

LOWER CHURCHILL HYDROELECTRIC GENERATION PROJECT  
**JOINT REVIEW PANEL**

PROJET DE CENTRALE DE PRODUCTION D'ÉNERGIE HYDROÉLECTRIQUE DANS  
LA PARTIE INFÉRIEURE DU FLEUVE CHURCHILL  
**COMMISSION D'EXAMEN CONJOINT**

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Conference Room  
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Happy Valley-Goose Bay, NL

**Wednesday, April 13, 2011**

**Volume 32**

**JOINT REVIEW PANEL**

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1 Happy-Valley Goose Bay, NL

2

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

4 CHAIRPERSON GRIFFITHS: Good

5 morning, ladies and gentlemen. I'm sorry that

6 we've kept you waiting to get started here. I'm

7 glad to see you back.

8 We've -- as you know, the panel

9 was in Sept Iles in St. John's and Sept Iles last

10 week. In St. John's we held general sessions and

11 in Sept Iles we held a total of six individual

12 community sessions at which six of the Quebec Innu

13 communities came forward to give their

14 presentations to the panel. It was an excellent

15 week.

16 --- OPENING REMARKS:

17 CHAIRPERSON GRIFFITHS: So now

18 before I go on to what the plan is for today, I'd

19 just like to look a little bit ahead.

20 As you know, we're in our last

21 week and we have sessions for closing remarks on

22 Thursday and Friday. The registration to make

23 closing remarks has now closed, and I just want to

24 -- a little reminder to any of you who are

25 registered for those sessions that the panel cannot

1 accept any new information in your closing remarks.

2 It's a time for you to reflect on  
3 all the information that's been brought forward to  
4 the panel and to give us your views.

5 If there is any new information  
6 that gets put in to the closing remarks, the panel  
7 will simply have to disregard it. But we certainly  
8 are inviting you to present your interpretation of  
9 what you've heard and, you know, if your views have  
10 evolved over the course of the hearings we'd be  
11 very happy to hear that and for you to highlight  
12 that.

13 There will also be no questioning  
14 during the closing remarks sessions. You will  
15 basically be listening to people present to us.

16 The schedule is available on the  
17 web or you can get it from the Secretariat.

18 Now, today's session was billed as  
19 a general session, and it was an additional one  
20 that the panel decided to add. And we're going to  
21 be running the session until about 12:30 this  
22 afternoon.

23 And the purpose -- it has a very  
24 specific purpose, which is to address the two  
25 reports that were provided to the panel at their

1 request.

2                               One of them is -- was Undertaking  
3 number 54, and it was in response to questions the  
4 panel asked regarding the future fish assemblage.  
5 And the second one was a letter sent to us by  
6 Nalcor in response to our letter regarding requests  
7 for more information on economic justification of  
8 the project and comparison of generation options to  
9 meet island demand.

10                              So those are the two topics for  
11 this morning.

12                              And as you know, we didn't invite  
13 registrations for this session, so the way it's  
14 going to go is that the Proponent will be making a  
15 brief presentation on each of these two topics, so  
16 the first half of the agenda is dedicated to the  
17 future fish assemblage.

18                              And after their presentation, the  
19 panel has a number of questions in each case. And  
20 then there will be time in which we will invite  
21 other people present, and essentially you can ask  
22 questions of the Proponent or you can give a --  
23 state your views. We're not trying to enforce some  
24 kind of questioning-only rule.

25                              I guess it never worked anyway,

1 did it, so ---

2 But what we'll try to do, what  
3 will be important is that we've got kind of limited  
4 time and, you know, I want to see how many people  
5 are interested in speaking to the panel.

6 We'll try and share the time out  
7 as fairly as possible, so we appreciate if you can  
8 keep your material really -- your questions or your  
9 statements brief.

