors?

DR. KUGLER: I don't have the details with me but they did perform. I think one of them in fact had a relatively high capacity factor just before OPG decided to lay them up, as they call them, in 1988, I believe it was.

Q. - How many reactors were retubed at that time?

DR. KUGLER: Four reactors. two in the 80s and two I believe in the early 90s.

Q. - You said one had a good performance level?

DR. KUGLER: Well, I recall one of them in particular I think just before they shut down because there was some discussion about gee, isn't it too bad that the reactors are performing fairly well that they would be laid up. But the reasons for the lay ups were not directly related to --

Q. - Do you recall any of the other reactors --

DR. KUGLER: -- to the tubing.

Q. - -- there were four, you recalled one that had a good performance level. And you recall that there were three others that -- do you recall their performance levels, whether they were good?

DR. KUGLER: I don't have the numbers in my head. They were

all performing. They were still operating at the time.

Q. - Do you think they were probably operating around the 80 percent level, the other three?

DR. KUGLER: On average I don't think so, not at that time, no.

Q. - No. Might they have been operating at the 60 percent level?

DR. KUGLER: Some around that, some a little higher.

Q. - And you mentioned that they were shut down by Ontario Hydro, when were they shut down? They were retubed, you said in the late 80s and early 90s, so presumably they ran for a few years. How many years? When were they shut down?

DR. KUGLER: I believe they were shut down in very early '98, January '98 or so. Because I -- I remember the integrated performance assessment report came out in August '97 and they were shut down not too many months after that.

Q. - And why were they shut down?

DR. KUGLER: Largely the group that was brought in to review OPG's operation decided that OPG lacked the management and human resources to upgrade and improve the performance of all 20 reactors at the same time. They decided to focus their improvement efforts on the better running reactors

at the time, which were Bruce B, Pickering B and Darlington. And concentrate their efforts on those. When they felt they had brought those back up to better performing levels, they would then turn their attention to refurbishing Pickering A and Bruce A at the time.

Q. - So they were shut down because they wanted to focus on other reactors on improving their performance. So where you are saying that is it safe to assume that all the reactors were performing poorly at that time?

DR. KUGLER: Let's say they were performing not as well as they thought they could get them to perform.

Q. - Well it must have been getting to the point of uneconomic when they shut them down, would that be fair to assume?

DR. KUGLER: They could have been more economical, I don't know what the precise test for economical is in that case, so --

Q. - Well let's go back again -- there must have been a problem at first when they decided to retube them. Was it a similar problem when the initial retubing occurred at Pickering? Was it because of similar problems that are occurring at Lepreau now?

DR. KUGLER: No. The shutdown in the 80s was precipitated by an accident in one of the Pickering A units in 1983, I believe.

Q. - So they just decided to retube the other units because of this accident?

DR. KUGLER: The -- two units were refurbished shortly after the accident or around that time. And two other units were retubed later on.

Q. - Do you know why they made that decision to do that?

DR. KUGLER: Which decision?

Q. - To retube them.

DR. KUGLER: All of them?

Q. - Yes. The others. The ones that didn't have the accident.

DR. KUGLER: Yes. Because they felt that there would be life limiting factors on the reactors. If they wanted to carry on operation they would have to retube them.

Q. - It sounds a lot like Lepreau then, doesn't it?

DR. KUGLER: For different reasons. It occurred earlier in the life of the Pickering A reactors because of the specific problems. The materials were different. The design --

Q. - But the problem was the same and the outlook that the utility had about retubing them was basically the same, would you agree with that?

DR. KUGLER: I would say the circumstances were different. Point Lepreau is looking at a genuine life extension to

operate for another 25 years after refurbishment. In the case of the Pickering reactors, the accident occurred earlier in the life, unanticipated and --

Q. - Well what about the other reactors though that --

CHAIRMAN: Let the witness finish, Mr. Thompson, please.

MR. THOMPSON: Sorry.

CHAIRMAN: You know, I would like to know where we are going with this too.

Q. - Okay. I'm just drawing the -- I guess attempting to see if there are similarities between the two. Okay. Getting a little further here, at the time that these reactors were retubed, what was the contractual role or the management role of AECL in the retubing of the Pickering reactors in the late 80s and early 90s? What was the role of your corporation?

DR. KUGLER: We were asked to provide various services and to assist OPG who were the general contractor. Engineering services, analysis, special tooling. And it was all in support of their efforts.

Q. - Was there some kind of a performance agreement entered into at the time between Ontario Hydro and Atomic Energy Canada Limited with compensation to Ontario Hydro if the reactors didn't perform at a certain rate and payments to you, Atomic Energy Canada Limited, if they performed at a

certain level, I guess similar to what is being proposed - - well generically similar at least to what is being proposed at Lepreau now.

DR. KUGLER: When you say at the time you mean after the retubing?

Q. - Yes. After the retubing occurred was there a performance agreement between Atomic Energy of Canada Limited and Ontario Hydro?

DR. KUGLER: No, there wasn't.

Q. - There was no performance agreement?

DR. KUGLER: No.

Q. - There was no agreement about --

DR. KUGLER: Not after the retubing.

Q. - Not after the retubing. Okay. You have -- well anyhow, just one moment here, I will try and be as quick as I can. I'm going to the annual report of Atomic Energy Canada Limited, the most recent one under -- well it's in exhibit A-6 under the CCNB interrogatory 6-B is where it is located. And I'm looking at page --

CHAIRMAN: Mr. Thompson, just wait for the witness to get what it is you are referring to.

MR. THOMPSON: I'm just giving the page numbers.

CHAIRMAN: All right. Give the reference again, please.

MR. THOMPSON: The reference is -- well anyway, it's AECL

annual report, the most recent report, and it's in binder A-6.

DR. KUGLER: That's the report 2000/2001.

Q. - Yes. That's the report.

DR. KUGLER: Yes.

Q. - Now if we turn to I guess page 18.

DR. KUGLER: Yes.

Q. - Look down the page, Nordion Medical Isotope Reactors, do you see that paragraph?

DR. KUGLER: Yes.

Q. - Yes. And if we read there it says, In August 1996 MDS Nordion contracted AECL to build two new maple reactors. Now in respect to those reactors, are those reactors in operation now?

DR. KUGLER: No, not yet.

Q. - So when did -- when did construction start there? When did the work start on those reactors?

DR. KUGLER: Those reactors have a long history. They were started in the 80s, in the late 80s. The project was suspended, I think, from about '93 to '96, and then was resumed.

Q. - Why was it suspended?

DR. KUGLER: It's a complex story. Do you want to hear it?

Q. - No. No. We don't have a lot of time. I will leave it

at that. Anyhow, are those reactors -- are they on budget and on schedule at the current time?

DR. KUGLER: No. They are over budget and over schedule.

Q. - How much over budget, and how much over schedule?

DR. KUGLER: I don't have the figures with me.

Q. - Substantially?

DR. KUGLER: I would say, yes, substantially.

Q. - If I said 50 percent in each case, would you agree with that?

DR. KUGLER: On price -- or on cost, rather, it's of that order that we project by completion not yet incurred. On schedule though, not 50 percent.

Q. - No. Well how much on schedule, 30 percent?

DR. KUGLER: You don't measure it in terms of percentage. The initial construction -- or when we resumed the project I think it was contemplated that the first unit would start to operate in late 2000. And we project that it will be operating late this year.

Q. - Do you have any other reactor projects under way in Canada now?

DR. KUGLER: No new built projects, if that's what you mean.

Q. - No new built projects. In respect to, I guess, the financing of Atomic Energy Canada, Mrs. -- sorry, Sharon Flatt had asked a question there regarding the federal

contribution to Atomic Energy of Canada Limited.

In respect to that contribution -- and what's that contribution been like in recent years? Has that contribution been rising or falling?

DR. KUGLER: It has fallen substantially in -- starting in 1995 as a result of the federal government's program review. This budget was cut by about 40 percent from what was at that time about $172 or '3 million annually to about 100 million. And it has been indexed with inflation. I think last year it was about 107 million.

Q. - Is there some kind of a review currently under way, some kind of a federal review? We believe we heard something about a review that was announced by Minister Herb Dhaliwal shortly after he took office. Is there some kind of a federal review under way at the current time on Atomic Energy of Canada Limited?

DR. KUGLER: We are being subjected to an annual review of our corporate plan which is a five year evolving plan. Maybe that's what he has been referring to. We have not had it approved for the last several years because of issues surrounding the waste management liabilities.

Q. - How much is your waste management liability? What is the total dollar figure on your waste liability --

DR. KUGLER: I think --

Q. - -- at the current time?

DR. KUGLER: I think on the balance sheet it's shown currently at about $380 million.

Q. - What is the current share value or asset value of AECL?

DR. KUGLER: I think our physical assets are on the books at somewhat over $100 million.

MR. THOMPSON: Thank you. That's all the questions I have.

CHAIRMAN: Thank you, Mr. Thompson. Mr. Craik is not here today. Mr. Adams, you are, do you have any questions of this witness?