10 Then we'll take a break and we'll  
11 come back and we'll address the second topic in the  
12 same way.

13 I should just say that after this  
14 session you have until 4 o'clock -- is that  
15 correct? I have to look at the Secretariat. Four  
16 (4) o'clock, thank you. Four (4) o'clock this  
17 afternoon to submit any new information that you  
18 want the panel to consider.

19 After 4 o'clock this evening, we  
20 cannot receive any new information. So in other  
21 words, if you find that there's not enough time  
22 this morning for you to say all that you want to  
23 say to the panel on either of these two topics,  
24 you've got about three and a half hours if you can  
25 go home and -- if you can prepare something in

1 writing and just email it to us by 4 o'clock and  
2 then it comes in to the record and we will  
3 certainly be very interested to read that. It  
4 would be very helpful to us.

5 And I think that is all that I  
6 need to say by way of opening remarks. I assume we  
7 have no -- we're done for housekeeping. Yes.

8 So now I would like to invite the  
9 Proponent to make a presentation on the future fish  
10 assemblage.

11 --- PRESENTATION FROM NALCOR ON UNDERTAKING #54 BY  
12 MR. JIM MCCARTHY:

13 MR. MCCARTHY: Thank you and good  
14 morning to the panel and ladies and gentlemen.

15 It's good to have an opportunity  
16 again to go through the fish assemblage. What I'm  
17 going to do is hit, I guess, some of the high level  
18 non-technical description of the future fish  
19 assemblage. And I'm sitting over here so I can use  
20 the mouse to point out some stuff.

21 Okay. The request, basically,  
22 wanted an overview, and the overview was to be  
23 broken down in three separate areas; and that is,  
24 below Muskrat Falls, the Muskrat Falls reservoir,  
25 the Gull Island reservoir, and predict the future

1 fish habitat during the transition period and post-  
2 transition period.

3 And the description is in terms of  
4 the fish assemblage, so I'll try to go through what  
5 information I need to describe the habitats, what  
6 parameters were used to predict the habitat that  
7 would be both in those two periods and then to  
8 discuss the fish assemblage.

9 I will start out by saying that  
10 the prediction with the incorporation of the fish  
11 habitat compensation strategy is that there will be  
12 no change in the fish assemblage and the  
13 sustainability and biodiversity of the fish  
14 populations will be maintained.

15 And just very quickly, some of the  
16 habitat descriptions that were provided in the  
17 request included impoundment, turbine-related  
18 mortality, erosion, water quality, habitat quality  
19 and trophic shifts.

20 I've put the impoundment and  
21 turbine-related mortality at the beginning because  
22 they're not really related to the different habitat  
23 areas, but more related to either activities or the  
24 facilities themselves, so I'll discuss those first.

25 CHAIRPERSON GRIFFITHS: Mr.



1     McCarthy, could I interrupt you for one second?

2                     MR. McCARTHY:    Yeah.

3                     CHAIRPERSON GRIFFITHS:    I'm  
4     finding the volume low.    I don't know if other  
5     people are as well.    Not you, necessarily.    I think  
6     you're close enough.

7                     I just wonder if we could get a  
8     little more volume from the back?    Thank you.

9                     MR. McCARTHY:    Is this better?  
10    All right.

11                    I'll try to speak a little bit  
12    louder, I don't know if it will help or not.

13                    In terms of the impoundment what  
14    we've described is that impoundment will occur  
15    twice, once for each reservoir, and the prescribed  
16    minimum flow release right now is 30 percent.    That  
17    equates to about 552 cubic metres per second,  
18    downstream of Muskrat Falls.

19                    And keep in mind, in terms of the  
20    construction sequence, if Muskrat Falls is built  
21    first with Gull Island afterwards, the habitat that  
22    would be involved in the dewatering or the minimum  
23    flow would be from Muskrat Falls downstream.

24                    What I wanted to do is just  
25    quickly put up a comparison of the 30 percent

1 mean annual flow to some other rivers that are  
2 gauged by the Department of Water Resources.

3 And, as you can see, the Alexis  
4 River, its maximum flow in 2010, was about 4,801  
5 cubic metres per second; just to put it in some  
6 perspective, it is a large amount of water. But in  
7 any case, associated with the impoundment will also  
8 be fish relocation.

9 A fish relocation plan is  
10 typically required for any water reduction by DFO  
11 through either an authorization or a permit or at  
12 least just a requirement, and that will be  
13 implemented, similar as it has been for Nalcor at  
14 Granite Canal.

15 There will be surveys and  
16 collection of fish, moving them out of areas where  
17 they're stranded or isolated into small pools.

18 The other thing to note is that  
19 there won't be any saltwater intrusion downstream  
20 towards the mouth of the river, because of the 30  
21 percent mean annual flow.

22 With Muskrat Falls, the  
23 maintenance of the 30 percent mean annual flow  
24 during reservoir filling is actually conducted  
25 through the spillways, so there's a great amount of

1 control in terms of how much or how quickly they  
2 can reduce the flow.

3 I believe it was Mr. Davis has  
4 talked about, perhaps the ability to reduce the  
5 quickness of the -- the reduction to 30 percent  
6 mean annual flow, or maybe not going to 30 percent  
7 mean annual flow at all.

8 And we've had discussions with the  
9 engineers, and that is quite a possibility, that if  
10 we see that 30 percent may not cut it in terms of  
11 isolating large areas of habitat, that it may not  
12 go down to 30 percent, that there is flow control  
13 at Muskrat Falls -- still some terrestrial issues  
14 and whatnot to make sure that we're not cutting off  
15 our nose to spite our face.

16 But there is the ability there to  
17 maintain flow control downstream of Muskrat Falls.

18 So with that in mind, we still say  
19 that the overall effect on the fish assemblage  
20 below Muskrat Falls, as a result of the  
21 impoundment, and the timing of impoundment, will  
22 not affect the fish assemblage.

23 The second is turbine effects, and  
24 the effects on the fish populations.

25 Turbine effects are obviously

1 associated with the facilities themselves, and what  
2 I've got here is just a quick table, looking at  
3 some of the -- the configuration of both Muskrat  
4 Falls and Gull Island facilities.

5                   The Muskrat Falls is a Kaplan or  
6 propeller-type turbine, with a 35-metre head. And  
7 what we've done is, we've taken the configurations  
8 and looked at previous locations where mortality  
9 studies and injury studies have occurred, and used  
10 the models from those studies with our  
11 configurations to come up with estimates of  
12 survival, or mortality and injury.

13                   And what you can see there is that  
14 of the fish that would go through a turbine -- and  
15 this is not related to the entire population in the  
16 reservoirs -- it's of the fish that go down through  
17 the turbines. For Muskrat Falls, the survival is  
18 89 to 94 percent.

19                   Of those 89 to 94 percent, the  
20 injury rate is between 2 and 22 percent, and that's  
21 predicted based in the size of the fish.  
22 Obviously, the bigger the fish, the more chance  
23 that you're going to come in contact with the  
24 runner or have something -- something in terms of  
25 an injury.

1                   For Gull Island, the turbine is a  
2 Francis-type turbine. It isn't as fish-friendly.  
3 It does have a much higher head and so the  
4 survival, based on work done in other locations, is  
5 that it is lower, it's about 67 percent, and the  
6 injury rate again is 3 to 34 percent. That's,  
7 again, based on the fish size.

8                   When we look at the proportion of  
9 the population that would go through the turbines,  
10 Muskrat Falls is a complete obstruction. There is  
11 no migratory path there now. That's not to say  
12 that some fish may not go downstream.

13                  In Gull Island, the radio-  
14 telemetry program showed that there is no  
15 population based or migratory movement there. In  
16 terms of the brook trout, there is some movement of  
17 a local population that goes back and forth, so  
18 there is some -- there is some population numbers  
19 that would be predicted to go through there, but  
20 not at a very high population level.