MR. ADAMS: I will be very brief.

CHAIRMAN: Okay.

CROSS-EXAMINATION BY MR. ADAMS:

Q. - Good afternoon, Mr. Kugler. I wonder, could you tell us about the safety failures of the maple reactor unit 1?

DR. KUGLER: We encountered -- I presume you are referring to shutoff rod problems that they encountered during the commissioning of the reactors in about two years ago. Is that what you are referring to?

Q. - Yes.

DR. KUGLER: Yes. During routine commissioning we discovered that some of the rods would not poise as they were designed to poise. That means raising. The traditional tests include shutoff rods dropping to ensure

that the drop was in the design time and that they can also be raised in the design time.

And during those tests we found them sticking. And they did not drop in -- actually, they did not poise at the right -- at the rate that they should have.

Q. - And what were -- can you summarize the comments of the safety regulator in response to these problems?

DR. KUGLER: We had to demonstrate that they would perform reliably within the design basis. And the assumptions in our safety report were based on them dropping within a certain period of time. Their comments were that there was never any safety concern, but they did not perform according to the design and to the assumptions made in the safety report.

Q. - I wonder, would the counsel for AECL object if we filed those comments on the record in this proceeding after the witness has withdrawn from the stand?

CHAIRMAN: I will just comment on that. I think, Mr. Adams, the appropriate way to do it is that you would do it while the witness is on the stand, because this may in fact be something new that AECL could not anticipate when they did their examination in chief, and therefore it's only appropriate and fair that they be able to ask questions on the -- on that new evidence that they couldn't anticipate.

MR. ADAMS: I have asked the witness to summarize. He has provided his summary. The decision of the safety regulator is on the public record. It's another public body.

CHAIRMAN: I don't know. I'm anticipating that there might be something.

MR. ADAMS: It might be best for -- to hear his objection first.

MR. MILLER: Mr. Adams is an intervenor and he is going to be taking the stand. And if he has an exhibit he intends to introduce and speak to, then that would be the appropriate time, in my opinion.

MR. HASHEY: Mr. Chairman, I disagree with that procedure. In fairness we have been put to the fact that if we prefile evidence, then that evidence is the evidence that we are to deal with here. I don't think it would be appropriate for Mr. Adams to be adding additional evidence without us having the opportunity to properly examine it, consider it and cross on it.

CHAIRMAN: The thing that bothers me about this whole thing, Mr. Adams, is you said after this witness comes down off the stand. And that's what I don't appreciate. Mr. Hyslop? 16.

MR. HYSLOP: Yes, Mr. Chairman, Mr. Adams made -- there may

be different procedures in Ontario, but here if there is a document that we want a witness to comment on we have got a pretty well established procedure. We identify it, show it to him and maybe it ends up being an exhibit and maybe it doesn't.

So in fairness to the witness, if he wants him to comment on a document he should show it to him.

CHAIRMAN: Do you have that document here, Mr. Adams?

MR. ADAMS: No, I anticipated that the witness would have an understanding of the comments of the safety regulator. I have asked him the question. And my recollection of the document is quite different than his explanation. Hence my invitation to the Panel to take judicial notice of it.

CHAIRMAN: Well we can't take judicial notice of it. In that this -- that's immaterial. How can we get a copy of that?

MR. ADAMS: It's on the public record with the CNSC.

CHAIRMAN: That's not answering my question though.

MR. ADAMS: No. I would intend to file it with the tribunal for the benefit of the proceedings.

CHAIRMAN: Is there somewhere that it can be obtained in our next break? Is it on the Net?

MR. ADAMS: I'm not sure.

CHAIRMAN: Okay. We are going to take a 15 minute recess

right now. I would ask that you speak with both counsel for the applicant NB Power and Mr. Miller in reference to this document and see if you can get a hold of a copy of it if you want to put it on the record.

(Recess)

CHAIRMAN: Were we able to find the document over the break, Mr. Adams?

MR. ADAMS: Regrettably not.

CHAIRMAN: You can't find it?

MR. ADAMS: No. So what I propose to do -- I have no questions on the document. I received an answer from the panel, that's all I require. I was just hoping to be able to put as a matter that could be referred to in argument statements from the federal regulator. That's all I'm seeking.

CHAIRMAN: I will go back to the appropriate way to deal with this. And that is that we give -- present it to this particular witness and ask them to -- if they have any comments on it. I mean, if he has made a statement that would presumably attack the veracity of the testimony. But that's the appropriate way to do that rather than putting a document on the record subsequent to the testimony so the witness has absolutely no opportunity to comment on the document. You know, if the purpose for

that document is other than that, then you can explain that and it may well be that you can introduce it at the time of your own testimony. That's my understanding.

You are not going to be here on Monday, Mr. Adams?

MR. ADAMS: That's correct.

CHAIRMAN: Yes. And that's the last day that this witness can be here.

I would suggest that if you can get the document, that you can contact one of the other intervenors or Board counsel, they could then present the document to the witness, give the witness the opportunity to comment on whatever portion you wish. And then we will deal with whether or not it's admissible, et cetera, et cetera.

MR. ADAMS: Thank you very much.

CHAIRMAN: Okay. Thanks, Mr. Adams. Do you have any other questions for this particular witness?

MR. ADAMS: Yes, just a couple.

CHAIRMAN: Okay.

Q. - Dr. Kugler, are you familiar with the Pickering payback agreement?

DR. KUGLER: In very broad terms.

Q. - Can you describe it in broad terms for the benefit of the Panel?

DR. KUGLER: It's my understanding that around the time that

the first two Pickering units were built, AECL contributed, invested a capital amount of the order of 120', $140 million. And entered into a payback agreement under which they would be paid back their investment based on a formula that related the cost of electricity from Pickering units 1 and 2 to the cost of electricity from a thermal plant.

Q. - Lambton units 1 and 2, is that helpful?

DR. KUGLER: I believe so, yes.

Q. - And is it your understanding that under the terms of that agreement, AECL came to owe Ontario Hydro a sum of money?

DR. KUGLER: No, it's not.

Q. - That's not your understanding?

DR. KUGLER: No.

Q. - Are you aware of Ontario Hydro's decision in 1993 to write off debts owing to Ontario Hydro from AECL related to the Pickering payback agreement?

DR. KUGLER: I'm not aware of that, no.

Q. - In the context of -- for the benefit of the transcript they -- Energy Probe interrogatory from NB Power number 1 contains information on that decision by Ontario Hydro to write off that amount.

For the -- in the Pickering A retubing are -- were you -- are you familiar with what the scope of work was for

that retubing?

DR. KUGLER: It was a retubing of the reactors.

Q. - Do you know what other work was conducted on the reactors other than the retubing?

DR. KUGLER: No, I'm not familiar with the details of other work.

Q. - Are you aware of the decision to replace some control rods in the Pickering core with -- and change their function to shut down rods during the retubing of Pickering A units?

DR. KUGLER: I thought that was done later. I'm not sure that it was done around the same time. I know that there was an issue of basically speeding up a second shutdown system because the Pickering A reactors had one fast shutdown system and moderate a dump at its -- as it's referred to as a slower acting shutdown system. And subsequent to the construction of the initial units, the regulator required two fast acting shutdown systems and changes along the lines that you mentioned were implemented, but I don't know whether that was done during the time of retubing or later on.

Q. - You are suggesting that Pickering A has two fast shutdown systems?

DR. KUGLER: The requirement was that there be two fast

acting shutdown systems. That came later after the initial construction.

Q. - And are you familiar with the reasons why Pickering A was shut down in 1997? Let me refine my question here. Are you aware of any safety deficiencies that related to the decision to shut down Pickering A units in 1997?

DR. KUGLER: I understand OPG had been requested by the regulator to make improvements on the second shut down system and whether or not that became a direct result -- whether that was a direct result of the shut down, I understand, as I explained in previous testimony, the decisions by OPG to lay up the reactors related to a broader range of issues. They simply felt that they could not deal with the improvement and upgrading of 20 reactors, their entire fleet. They wanted to concentrate first on 12 reactors, lay up Bruce A on the Pickering A reactors and then return to those at some future time.

Perhaps the shut down issue -- shut down system issue factored into that decision, but I don't recall that as being given as the prime reason.

Q. - Were you aware of the fact that the Pickering A units were under licence condition to enhance their single shut down system, the SDS with the so-called SDS E, prior to December 31st of 1997, or their licence to operate would

be withdrawn.

DR. KUGLER: I'm aware that there were enhancements required on the shut down system, which particular system I can't remember.

MR. ADAMS: No more questions.

CHAIRMAN: Thank you, Mr. Adams. Mr. Gillis?

MR. ALBERT: Mr. Chairman, Mr. Gillis would like to cross-examine the witness. However he is unable to be here at the moment.

CHAIRMAN: Okay.

MR. ALBERT: Mr. Gillis would definitely like to cross-examine the witness. I'm afraid he is unable to be here at present. He will be here on Monday morning, however. Mr. Young has graciously consented to jump ahead of us if the Board would permit this. Mr. Hyslop, who would come also before Mr. Young, has agreed to this arrangement.