21                  What I'd like to do now is just go  
22 through the three riverine sections, and talk about  
23 what it looks like now and what it will look like  
24 in the future. And I may a tiny bit of time on  
25 some of the models and some of the model outcomes.

1 I think it was Mr. Hendriks said  
2 that sometimes the scientists focus on the numbers  
3 and don't put stuff in context, so I'm going to try  
4 to put some stuff in context, rather than just  
5 spitting out a bunch of numbers and graphs, and  
6 hopefully that will be helpful.

7 I'm not going to explain this  
8 graph again, but I did throw it up there. The  
9 first thing that was requested was the erosion, and  
10 downstream of Muskrat Falls there will be  
11 reduction in the sediment load because the Muskrat  
12 reservoir will trap a lot of the sediment that used  
13 to come down.

14 And what that will do is, it will  
15 change the bed of the river closest to Muskrat  
16 Falls so that it changes the energy of the river.  
17 It will basically pick up sediment, or sands, from  
18 near Muskrat Falls and deepen the channel there.  
19 Over the 100-years computed run, it'll deepen it by  
20 about five and a half metres, and that will slowly  
21 attenuate as you move downriver.

22 So this graph shows -- this is the  
23 pool at Muskrat Falls. It shows the existing water  
24 level, or this bed level, and the predicted bed  
25 level after a 100-year run. You can see Black Rock

1 Bridge is right around here.

2                               So it gets less and less as you  
3 move downriver, and that's not to say that there  
4 may be a change in the deepest part of the river,  
5 the thalweg. The thalweg moves back and forth and,  
6 if that thalweg does come towards one of the  
7 shores, it could have some undercutting and it  
8 could have some changes to the shoreline.

9                               And I'm just very quickly showing  
10 the -- these are some of the transects that they  
11 looked at, as you move downstream. This is just  
12 downstream of Muskrat, and you can see the change  
13 in water depth, and then it gets less and less as  
14 you move downriver, and this is at kilometre zero.  
15 They're basically the same and, in fact, it's  
16 slightly -- slightly higher for the future, after  
17 100 years, than before.

18                              In terms of water quality, we were  
19 asked to look at these five main factors; flows,  
20 total suspends, solids -- so I've got a very quick  
21 run-through here, and what I'll do is, I will  
22 discuss some of the models here

23                              I've got the exact same, almost  
24 identical graphs, for all the three different  
25 areas, so I'll explain the models here now and then

1 just show the results in each applicable section.

2 In terms of the flow, we've seen  
3 this one before. The flow downstream below Muskrat  
4 Falls will not change. It will be similar to the  
5 flows that are currently experienced, and this is  
6 just showing the mean annual flow right now, post-  
7 GWAC, 1998 and onwards, and it shows the upper  
8 limit and the lower limit of the discharge profile,  
9 so it will maintain or stay within that range.

10 So in terms of total suspended  
11 solids, I put this image in here. This is a net,  
12 the Gillnet set -- that was set just as the -- just  
13 on the island below Muskrat Falls. You can see  
14 some of the stabilization or the armouring of the  
15 shoreline. There's a lot of sand, but you can see  
16 that it's become more cobble, and you can see the  
17 different water levels based on the operation of  
18 the facility in the spring, the spring flow, but  
19 you do get this bank.

20 In terms of total suspended  
21 sediments -- what I've done for all of these is to  
22 put down what the existing range is, what the mean  
23 range is, and then what the predicted peak, in  
24 terms of what parameter we're talking about is,  
25 just to put it in context relating to the existing



1 environment.

2 But if I could just take a second  
3 to explain what the model outputs are, the model  
4 output is -- this is over years, so you've got a  
5 20-year run here, and what you've got is a peak  
6 concentration at year one, two, three and so on.

7 And what you see is that there is  
8 a peak at about year two, and that's the same for  
9 total suspended sediments and total phosphorus.  
10 And what you've got is, it stays elevated now for  
11 the open water period.

12 So before, you had your high peak  
13 in the spring, and it went down a bit and then it  
14 came back up in the fall. It will change a little  
15 bit here, but what it does do is -- there are two  
16 things I guess related to the model that I think  
17 even DFO, in their initial submission, said that  
18 models are good tools for predicting post-project  
19 or predicting the effects of something, but they  
20 don't necessarily always take into consideration  
21 the real world in terms of how the model has to be  
22 set up.

23 And two things come to mind when  
24 you look at the modelling of total suspended solids  
25 and total phosphorus, they were done with the same

1 model.

2                   The first one is that it treats  
3 the river as a series of blocks and each one of  
4 these blocks, the model assumes that the  
5 concentration that's predicted for whatever  
6 parameter is evenly distributed. So it's  
7 constantly mixed, totally, in each block.

8                   And I'll show you a couple of  
9 photographs later on of the slide at Edwards Brook.  
10 That's not the case, that's not what happens in  
11 term of the total suspended sediments, it tends to  
12 stay close along the shoreline because the flow is  
13 keeping that higher suspended sediment closer to  
14 the shore.

15                   So when we say that there's a peak  
16 in TSS at 26 it's not evenly distributed, except  
17 for below Muskrat Falls where it's coming over the  
18 falls, it actually is getting fairly well mixed.

19                   The other one is, if you look at  
20 the model they had to pick a baseline or a  
21 background and for the total suspended solids they  
22 used 1 milligram per litre. And that's not to say  
23 that 1 milligram per litre will be the post-project  
24 baseline. The baseline is still going to have  
25 total suspended solids coming in from the

1     tributaries.

2                     When the shorelines are stable, as  
3     they are now, we're still getting erosion, there's  
4     still going to be -- it's not going to be  
5     absolutely constant in terms of post-project  
6     concentration.

7                     So when I say that there'll be an  
8     increase of 26 milligrams per litre that'll be  
9     above, I think, some other additional value. And  
10    when you look at the existing TSS range, eight,  
11    it's got at least be added to 8 milligrams per  
12    litre.

13                    Well, I put it in perspective  
14    here, there will be some variability in that peak  
15    increase.

16                    And again with total phosphorus,  
17    same model output, they use .01 for their beginning  
18    and that's based on the lowest measured  
19    concentration from the tributaries and from  
20    upstream. But again, that's not going to be the  
21    total in the spring, there will be some inflows.

22                    But what you can see is that the  
23    predicted peak at year one, downstream of Muskrat  
24    Falls, is still within the realm, it's not an order  
25    of magnitude, it's actually within the

1 concentrations that are seen now. And while it is  
2 above the mean we're not looking at orders of  
3 magnitude increases.

4 And that plays an important role  
5 in terms of the productivity and the fish  
6 assemblages.

7 And this is again the same thing  
8 with water temperature. We look at the water  
9 temperature -- and this is close to Goose Bay for  
10 below Muskrat Falls -- the blue in each one of  
11 these graphs is the existing and that's the  
12 existing of a particular year and I believe this  
13 year is 1993 and it shows -- the pink is the  
14 estimated change in water temperature.

15 And what you can see is that  
16 there's a slight change and a reduction in the  
17 overall peak water temperatures but the variability  
18 is fairly similar. There is that delay at the end  
19 and that corresponds as well to that ice formation  
20 that we've got a delay in the cool-down period.

21 And you'll see in the reservoirs  
22 there's actually more of a delay in the warm-up  
23 period because of that large body of water.

24 But when you look at what the  
25 potential effect on water quality could be you have

1 to look at the temperature preferenda of a lot of  
2 these species. And in fact, when you look at the  
3 peak of the existing it gets above 20 degrees and a  
4 lot of the fish species that are here don't like  
5 water when it gets above 20 degrees.