CHAIRMAN: Nobody is ready, are they. Okay. We have no problem, but, Mr. Young, your questions are not going to take two hours, are they?

MR. YOUNG: No, Mr. Chairman.

CHAIRMAN: No. So that it's really not worthwhile doing that, frankly. So I think we have plenty of questions to last us through today so Mr. Gillis could go on on Monday morning. That's no problem. So we will skip Mr. Gillis at

this time and go to -- does JD Irving have any questions, Mr. Mosher? He not being here, I guess JD Irving doesn't. And Mr. LeBlanc is not here. So Mr. Hyslop, you are up.

CROSS-EXAMINATION BY MR. HYSLOP:

MR. HYSLOP: Thank you, Mr. Chairman. I might also advise it may be necessary for -- and I may change my mind depending on how the cross-examining goes. But it may be necessary, Mr. Chairman, also to have a short in-camera cross-examination of this witness as well.

There is one line of questioning and it may lead us to the confidential documents that I would want him to comment on. So I would advise of that.

CHAIRMAN: Well, we will cross that bridge when we come to it, Mr. Hyslop.

MR. HYSLOP: Thank you, Mr. Chairman.

Q. - Dr. Kugler, I don't want to spend forever going through the history of AECL's construction projects and successes and lack of successes. But I think it is important perhaps to try to create a record of it.

As I understand it AECL, if you go way back, their first project was a 20 megawatt unit at Chalk River sometime in the early 1960s, is that correct?

DR. KUGLER: I believe you must be referring to the NPD

reactor near Ralston, not far from Chalk River.

Q. - Yes. That would be correct. And later there was a 200 megawatt prototype at Douglas Point in Ontario?

DR. KUGLER: Correct.

Q. - And as I understand the history, the first major involvement of AECL in the nuclear industry in Canada would deal with Pickering A?

DR. KUGLER: Yes. It was a major involvement, so was Douglas Point.

Q. - Sure. And Pickering A consists of four CANDU reactors each having a capacity of 500 megawatts?

DR. KUGLER: Correct.

Q. - And as I understand it AECL was not the contractor with regard to Pickering A. But you supplied technical and support services to this construction process?

DR. KUGLER: Yes. And we were the designer of the nuclear steam supply system.

Q. - Right. And the nuclear steam supply system, if I may, that has really been the forte of AECL over the last 35 to 40 years --

DR. KUGLER: Yes.

Q. - -- the development of this technology?

DR. KUGLER: Yes.

Q. - And in fact, as far as the development of NSSS technology, that is in fact the -- I think it is fair to

say AECL has developed a worldwide reputation for the quality of the nuclear reactor it builds?

DR. KUGLER: Yes. We consider that our core business.

Q. - Yes. And just to follow up -- and I understand from your evidence in 1997 Pickering A was shutdown. And in large part this was due to decisions of Ontario Hydro in relation to the reorganization of their nuclear generation as a whole?

DR. KUGLER: Yes.

Q. - Yes. And recently there has been an effort to start to try to refurbish and retube all or some of the nuclear reactors at Pickering A, is the correct?

DR. KUGLER: Not retube. Other refurbishment work.

Q. - Other refurbishment. So there is not a retubing associated with Pickering A at this time?

DR. KUGLER: That's correct.

Q. - And as I understand it in this refurbishment process, AECL is not the general contractor?

DR. KUGLER: That's correct.

Q. - You are, however, part of the design and support staff, is that correct?

DR. KUGLER: That's correct.

Q. - And I read something the other day that due to difficulties in this regard that Ontario Hydro has now

relieved both the contractor and AECL from their contracts in relation to this refurbishment. Am I correct in that, Dr. Kugler?

DR. KUGLER: No. They have not relieved us. They continue to retain us.

Q. - Okay. Is there any question as to the future of that retention at this time?

DR. KUGLER: Not to my knowledge.

Q. - Okay. And as I do understand it there are some problems with this particular refurbishment project and its ability to come in on time and on budget that has been mentioned in the press?

DR. KUGLER: Yes.

Q. - Yes. Thank you. In the later 70s I understand that you supplied much the same services to Ontario Hydro for the construction of Pickering B, is that correct?

DR. KUGLER: That's correct.

Q. - And that was --

DR. KUGLER: Our role was not quite as extensive as it was on Pickering A.

Q. - Okay. And as I understand it, over the years Ontario Hydro as they gained more and more knowledge, they developed the want to do it ourselves type of thing?

DR. KUGLER: That's correct.

Q. - Thank you. And just for the record, Pickering B also consists of four 500 megawatt reactors?

DR. KUGLER: Yes.

Q. - Thank you. And again Ontario Hydro in the early 80s began with the Bruce A which is four 900 megawatt reactors?

DR. KUGLER: Actually the first Bruce A units started up in 1976.

Q. - Okay. And were finished sometime in the early 1980's?

DR. KUGLER: I think all four Bruce A units were completed prior to 1980.

Q. - And they consist of nine -- or four 900 megawatt units?

DR. KUGLER: Initially 750 megawatts. That is the size of the turbine. But they upgraded their reactor power to deliver some steam as well.

Q. - Thank you. And again this was the -- your involvement with regard to these was really the seller of the technology to construct these reactors?

DR. KUGLER: Yes. We did the design of the nuclear steam supply system.

Q. - And you weren't involved as a project manager or any way in the direct construction of these particular nuclear reactors?

DR. KUGLER: That's correct.

Q. - Thank you. And as I understand it at present there is -- the Bruce units have now been leased to -- I don't know if it would be fair to use the word competitor -- but British Energy which is also in the nuclear business?

DR. KUGLER: The company is Bruce Power. British Energy is the major shareholder.

Q. - Yes. And they are in the process of upgrading and refurbishing Bruce 3 and 4 at the present time?

DR. KUGLER: That's correct.

Q. - Thank you. Now dealing perhaps more with the units that you have been more involved in, I understand there were a series of approximately five reactors that came on stream in the early 1980's, the one in Argentina, the one in Point Lepreau, the one in Korea, Wolsong 1 and the unit in Quebec. And these are all relatively the same vintage of CANDU-6 reactor, is that correct?

DR. KUGLER: That's correct.

Q. - And as I understand it, the Point Lepreau unit, you were not the general contractor on that unit?

DR. KUGLER: That's correct.

Q. - And I do understand that in Argentina you were heavily involved in the project management with an Italian company with you?

DR. KUGLER: That's correct.

Q. - Would you go so far as to describe yourself as the project manager with regard to the construction of this unit?

DR. KUGLER: Yes.

Q. - And just for the record, this was a brand new greenfield unit that was constructed?

DR. KUGLER: That's correct.

Q. - And the same would hold with Wolsong as well?

DR. KUGLER: That's correct.

Q. - And the unit in Quebec, were you the general contractor on that unit?

DR. KUGLER: No, we were not.

Q. - I expect Hydro Quebec was?

DR. KUGLER: That's correct.

Q. - Thank you. Now you use the phrase turnkey supplier. Just so I understand, a turnkey contract -- would you just elaborate a little more on what your understanding of that term means as it relates to the nuclear industry?

DR. KUGLER: Generally it means taking on the responsibility for the design, for equipment procurement, for licencing, for construction management, project management, training, the integration of these various activities, and bringing a reactor to full power operation and performing some acceptance tests at which time the job is basically done.

Q. - Okay. And as I understand nuclear power plants, there is two parts to producing nuclear power, one is the nuclear steam system, and the other is what they call the balance of plant. Am I correct there?

DR. KUGLER: That's correct.

Q. - And with respect to the balance of plant, I understand that you get the steam coming from the reactor. And what the balance of plant would be -- and I don't want to oversimplify -- but it would be somewhat similar technology to any thermal generation unit. Would that be a fair characterization, Dr. Kugler?

DR. KUGLER: It's a reasonable characterization, yes.

Q. - Yes. And the point I'm making is at least with regard to the balance of plant, I would suggest to you that there are many corporate bodies in North America that would be familiar with the design and construction of at least the balance of plant models in the nuclear industry?

DR. KUGLER: In Canada there is one company that has been traditionally involved on the balance of plant while I acknowledge that the balance of plant is similar to traditional thermal plants on the turbine side.

But there are interfaces with the nuclear steam supply system that are specific to a nuclear plant and some of the standards, especially seismic design and so on, are

perhaps unique to balance of plant for nuclear plants rather than any thermal plants.

Yes, there are generally more architect engineering companies that could do the engineering and design of balance of plant than there is -- than is the case for nuclear plants.

Q. - And I would take it that with your specialization in the reactor in the nuclear side of things, any design modifications could be adopted and adapted by these other engineering companies to take it out of the mainstream thermal generation type of project to any special qualities needed for the balance of plant at a nuclear facility?

DR. KUGLER: I didn't quite follow your question.

Q. - Okay. I will just maybe go a little slower on this. You indicated that there would be minor modifications or some modifications because of the fact the balance of plant interfaces with a nuclear reactor?