6 So in actual fact the water  
7 temperature regime here stays within the  
8 temperature preferenda and actually stays closer to  
9 the temperature preferenda.

10 I'm not going to get into the  
11 preferenda and they're cold-blooded species so, you  
12 know, if it gets too hot then their conversion to  
13 food gets less and less and they need more food.  
14 So it's nice to keep it in the temperature  
15 preferenda. I just want to point that out in terms  
16 of what this will do in terms of the productivity.

17 I'd also like to point out that  
18 it's not just the temperature that's going to  
19 affect the productivity, there's going to be  
20 retention time in the reservoirs that change in the  
21 nutrient cycling. And I'll talk a little bit more  
22 about that when we get up into the Muskrat  
23 reservoir.

24 I'm going to briefly touch on ice,  
25 although it's not a major portion of fish habitat

1 in terms of what the fish have to depend on. As  
2 long as it doesn't freeze to the bottom or impede  
3 any of their movements or survival underneath the  
4 ice it's not a major role in terms of the habitat.

5 But we did have a predicted delay  
6 in ice formation by approximately two weeks in  
7 early winter, in the area of Mud Lake. And as  
8 well, the progression of that ice upriver will also  
9 be delayed. So you've got that cut off of the  
10 frazil ice that comes over Muskrat Falls.

11 That won't be available; the  
12 frazil ice will have to form below Muskrat Falls  
13 downstream, so you've got less frazil ice formation  
14 so the progression of ice will be delayed up the  
15 river.

16 And as submitted, I think in  
17 Undertaking 38, the ice in Goose Bay and Lake  
18 Melville will not be affected.

19 I just wanted to take -- I put  
20 these slides in because I don't think I did a very  
21 good job on describing the fish health and how the  
22 fish health was incorporated in the catch per unit  
23 effort. So before I get onto the habitat  
24 utilization stuff I'd like to just take a little  
25 quick -- a quick explanation I guess on how fish

1 health has been incorporated into the habitat  
2 utilization.

3                   So what I've done is I've created  
4 just three arbitrary habitats and there's a number  
5 of fish, all the same size, so we're dealing with  
6 one lifecycle stage in each of the habitats.

7                   And what I've shown in the green  
8 circles is this is the habitat that's required for  
9 them to grow and to reproduce. So if you were  
10 going a catch per unit effort, if you were to  
11 sample these three habitats Y would be the fish  
12 habitat that would be most suitable because there's  
13 the ability for more fish to get what they need out  
14 of less habitat.

15                   That only works if these two fish  
16 aren't forcing these fish over in this habitat so  
17 that they're -- for lack of a better word --  
18 they're bullying the other fish; they taking the  
19 best of the habitat and forcing everybody else to  
20 be in the smaller -- into the other habitat.

21                   Then when you sample the habitats  
22 you've got the opposite effect. That's where the  
23 fish health comes into play.

24                   In order for this catch per unit  
25 effort to be valid, the growth rates for all these

1 three different habitats have to be the same so  
2 that we know that they're getting everything that  
3 they require from the habitats that they're in.

4 For example, if the growth rate in  
5 this highly dense habitat is a lot less we know  
6 that they're not there because of their own choice.

7 So what I've done is just looked  
8 at some of the growth rates and threw them up very  
9 quickly for the five different areas; for the  
10 estuary below Muskrat Falls, the proposed Muskrat  
11 reservoir, Winokapau and then the riverine portion  
12 of the Gull reservoir.

13 And what you see, there's a bunch  
14 of different metrics to look at condition factor,  
15 there's individuals ones, there's a growth rate for  
16 populations but this is one of them. And what you  
17 see is that they're similar across.

18 So the fish health comes into play  
19 in terms of validating the catch per unit effort  
20 can be used to look at the suitability of the  
21 habitats.