DR. KUGLER: Yes. In other words you can't just take the steam system and the turbine generator from a thermal plant, let's say a coal-fired plant, and match it as is to a nuclear plant. No, you can't do that.

Q. - Sure. But the changes that would need to be accommodated, AECL could easily supply the design work or

modifications to people who normally function in the balance of plant construction and engineering?

DR. KUGLER: We would specify -- we would provide what are called interface specifications. And other engineering companies could look at those and decide whether or not they felt capable of designing a balance plan that matches that.

Q. - Sure. And as I also -- and to go on from there, the next series of plant Ontario Hydro had were the Darlington 1, 2, 3 and 4?

DR. KUGLER: Actually Bruce B first --

Q. - Yes.

DR. KUGLER: -- and then Darlington.

Q. - And I understand you had very minimal support and involvement with these construction projects?

DR. KUGLER: For Bruce B we were the designer of the nuclear steam supply system. For Darlington we were not. We did do design for some specific parts of the safety systems and provide general technical consultation.

Q. - Okay. And further to these, you have already in your evidence indicated your construction projects of Wolsong 2, 3 and 4 in Korea?

DR. KUGLER: What was your question? Sorry.

Q. - Yes. You were involved with the construction of these

three additional reactors in Wolsong?

DR. KUGLER: Yes. That's correct.

Q. - And in those you were the principal contractor on --

DR. KUGLER: We were the main contractor for the nuclear design, for nuclear equipment and for architect engineering which is the design of the balance of plant.

But we did not procure the equipment for the balance of plant nor did we have any construction responsibility.

Albeit we did have technical supports to construction.

Q. - Okay. And you have mentioned your involvement on the two units in China earlier. And I think that is -- again just to be sure on the record, you were the -- those were complete turnkey operations?

DR. KUGLER: Not complete but very close to it. The one part that we did not have responsibility for is for construction of the balance of plant.

Q. - Okay. And that would be with regard with both reactors in China?

DR. KUGLER: That's correct.

Q. - Okay. Thank you. So if I can summarize this history, and I don't want to make it too detailed, your specialization is really on the delivery of the nuclear steam supply system?

DR. KUGLER: That's correct.

Q. - Right. And you have undertaken at least outside of Canada the principal construction of -- I estimate eight or nine units from greenfield to operation on the nuclear supply system itself?

DR. KUGLER: Yes. I haven't counted them up mentally. But those that you mentioned, yes. And just one clarification. When we do take turnkey or close to turnkey, the responsibility which includes the balance of plant from time to time, we generally subcontract the design and equipment procurement for the balance of plant to other companies. But we manage the interface. And we take over all responsibility.

Q. - Sure. Okay. Now two things on these. These were all new nuclear power plants, correct?

DR. KUGLER: The ones that you have mentioned, yes.

Q. - Yes. And there have also been a few projects where you have replaced a limited number of feeder tubes in nuclear power plants?

DR. KUGLER: Yes, as part of our services to maintenance and operation we have done that.

Q. - Yes. And I also understand from the evidence, and some of the evidence may have been given while you were not present, I understand that in your history you have in fact acted on the replacement of six Calandria tubes?

DR. KUGLER: That's probably about right.

Q. - Yes.

DR. KUGLER: We replaced some in various reactors.

Q. - Subject to check. It may be off a couple one way or the other. Now my point is that this Point Lepreau situation I suggest involves two parts. The second part is installing the new feeder tubes and the new Calandria tubes which would be I understand similar to installing Calandria tubes and feeder tubes and pressure tubes in new nuclear power generation stations?

DR. KUGLER: Yes. Except that it's done in an environment inside the reactor building which has radioactivity and radiation fields.

Q. - Yes. But before we even get to the installation we have the removal of the pressure tubes and the Calandria tubes, is that correct?

DR. KUGLER: That's correct.

Q. - And just so I understand accurately, this is the first time that AECL has undertaken a project that involves, shall we say, the teardown of a nuclear reactor?

DR. KUGLER: In a comprehensive way and in the way we are structuring the project, that's correct. We have not done a project precisely like this before.

Q. - Right. And for the record, I understand there is 380

pressure tubes and 380 Calandria tubes?

DR. KUGLER: That's correct.

Q. - And they both have an interface at both ends of the reactor?

DR. KUGLER: Yes.

Q. - And that would involve then 760 new connections that will have to be made with those tubes?

DR. KUGLER: I think you are referring to end fittings perhaps.

Q. - Yes. Okay. Now just so I can understand the business thoughts of AECL on this, and I hope you can appreciate that perhaps these numbers aren't accurate, but the intention is to get some feel.

I understand that during the early and mid 90s the use of the combined cycle gas generation units became more and more dominant in the electricity generation industry?

DR. KUGLER: Generally speaking, yes.

Q. - Yes. And these are rough numbers and I apologize if they are grossly in error, but just the general sense is that the technology developed at a combined cycle generation unit we could produce electricity for somewhere in the area of a thousand to $1,200 per kilowatt, does that sound close?

DR. KUGLER: You mean at a new plant?

Q. - Yes.

DR. KUGLER: I can't really comment. I don't have the numbers.

Q. - And then by comparison a new CANDU-6 reactor would be in the area of perhaps $4,000 per kilowatt hour to produce a new plant in Canadian dollars?

DR. KUGLER: Not that high. I think a repeat plant of a CANDU-6 --

Q. - I didn't say a repeat, I said a new CANDU reactor.

DR. KUGLER: A CANDU-6 reactor --

Q. - Yes.

DR. KUGLER: -- or a next generation advanced CANDU reactor?

Q. - We will get to the next generation shortly. Right now if you were -- if I was going to ask you to build me a new CANDU-6 reactor with the technology you had been using up to the time you completed the Chinese units, would I be looking at roughly $4,000 per kilowatt?

DR. KUGLER: Not that high.

Q. - Not that high. In excess of 3,000?

DR. KUGLER: Including interest during construction --

Q. - Yes.

DR. KUGLER: -- escalation and so on? Somewhat over 3,000, yes.

Q. - And then by comparison --

DR. KUGLER: I should qualify again. I think you would have to specify whether it's a single unit or whether it's a pair of CANDU-6's, because people use different numbers, they might quote it per unit, but assuming that two get built. But anyway, you are not far off in terms of the numbers.

Q. - Okay. And I won't pursue it deeply. We are a small province. We can only afford them one at a time, so --

DR. KUGLER: Okay.

Q. - Now -- and by comparison that's considerably in excess to what the development of what the combined cycle gas unit technology has developed.

DR. KUGLER: Yes, in terms of capital cost.

Q. - Right. And I would suggest that one of the results of this is that during the mid 1990s AECL's strategic business plan was left with the result that the market for building new CANDU-6 reactors had pretty well run its course?

DR. KUGLER: Yes, we recognized that the competition was moving in the direction of requiring substantially lower capital costs. In the past the focus has been more on levelized unit energy costs which looked at the costs over 30 years, but these days the focus is very much on capital cost and clearly gas plants have the advantage there.

Q. - Yes. And so, you know, in the broader perspective it was necessary for AECL to rethink somewhat their strategic plan in the longterm?

DR. KUGLER: I would agree and that's what led us to develop the advanced CANDU reactor as we have built it.

Q. - Look, you brought it up twice and it is in my line of questioning. Tell me about the next generation CANDU reactor. How far is the design technology along with regard to the next generation reactor?

DR. KUGLER: We started a conceptual design a couple of years ago, maybe three years ago. We set ourselves a target of a thousand dollars US per kilowatt installed as an overnight cost and a levelized unit energy cost of $30 US per megawatt hour. And we have looked at how we achieve those savings and it's through a variety of ways. We are making good progress. We are confident that we will achieve it. But we are still perhaps four years being market-ready.

Q. - Okay. So 2005, 2006 would be your outlook as to when you can say, I've got my new horse here and ready to go, type of thing?

DR. KUGLER: Yes, that time frame.

Q. - Sure. And the objectives on this would be -- your suggestion would be $1,000 per megawatt hour, is that

correct?

DR. KUGLER: 1,000 per kilowatt --

Q. - Kilowatt.

DR. KUGLER: -- installed as a specific capital cost.

Q. - Okay. And does this include the -- is your thinking on this just for the nuclear steam supply system or would this include balance of plant as well?

DR. KUGLER: No, that's the total plant.

Q. - Okay. If 2005/6 is when you feel your technology would be ready, and I appreciate that this has to be a qualified answer and there is qualifications that would be obvious, what would be your expectation as to when these might actually be able to be constructed and put in place if you were able to provide the technology in the time frame that you speak?

DR. KUGLER: The first to be built, the first advanced Canada rector to built, we would probably require about a five year construction schedule. The nth unit as we refer to it, and we hope to build a number of them, we are aiming for a total project schedule of four years, but the question is there will be the first two that will probably take longer.

So if we were actually signing a contract with somebody in 2006 the first to have it in service would be

in the time frame of 2010, 2011 at the earliest.

Q. - Thank you. Now between now and then I assume you are looking for some work?

DR. KUGLER: Yes, indeed. We are in the business.

Q. - Right. And unfortunately by the sounds of things your -- what has been the kind of your best product for a number of years is -- no longer seems to have much place in the market. And with that in mind would it be fair to suggest that there is some strategic direction that as the units in Argentina and Point Lepreau and Quebec come close to their life cycle that the refurbishment of these is something that has particular attraction to AECL?

DR. KUGLER: Yes. We think there is value in the units. I think the economics of life extension probably favour the economics of new construction.

Just to pick up on your point we are currently in negotiation with the Romanians, in fact we have signed a contract, we do plan to finish another CANDU-6 unit there, and the Romanians have declared their intent to build two more after that, or to finish them. We are also making proposals to the Chinese to replicate to the current project two more CANDU-6's. So we would hope to have some new built projects prior to then.

Q. - Okay. Now just to give you some perspective. Here in

New Brunswick we had a pretty bad experience with the original construction of Point Lepreau 1 and we have -- the provincial debt is about $10 million of which about 3 million is New Brunswick Power. So we are pretty concerned that things come in on time and in money. And you have entered into a contract and perhaps what I would refer you to -- and I don't have to show you, I will read it to you, and you can tell me what you think, and I'm reading from Rod White's evidence at page 9. And Mr. White says, NB Power as a small utility of a single nuclear reactor believes that a risk sharing partnership type agreement with the industry leader is the least risk strategy for the refurbishment project and beyond.

First of all, I would ask whether you would share his statements that the arrangements entered into with AECL can be defined as a partnership type of agreement?

DR. KUGLER: I think in general yes. We have common objectives. We enter into this in a risk and reward sharing context. We have complimentary roles and strengths. It's not a partnership in the legal sense but it's certainly a partnership in the nature of the way we intend to work.

Q. - Okay. And the partnership here you said was in the business sense, you have got a need to want to prove

yourself as someone that can put a nuclear reactor, tear it down and put it back together. That would be one of your objectives?

DR. KUGLER: Yes. Other clients or other customers have expressed similar interest in life extension. Hydro Quebec Gentilly 2 has declared their intent. We are currently doing studies with the Koreans to look at life extension of Wolsong 1. And the Argentines have registered similar plans.

Q. - And so it's some advantage if you can show these other parties in your partnership -- business partnership with NB Power that you can do a good job at this, this would be in your interest?

DR. KUGLER: Indeed.

Q. - Yes. And from NB Power's point of view if we can get this done at the times they have at least made a case, subject to some rigorous cross-examination, that economically there may be some support for that.

Now my concern is that -- I have a couple of concerns. The first concern is that developing of this technology, NB Power's evidence is to date they have expended about $40 million on having it -- having the technology to do the removal of pressure tubes and Calandria tubes design. You are aware of that?

DR. KUGLER: I would characterize most of the $40 million as having been spent on the conditional assessment and the planning of the refurbishment job.

Q. - Yes.

DR. KUGLER: This I believe was the right thing to do. A good definition of what ought to be refurbished and how it ought to be done is a prerequisite to doing a good job.

Q. - Sure. And if all of this planning and consideration and review works, then you will have the knowledge that the money invested by NB Power does work, is that correct?

DR. KUGLER: We would expect, yes, that the result would be what we predict.

Q. - Sure. And when you take this knowledge and go and sell it to the Koreans or to Hydro Quebec what, if any, part of your partnership with NB Power can they expect to have repaid to them in return, Dr. Kugler?

DR. KUGLER: Well every time we do a job we gain knowledge. We also invest directly into product development. But clearly the experience gained in every project is valuable on the next project. In terms of the benefit to NB Power, NB Power's benefit comes through the sale of electricity.

Q. - I appreciate you are going to sell electricity. They have expended $40 million and I think there is -- phase two is going involve I think in excess of -- the remainder of the

design they are going to spend a fair amount of money. My question is in this business partnership when you make a further sale, will all or some of those costs that NB Power has been expended, has AECL -- or have you contracted to pay any part of those costs expended by NB Power back to them?

DR. KUGLER: No, there is no such agreement.

Q. - Thank you. Now you also in the -- in Mr. White's evidence he makes the statement that there is a risk sharing partnership type of agreement and I want to deal a little bit with the risk sharing.

You have entered into two contracts. One is the retube contract and that provides I believe that if it's not completed on time you will pay $10 million as liquidated damages if the plant is down for -- if your period goes approximately 40 days and beyond, is that correct?

DR. KUGLER: I think we pay $250,000 per day.

Q. - Yes.

DR. KUGLER: That maybe the arithmetic adds up to that.

Q. - Yes. And I think the cap on that is $10 million.

DR. KUGLER: I believe so.

Q. - Right. And this is dealing exclusively with the retubing project, which is the removal and the putting in of the

pressure tubes and the Calandria tubes.

DR. KUGLER: That's correct.

Q. - Right. And the refurbishment contract, that deals with the issues of balance of plant?

DR. KUGLER: Some, but some also on the nuclear part of the plant, in particular upgrading what we refer to as trip systems, part of the safety system.

Q. - Okay. And on that refurbishment I believe that there is a capped liquidated damage at $5 million?

DR. KUGLER: I believe that's the case.

Q. - And there has been evidence produced during this hearing that NB Power's net present value of the extra money it would cost them in 2006/2007 if the plant goes over four months would be in excess of $63 million. Are you aware of that evidence, Dr. Kuglar?

DR. KUGLER: I have not seen that evidence myself.

Q. - Fair enough. But there has been some concern of intervenors that in fact if this was over - we had this bad experience with Point Lepreau, the original construction, if this went into 30 months that it could cost NB Power in excess of $200 million. And I was going to ask as somebody in a partnership risk sharing agreement do you feel in that type of a circumstance AECL should be absorbing more of the potential loss?

DR. KUGLER: The contract is a negotiated contract based on risks that we believe are reasonable for us to take and based on the risk the New Brunswick Power believes is reasonable for them to take. There are many considerations involved in it. The longterm performance agreement is an element of risk sharing as well.

At the end of the day it's based on risk assessment and judgment and capability that the parties enter into a particular business nature.

Q. - Okay. I appreciate very much that -- and the mechanism by which risk is normally assessed is price. Would that be a fair statement, Dr. Kugler?

DR. KUGLER: Yes. The more risk, the more price.

Q. - That is right. So I have got a nuclear power plant that I guess you had a chance to assess what type of shape it is in? AECL has?

DR. KUGLER: Yes. We were involved in a condition assessment.

Q. - Right. So you know -- you have some idea what you are going to find when you tear down the nuclear reactor and start the refurbishment?

DR. KUGLER: Yes. We have a reasonably good idea.

Q. - Yes. And my only concern is that -- maybe just one moment. I believe this morning, Dr. Kugler, we were

referred to exhibit A-23. It is a one page document. It had a list of --

DR. KUGLER: Is that the one which listed various risks?

Q. - Yes. Yes, it is. And you are aware that these risks, this risk assessment has been done as part of the evaluation of Point Lepreau?

DR. KUGLER: I believe it was an evaluation that Point Lepreau did.

Q. - Yes. Has AECL been made party to this? Is AECL aware of this document and the information contained in exhibit A-23?

DR. KUGLER: It was the first time I personally saw it when I looked at it today.

Q. - Okay. Well, do you have the exhibit in front of you?

DR. KUGLER: I will find it. What is the number?

Q. - It is exhibit A-23. Take your time.

DR. KUGLER: I have it now.

Q. - Thank you, Dr. Kugler. There are a number of risks listed on exhibit A-23 which have been identified by NB Power. And from your evidence you are not sure whether AECL would have been made aware of these potential risks?

DR. KUGLER: No. I can't comment on that.

Q. - Okay. Well look, from your knowledge of the contracts and the way you do business, let's assume that one of

these risks were to occur and it was necessary that we have to replace all the PVC cables and it cost $100 million. Is any part of that risk being accepted or absorbed by AECL, Dr. Kugler?

DR. KUGLER: In the sense that we have accepted the risk of providing a licensable design we have assumed that risk.

Q. - Okay. If it took $100 million to replace these cables, am I correct that that would be an extra expense that would have to be borne under the contract by AECL?

DR. KUGLER: No, that would not be. Because it is not one of the tasks that we plan to do.

Q. - In other words, it is outside of the scope of your contract?

DR. KUGLER: That is correct.

Q. - So any items that are outside of the scope of the contract, even though you have been described as a risk sharing partnership type of arrangement, under the contracts themselves, you are not required to participate, are you?

DR. KUGLER: We take risks on the work that we -- will be performing. And as I mentioned, we have jointly assessed the condition of the plant to -- we believe that the things that we agreed to refurbish are the right things to do.

There is always a risk that something else may come along. That is recognized.

Q. - Well, you told me a few moments ago that price is usually the mechanism that we use to allocate risk. I am going to propose to you, Dr. Kugler, that in addition to what you know I would give you the background.