22 The one that I will note here is  
23 that the Ouananiche here seems to be a little bit  
24 low and we've said that but the Ouananiche they  
25 don't really like that sandy habitat and that sandy



1 environment. We did catch some of them down there,  
2 very few, but you can see that it's slightly low  
3 and again, the lake whitefish.

4 But overall, the habitats are  
5 similar in terms of health therefore the catch per  
6 unit effort can be used. And this is another  
7 important reason why the growth, the condition  
8 factor, the growth rates and the fecundity because  
9 it's the growth of the fish and it's the  
10 development of the eggs, why that's incorporated  
11 into the monitoring program.

12 So we have our catch per unit  
13 effort post-project but we also need to make sure  
14 that the fish are still in the same health that  
15 they were previously and that's an important part  
16 of the monitoring program. So I just wanted to  
17 throw that in there because I don't think I did a  
18 very good job last time.

19 So if we look at the habitat  
20 quality downstream of Muskrat Falls -- in fact,  
21 based on the range of nutrients, the range of  
22 suspended sediments, and some of the sediment  
23 transport, the habitat quantity in terms of the  
24 flow -- the quantity won't change, it'll still be  
25 the same amount of habitat, it'll be slightly

1 deeper, it'll have a channel as you move  
2 downstream.

3                               In terms of what that does to the  
4 fish, very little and there's no predicted change  
5 in habitat suitability or actually in terms of the  
6 fish assemblage, that's predicted because there's  
7 really not much of a change that would happen  
8 through there. There is some changes to the ice-  
9 free period but the habitat really doesn't change.

10                              What I've got at the end of each  
11 of these is an example of the catch per unit effort  
12 that we received or that we've collected. This is  
13 gill nets, this is the weight, the grams of each  
14 species captured below Muskrat Falls since 1998.  
15 And what you can see here is that the majority of  
16 it is lake whitefish and longnose sucker and  
17 there's been concerns, I guess, that the system  
18 will become a sucker-dominated community.

19                              And in fact, if you go and sample  
20 using the methods that sample the whole water  
21 column, including the bottom, this is a sucker-  
22 dominated community now and it will continue to be  
23 a sucker-dominated community.

24                              But I put this scale here because  
25 I've -- in all the other sections I've included the

1 same scale just to give you an idea of the relative  
2 utilization of the habitats that are there.

3 But in terms of changes in the  
4 production or the food availability downstream, the  
5 biggest difference will be the fact that the  
6 reservoirs are upstream, and I'll just take a  
7 second to describe a little bit about what the  
8 reservoirs will do.

9 The reservoirs are going to slow  
10 the water down and that's increasing the retention  
11 time of the water. And what happens right now is  
12 that a lot of the phytoplankton and zooplankton  
13 that come down from the Upper Churchill basically  
14 flow through the system, they don't have a time to  
15 actually reproduce and create a community right  
16 now. The cladocerans and some of the other  
17 species, their lifecycle is about 14 days.

18 The water comes down through now I  
19 think it's three days -- three to four days from  
20 the Upper Churchill down to the saltwater where  
21 these freshwater species will die.

22 What will happen is that the  
23 nutrients that are upstream will be taken up by a  
24 zooplankton and phytoplankton community that can  
25 now regenerate itself because there's a 28-day

1 retention time in the Gull reservoir and a 10-day  
2 retention time in Muskrat.

3                               So a little bit less in Muskrat  
4 but there will be an establishment of a community  
5 of phytoplankton and zooplankton, and that will  
6 start to establish its own -- a community that will  
7 start using the nutrients internally, like an -- so  
8 there will be a shift in terms of the feeding  
9 ability or the feeding opportunities on these for  
10 species, but what will also happen is that these  
11 zooplankton and phytoplankton will then start  
12 becoming the exhaust, if you will, of the  
13 reservoirs and they'll start moving down.