In fact they had Ernst & Young I think -- did a review of this. It is one of the confidential documents and there was discussion of all this risk. I am going to give you all that information and point out to you that there is a number of items here. If they go wrong in the very, very worse case scenario it would add up to another $623 million.

But instead of me, as NB Power accepting the risk of these going along, I would like you to give me a price that it would take you to refurbish my plant taking into account those risks.

I assume first of all it would be higher than the prices that are in the contracts now?

DR. KUGLER: I am not sure exactly what risk you ask for. This is a -- as I look at it, as I understand it, these are maximum costs for specific tasks that might have to be done that may come as a result of licencing requirements and so on.

Now these would have low probability. If one looks at risks you look at both consequences or impact and probability. You don't just add them up. If you did so, people wouldn't get out of bed in the morning because there is so much risk involved.

So we would -- if we were asked to take certain risks on certain items we would do a risk assessment of our own and look at the probability, look at the potential consequences and decide on what that would be worth to us. But one would have to get specific.

I hesitate to comment on a list such as this that I have never looked at.

Q. - Okay. But it would be fair for me to say that the more risks you are accepting the more money you would want?

DR. KUGLER: That is correct.

Q. - Okay. And it may be an unfair question, but my question would be if -- and I may ask making that request to the Board in an undertaking, Mr. Chairman. If I was to provide you the copy of Ernst & Young confidential document relating to these risks, detailing them, would you be prepared to come back with a price that you would want to take this contract on including all these risks?

DR. KUGLER: I can't comment on that. It depends on the specifics.

Q. - Well, I can give you a document that is about an inch thick that goes into the specifics of these risks, Dr. Kugler. And I am wondering if you would be prepared to review it and tell me what you might want for a price to take the contract on with AECL and not NB Power accepting these risks?

MR. MILLER: Mr. Chairman, I just wanted to clarify for the record that Dr. Kugler was not listed on the order that this Board made of people that were entitled to see the Ernst & Young report. And he has not seen the Ernst & Young report. So this question is probably very confusing to him for that reason.

But in addition it is presented one, by the question or prefacing it that it is probably an unfair question. And two, it is entirely hypothetical.

Q. - Mr. Chairman, may I reply?

CHAIRMAN: Yes, Mr. Hyslop.

Q. - We went through this exercise with the Panel A. And that was the ruling. Panel A is a -- Mr. White's Construction Limited was a hypothetical company.

This witness has already stated that they are priding themselves. They are the industry leader in CANDU-6 technology. They have designed it. They are a world wide leader in it. They have indicated that part of their

strategic decision making is to get into issues of refurbishment. These people are contractors in the business of providing this type of services. They are holding themselves out as such.

All I am asking is take this risk assessment, look at it and how much more money would you want? And I think that is a pretty relevant question to the exercise we have been going through.

CHAIRMAN: Go ahead, Mr. Hashey.

MR. HASHEY: Are we going to get a two months delay and a $2 million fee for the Province to do this?

CHAIRMAN: Any other intervenors have any questions? It does appear to be a monumental task, Mr. Hyslop.

I mean it is not the kind of thing you do on the back of an envelope, is it?

MR. HYSLOP: I don't know what is involved. I know one thing, you couldn't put the Ernst & Young report in any letter size envelope I know, Mr. Chairman.

I appreciate they may not have to be able to give a specific number. But since risk assessment seems to involve less than one percent and one to five percent, and five to 20 percent, maybe he could pick a category. I would want 50 million more, 100 to 150 million more or more than 200 million more. And maybe most importantly

maybe I would want 234 million more. I don't know. I don't know what he would say.

And at the end he may say we can't answer the question. But I think their people could look at the Ernst & Young report in a fairly short period of time and at least give us some indication what the extra dollar amount might be.

CHAIRMAN: We are going to take a 10 minutes recess. I am just thinking about the fact that this witness, as Mr. Miller has said, has not seen that particular report.

And certainly from the Board's perspective, if you wish to show him that report during this break and he return it to you after the break before he gives answer to your question, why I think that is certainly in order.

Does NB Power have any difficulty with that?

MR. HASHEY: Having this witness see that report, absolutely not.

CHAIRMAN: Okay. All right. Well, let's do that. We will give a 10 minutes recess now and he can take a quick look at it.

(Recess)

CHAIRMAN: When we took the break, counsel had addressed the Panel on a particular issue. However, the witness has not answered the question. So that's -- has the witness. You

asked him if he were prepared to undertake to do this study?

MR. HYSLOP: I -- perhaps I will try to simplify the question. I'm asking after having an opportunity to review the document which is C-1 -- after having done so he would be prepared to indicate the price range that AECL would quote NB Power if all of the risks set out in this contract were to be absorbed by AECL?

CHAIRMAN: I.e. they become an insurer against these events occurring?

MR. HYSLOP: I think they would become a party to a contract where they agree to accept those risks. I don't know if that would be the insurer. I would think perhaps, Mr. Chairman, and not to be glib, but a risk shared partnership.

CHAIRMAN: Doctor?

DR. KUGLER: After looking at the document, it seems like a comprehensive risk assessment. I really think I wouldn't be doing justice answering you in a potentially glib way to say yes, we could name a price.

I think this is fairly serious. I would be -- it would be irresponsible for me on the basis of 10 minutes to say yes, for this much money we would take those risks.

Generally we take risks on things that we have

reasonable control and influence over.

If NB Power wanted us to assume more risk, we would be prepared to discuss it. We have had a lot of discussion where we ended up with the contracts that we have entered into we felt were reasonable risks to be assumed by both parties. And the issue of us taking on further risk did not arise at the time. But to put a price on sort of holding NB Power risk free from all of those is not a simple matter. This would require extensive review and negotiation, and as you know, the devil is in the details.

MR. HYSLOP: I appreciate that. I'm going to ask -- I have got a couple of other short lines of questioning, Mr. Chairman, which shouldn't take more than I hope, 10 minutes. And then I would propose to move to an in-camera session when we might talk a little bit more about C-1. And I have a couple of short questions which relate to C-2 which I would be putting to the witness in-camera.

And part of the line of questioning follow-up on Dr. Kugler's answer to my previous question, will be covered in the in-camera session. I think given your order, I can't go any further with this line of questioning.

CHAIRMAN: Okay. My only question is can you complete you other cross so that, for instance, those folks who are not going to be involved in the in-camera session are able to

go until Monday?

MR. HYSLOP: Yes.

CHAIRMAN: I'm sorry, let me -- yes, that's probably --

MR. HYSLOP: Yes.

CHAIRMAN: I may -- what I may do, depending on -- how long do you anticipate this in-camera session would take?

MR. HYSLOP: Maybe 10 minutes.

CHAIRMAN: Okay. Let's see how long it takes you to get through. Because what I might suggest is that, for instance, the representative for the City has a few questions, as I understand it. Is that correct?

MR. YOUNG: Saint John Energy does.

CHAIRMAN: Energy, sorry. Yes. Then it may be that we -- how late did you anticipate them to be?

MR. YOUNG: Approximately 15 to 20 minutes, Mr. Chairman.

CHAIRMAN: Okay. All right. I will probably put that off until Monday. Go ahead, Mr. Hyslop.

Q. - Thank you. Dr. Kugler, there has been evidence given at this hearing that there is a shutdown at Point Lepreau at the present time. And as I understand it, I may be off on the number, but approximately 70 pressure tubes are being replaced -- are being slarred, I'm sorry. Are you aware of that -- the work that is being done on the current shutdown?

DR. KUGLER: Yes. That's my understanding as well.

Q. - Right. And has AECL had any involvement in the design and the work that is being performed during this shutdown?

DR. KUGLER: I believe we are involved. But I don't know the details of precisely what our scope is.

Q. - And Mr. White had indicated that one of the effects of this could be that the life of the plant could be -- I'm not quite sure of the exact words, but it might well be able to be extended as late as 2009. Are you aware of that evidence, Dr. Kugler?

DR. KUGLER: No, I'm not familiar with that -- or those deliberations.

Q. - Sure. With your understanding of the review, the plant review that was done as part of the contracts you entered into with NB Power, do you see some possibility of the plant continuing to run with perhaps reduced capacity factors longer than 2006? Is that a possibility?

DR. KUGLER: We were asked to look at the potential life limiting aspect of it. And some were potentially life limiting at around 2006 or so, others later. I think the decision ultimately is one of economics. It does require more inspection, more maintenance possibly operating at reduced power. If NB Power intends to operate it to 2032, I think the economics of doing it earlier or later are

probably not affected a lot.

If they were any attempt to shut it down permanently, then you would probably want to look at operating it as long as you can even with the additional maintenance and inspection costs.

Q. - Okay. So to stretch it out to 2032, a couple of years one way or the other isn't going to make a great deal of difference from your point of view?

DR. KUGLER: I wouldn't think so.

Q. - Thank you. Now one of the other issues that came up, and I never thought about this much until after, but there was evidence that when you finally reach the stage when you can install the Calandria tubes, there was evidence to the effect that the 380 Calandria tubes could be installed in 100 hours. Does that seem reasonable to you?

DR. KUGLER: I believe we did it in that period in the factory where the calandria was fabricated, recognizing it's done under so called "ideal conditions". Getting the Calandria tubes in and out of the reactor is obviously going to take more time than doing it in the factory.

It gave us confidence doing it in that time. That we have the tools. We know how to do it. But we do have to add that additional time for doing it in the reactor building.

Q. - One of my concerns in removing the Calandria tubes is that there may become some damage to the Calandria surfaces, Dr. Kugler. Is that something in your analysis that has been considered? And has any analysis been done to determine the extent to which there may be needed remachining of any of the surface areas around the Calandria tubes?

DR. KUGLER: I can't comment on that. It's a level of detail I have not -- I don't have any knowledge in.

Q. - Subject to investigation, would it be possible for you to check with some of your technical people to determine if any such analysis has been completed?

DR. KUGLER: And the question was specifically on potential damage to the inside of the Calandria, is it?

Q. - And to the inside of the Calandria itself, yes. And if so -- and in particular in the area where the Calandria tubes join to the vessel itself. And whether there has been any analysis of the extent damage may occur, and the nature of any remedial work that would be done?

DR. KUGLER: I will undertake to look into that.*

Q. - Thank you. One of the reasons for extending the life of Point Lepreau was whether or not that it may or may not be a potential option to be considered, whether we could go with Point Lepreau and reach a point in time when the next

generation nuclear reactor might be available.

Dr. Kugler, would you be in a position to provide any views on that?

DR. KUGLER: Well, we discussed potential timing. As I mentioned, I think we would be market-ready in the sense of being prepared to sign a contract and take price and schedule risk on it around 2006.

If these were the first advanced CANDU reactors to be built anywhere in the world, we expect it will take longer than we expect future reactors to take. And the timing we would be looking at is somewhere around 2010, 2011 in service at the earliest.

And the price targets I mentioned earlier are based on two units being built. We plan to build them in pairs which is the way most utilities seem to want to do it.

Q. - Okay. First of all, in consideration of the possibility of going to the next generation nuclear reactor, have you had discussions within the industry and within -- with regard to potential buyers of this technology from AECL to work together in furtherance of the possibility of using this technology?

DR. KUGLER: Yes. We are in discussion with a number of utilities. Some of them are publicly-traded. And they would probably not wish to be named as being interested in

it.

Q. - Okay. And the last question on this line is would it be possible to marry up a next generation nuclear reactor with the balance of plant facility that existed at Point Lepreau at the present time?

DR. KUGLER: That is a possibility. One could take a look at that.

MR. HYSLOP: Sure. Just one second. I just want to flip through my notes, Mr. Chairman. I think I have covered everything.

Q. - I mentioned 380 tubes, the potential of Calandria tubes. That would be 760 ends. There would be two ends?

DR. KUGLER: Yes.

Q. - My colleague, Mr. Thompson asked a question. What happens if a Calandria tube falls to the floor of a reactor?

And my question is -- your answer was along the effect you didn't think it would happen. And you didn't know what the result would be.

Could you undertake to provide an answer to us of what difficulties if any would occur if in the course of removing a Calandria tube it fell to the floor of the Calandria vessel?

DR. KUGLER: Okay. I believe my answer was that we planned

to look at this in the course of doing the work to look at contingency measures and any special tooling or processes that we might want to put in place.

So the answer may not be available for a year or two until we get into doing the planning work. But I can at least undertake to tell you what we propose to do in terms of safeguarding --

Q. - Sure.

DR. KUGLER: -- against such events.

Q. - You can qualify to the extent necessary that you are comfortable. But that would be fine.

The question in cross-examination was asked, you indicated you had never paid liquidated damages. I'm wondering if any of the contracts that you have or have had in the past, demands have been made by any of the parties you contracted with to pay liquidated damages?

DR. KUGLER: Not to my recollection.

Q. - Thank you.

MR. HYSLOP: I do apologize, Mr. Chairman. These notes weren't quite as organized as I hoped they would have been.

CHAIRMAN: Take your time, Mr. Hyslop.

Q. - On the Maple isotope reactor that was discussed earlier, are you the general contractor on that? Is AECL the

general contractor?

DR. KUGLER: Yes. That is correct.

Q. - Are you subject to penalties at the present? Are you subject to liquidated damages under those contracts at the present time?

DR. KUGLER: Not liquidated damages. But we are sharing cost overruns with the client.

MR. HYSLOP: Thank you. I have no further questions in the public part of my examination. I probably have about 10 minutes of in-camera cross-examination.

CHAIRMAN: All right. Well, just before we adjourn the public portion until Monday morning, what is different about the Maple reactor? We have heard of CANDU's. But what is a Maple reactor?

DR. KUGLER: The Maple reactors are small reactors built specifically to produce medical isotopes. They will not be power reactors.

The client is MDS Nordion. MDS Inc. is a large health services company. And they want to continue to supply isotopes for medical purposes, diagnostic therapeutic purposes used in many hospitals around the world.

These isotopes are currently produced in one of our research reactors at Chalk River. But it is aging. And they want to ensure continuing supply. So they have

contracted with us to build two small reactors to produce isotopes. And that is their sole purpose.

CHAIRMAN: Okay. Thank you.

MR. SOLLOWS: Can I -- just one?

CHAIRMAN: Yes.

MR. SOLLOWS: Number 10. The next generation reactor, just so that my notes are complete in one spot, it -- what was the price for a single unit?

DR. KUGLER: When built in pairs we priced them -- the target capital cost is $1,000 US per kilowatt installed. So a 700-megawatt reactor would normally be 700 million US.

MR. SOLLOWS: CANDU is 700-megawatt reactors? That was my other question.

DR. KUGLER: In round numbers. About the same size as CANDU-6.

MR. SOLLOWS: And if you were going to build just one of them, a single unit?

DR. KUGLER: It would be higher. Because there are common savings and common engineering, project management. You might think of 25 percent higher cost if you build a single rather than a pair.

MR. SOLLOWS: Thank you.

CHAIRMAN: Okay. Well the public portion will adjourn until

Monday morning at 9:30. We will -- if any of the parties have any comments about timing, maybe we should do it right now.

The Board has been looking at it and discussing it. And this witness will be available on Monday. Has to leave, as I understand it, no later than 4:00 in the afternoon.

My suggestion is that we inform the Informal Intervenors to come around on Monday afternoon. So when this witness comes down from the stand that we will be able to have the Informal Intervenors make their presentations at that time.

As I understand it, Mr. Adams will be able to be -- he hopes to be able to be here first thing on Tuesday morning. So we can go through that.

Now what is your preference in reference to summation? And just before I go around the room, we can I think -- you know we have this room until Wednesday evening of next week. And then there is -- it is almost impossible to get it until sometime in September. It is just about that bad.

However, looking at the number of parties, et cetera, that sort of thing, we probably, for the purposes of summation, et cetera we can accommodate you in our

premises. They won't be as spacious or luxurious as you have here. But we can probably manage to do it.

So having all that in mind I will just start with the applicant Mr. Morrison and/or Mr. Hashey.

MR. HASHEY: Thank you, Mr. Chairman. We would be prepared and actually would like very much to deal with this either Tuesday afternoon or Wednesday, and while the evidence is fresh in our minds, make our presentation.

It will be short. We will probably have a short written summation to leave with you. I mean, I don't intend to go over the evidence in grand detail. I don't think you want any of us to do that. Just make our points.

Because it is obvious that you have been very attentive to the evidence and probably know it as well as we do. And the transcript is available on that. So that would be my choice.

CHAIRMAN: All right. Mr. Hyslop? That is 13.

MR. HYSLOP: I would have thought that perhaps going into next week would be warranted. But having said that I tend to agree with Mr. Hashey.

We have got to sit down and put our notes to paper and write our brief. And we are 90 percent of the way home on the evidence. And we have got three days over the

weekend. So we can get a start on it.

So I would probably prefer Wednesday to Tuesday so that I would have that overnight to think things through the last time.

CHAIRMAN: Yes. Mr. Miller?

MR. MILLER: The timetable that both parties have agreed to is agreeable to me as well.

CHAIRMAN: Yes. Okay.

MR. MILLER: That would be Tuesday and Wednesday.

CHAIRMAN: And Mr. Albert, do you have any idea what Mr. Gillis' approach might be?

MR. ALBERT: I can't speak with absolute certainty for Mr. Gillis at this point. But I believe that he would be in agreement with Mr. Hyslop and Mr. Miller.

CHAIRMAN: Yes. Okay. Conservation Council? Mr. Thompson, any preferences there?

MR. THOMPSON: Again I don't know what Mr. Coon's commitments -- Mr. Coon's schedules are for those particular days. But I will confer with him. And I think it is probably okay, yes.

CHAIRMAN: Okay. Any of the other Intervenors have any input they want to make? Okay. Appreciate that. And of course the Board counsel does not take part in the summation or anything further after completing the record.

His duties are through.

Okay. We will take a five-minute recess. And you are going to have to move your stuff out of this room. Perhaps we better take a 10-minute for those folks who have things here who can't remain and they want to get it out because they have got to clear it out for the weekend.

So we will take a 10-minute and come back. Those people who are named in the previous order of the Board will go into confidential session at that time in-camera.

(Recess: 4:35 p.m. to 4:45 p.m.)

** IN-CAMERA HEARING ** Subsequently ordered by the Board to be included in the public record.

CHAIRMAN: Okay. Go ahead, Mr. Hyslop.

MR. HYSLOP: Thank you, Mr. Chairman. There is just two lines of questioning, tie in a little bit to what was on in the in-camera.

The first relates to the issue I put with regard to if we changed this contract so that several of the risks identified by NB Power were in fact made the contractual risk of AECL. And in this regard I would refer you to exhibit C-1 which is the large report, and in particular under tab 12.

CHAIRMAN: Do we need them do you think, Mr. Hyslop? Should

we have the confidential exhibits out now?

MR. HYSLOP: Well I will identify the document. I'm not going to spend a lot of time going through it. Four pages in under tab 12 --

CHAIRMAN: Okay. Well the secretary will get us those exhibits then. Just a sec. She takes them home every night with her.

MR. DUMONT: Would you give us the reference again?

MR. HYSLOP: Yes. Under tab 12, and I think it's the fourth page under tab 12. And the document I'm referring to is a letter dated December 18th 2001. It's from a Mr. Bruce Ambeault who is the chief commercial officer risk assessment and commercial, I believe, of Atomic Energy of Canada, and it's addressed to David Reid of New Brunswick Power Corporation.

First, Dr. Kugler, can you confirm that Mr. Ambeault is the chief commercial officer risk assessment and commercial for the Atomic Energy of Canada Limited?

DR. KUGLER: That's correct, yes.

Q. - And in this letter -- and I'm referring in particular to approximately half-way down on page 3, the paragraph that says -- on page 2, I'm sorry. It says, Based on the above changes to the at risk model the results were as follows, and there is confidence levels assessed. Have you read

that -- able to see that?

DR. KUGLER: I see it, yes.

Q. - Yes. And it sets out that AECL has had the opportunity to review the risk factors and indicates certain confidence levels that they believe that the contingency -- the owner's contingency of $35,000 is a reasonable conservative amount for the project? 35 million, I'm sorry.

DR. KUGLER: I read that, yes.

Q. - Yes. And I guess my first question is in order to have written this letter I would assume that Mr. Ambeault has completed a fairly extensive and full review of the document C-1 to have written that letter. Would that be your conclusion?

DR. KUGLER: I don't know whether he was given a copy of this.

Q. - Okay. Then as part of your undertaking could you also determine the extent to which Mr. Ambeault or others at AECL would have had privilege to review this document prior to preparing the letter under tab 12?

DR. KUGLER: Yes, I will undertake that.

Q. - And my question would be in view -- if the answer to that question is yes, that it has been reviewed, then I would repeat the question that I asked earlier, given the

statements contained in this letter and the review, what additional price AECL would consider absorbing the contractual risk referred to in this document would be.

DR. KUGLER: I can undertake to review what analysis and what further review we would have to do before we could table a price, if we were willing to do that. We don't price these kinds of risks lightly. This would require formal review process by our risk assessment process. Board of director approval, et cetera. This is not a simple undertaking.

Q. - Okay. I accept that it's not a simple undertaking, and if you can't set a price, I would ask in your reply then you indicate the reasons why you cannot give a price and the nature of the -- the business reasons for not doing so or not being able to do so.

DR. KUGLER: I will undertake to do that, yes.*

Q. - Thank you very much, Dr. Kugler. My second line of questioning, I asked you before the break some questions with regard to damage to the Calandria vessel resulting from the removal of Calandria tubes and pressure tubes and whether or not this may cause some problems during the refurbishment. I would refer particular -- and I apologize. I trust that exhibit C-2 may have been provided to you as well?

DR. KUGLER: I don't see it here. Can I just have a clarification on whether or not I can show this to our Mr. Ambeault?

MR. HYSLOP: I would request the Board to add Mr. Ambeault to the list of people able to see the confidential document, Mr Chairman.

CHAIRMAN: And the witness.

MR. HYSLOP: Pardon me?

CHAIRMAN: And this witness.

MR. HYSLOP: Yes, and this witness. I hope I have added this witness prior to now.

CHAIRMAN: We certainly will do -- let the record show that the author of the correspondence that has just been referred to, Mr. Ambeault, can be shown the document which is exhibit C-1 by the witness, in order that the witness have an answer for the questions that have been put on Monday.

MR. HYSLOP: Yes. Thank you.

Q. - Dr. Kugler I believe you are now in possession of exhibit C-2?

DR. KUGLER: Okay. It's not labelled but if you would say that this is it.

Q. - At the bottom there is a description of the document and there is --

MR. HASHEY: Actually we have given him both.

Q. - There is two. You are looking at the smaller one, Dr. Kugler?

DR. KUGLER: Yes. It says, Point Lepreau Refurbishment Project Level 2 Schedule.

Q. - Yes. And it's the critical path?

DR. KUGLER: Yes.

Q. - Okay. It's -- I believe it's a five page document. And I would refer you in particular to page 3. And first of all in order perhaps to deal with the document, to your knowledge would AECL have had input into the creation of the critical path for this construction process?

DR. KUGLER: I would expect that we would have been involved in preparing this.

Q. - And in fairness to you as a witness, have you had direct involvement in any way with the preparation of this document?

DR. KUGLER: I personally? No.

Q. - And prior to me just showing it to you have you had any chance to review, or comment or become aware of the document?

DR. KUGLER: No. I was aware that a level 2 schedule had been prepared but I have not seen this.

Q. - Okay. I will ask you to comment and if you feel that

it's necessary to consult, please feel free to say so. At the top of page 3 of the document, it indicates that the Calandria tubes annulus spacer removal and volume reductions are to start on November 7th 2006, and finish on December 1st 2006.

DR. KUGLER: At the top of page --

Q. - The top item on page -- on sheet 3 of 5.

DR. KUGLER: Sheet 3 of 5, the top -- Calandria tubes annulus spacer removal and volume reduction to start 7th November, yes.

Q. - Yes. And as part of that as well on the next line it's, lattice tube inspection, refurbishment and set datum planes, and that also is to occur from December 2nd through December 24th 2006.

DR. KUGLER: Yes.

Q. - And I take it that the second item, the item on line 2, deals with the inspection of the Calandria vessel subsequent to removal of the Calandria tubes?

DR. KUGLER: I can't comment on the detail of the activity actually performed.

Q. - Okay. The other item that I would ask -- and what I will try to do is I will pose a question that includes all of this. The seventh item down has, install Calandria tubes. It starts on December 25th 2006, and ends January 23rd

2007?

DR. KUGLER: Mmmm.

Q. - And three items below that it says, check Calandria tube/end shield joints for leak, of January 24th to January 27th?

DR. KUGLER: I see that.

Q. - Right. I asked a series of questions during the public part of my cross-examination relating to the potential damage and re-machining of the Calandria vessels if there was damage that occurred for the removal of the Calandria tubes, do you recall those questions?

DR. KUGLER: Yes, I do.

Q. - Right My question, and I appreciate you may have to provide an undertaking, is in view of the potential damage and the nature and scope of work that might be required to repair the Calandria vessel, is there any revision or considered revision that might be required to the four items that I have just listed to you?

DR. KUGLER: Okay. I will undertake to get an answer to that.*

Q. - And finally just on that -- and this may have come out -- my question is whether any analysis has been done to determine the extent of and the percentage of incidents of damage that may occur during the removal of the Calandria

tubes that is allowed for at present?

DR. KUGLER: Okay. I thought that was already part of your earlier questions.

Q. - Yes. I think I may have done it in the evidence in chief.

MR. HYSLOP: Mr. Chairman, that completes my questioning on the in-camera.

CHAIRMAN: Good. Thank you. Any -- I'm sure there isn't, but, Mr. Miller, is there any re-direct in reference to this cross?

MR. MILLER: I'm sure there isn't as well.

CHAIRMAN: Okay. Mr. Hashey, would you over the weekend give consideration again to allowing that transcript of these proceedings being part of the public record, in that again the exhibits have been protected, and just very small portions have been referred to in them?

MR. HASHEY: I'm sure there is no problem.

CHAIRMAN: Yes. And also whether or not -- Mr. Miller, you can, converse with Mr. Hashey in advance of the hearing, but it might well be that they can be answered on the public record as well now that the questions have been put. But you can check that out.

And I would ask those of you involved in this in-camera hearing if you could be here at -- available anyway

at quarter after 9:00 on Monday morning, so we could do that, if we have to go back in-camera we can do it and not keep everybody else waiting.

Okay. Well have a good Friday and a good weekend.

MR. MILLER: I would like to thank Dr. Kugler for his co-operation.

(Adjourned)

Certified to be a true transcript of the proceedings of this hearing as recorded by me, to the best of my ability.

Reporter