14                              So there will be an increase in  
15 the number of phytoplankton and zooplankton  
16 available to the species below Muskrat Falls. And  
17 in terms of the species that can react to this, it  
18 is the lake whitefish. There is a table in the  
19 submitted document that shows that a lot of these  
20 species are actually very adaptable in terms of  
21 what they can feed on, and the stomach contents  
22 show that brook trout, Ouananiche, lake whitefish,  
23 dwarf lake whitefish and round whitefish utilize  
24 that zooplankton. So they will have the ability to  
25 take advantage of any of the increases in that food

1 source.

2 Longnose suckers, they're  
3 basically on the bottom eating on detritus and  
4 whatnot, so if there is any deposition of material  
5 they'd be able to benefit.

6 But all in all, there's really not  
7 expected to be any change in the assemblage, or  
8 even in the catch per unit effort of any of these  
9 species. So what we see there now is what we're  
10 expecting to see in the future.

11 Now we'll work our way up to the  
12 Muskrat Falls Reservoir.

13 Again in terms of the erosion,  
14 this is where the highest erosion potential is  
15 expected to occur. The majority of the shoreline  
16 here is sand once you get down below the upper part  
17 of the Gull Lake Reservoir.

18 We have a predicted time for  
19 stabilization of 10 to 15 years. And what you can  
20 see is -- this is just across from the deepest  
21 part. There's a small deep section of Gull Lake  
22 that's about 40 metres deep, and what you can see  
23 along the shoreline is this stable bench, as stable  
24 as it can be. It still gets inundated in the  
25 spring and it still gives off TSS, but this is what

1 is expected to occur once the reservoir is stable.

2 The wind and waves will now be the  
3 predominant force acting on the shoreline rather  
4 than the current because the flow will now be  
5 reduced.

6 And in terms of the Muskrat Falls  
7 Reservoir, when I get down into the TSS, it's not  
8 expected to be all that high but it is expected to  
9 persist in the transition period and it may affect  
10 some of the species that like the shoreline habitat  
11 more so than the deep water.

12 And I will say that this has been  
13 considered in the fish habitat compensation  
14 strategy and plan and I'll describe how we've  
15 identified it and we've incorporated it.

16 I threw this one in terms of flow.  
17 The flow will, again, it will be water-in, water-  
18 out, so it will be the same water, same in terms of  
19 flow, although with a higher water level in a  
20 reservoir you will have a decrease in velocity and  
21 an increase in water depth. And I've got a table  
22 just for comparisons a little later on.

23 Again I won't spend a whole lot of  
24 time but I would like to just -- I wanted to put  
25 this up just to show the predicted peak in TSS at

1 year two. In the farthest downstream section --  
2 this is the three outputs of the Muskrat Falls  
3 Reservoir -- there's about 30 milligrams per litre.  
4 Right now it ranges from 1.3 to 77 with a mean of  
5 about 13.

6 I would like to note that that  
7 large landslide that occurred at Edwards Brook was  
8 2.2 million cubic metres of material that let go in  
9 March of 2009.

10 We were in there this fall --  
11 yeah, a year later -- and actually did some  
12 sampling there because I wanted to know whether  
13 there were fish utilizing the habitat right out in  
14 front of it, which it's a heavy clay composition,  
15 whether there were fish using habitat downstream of  
16 it, as well as upstream, upstream was kind of our  
17 control.

18 And this photograph shows the net  
19 set right off the toe of this huge slide. The  
20 water quality was measured at 28 milligrams per  
21 litre. Just to give you an idea of what 30 would  
22 look like, it's not coffee coloured, it's similar  
23 to a lot of the sampling times when we're up on  
24 this section of river.

25 But what we did find in terms of

1 fish utilization, we got fish throughout.  
2 Downstream I think in three nights of sampling we  
3 got 95 fish. Up at the toe we've got -- I don't  
4 remember now the numbers, but we got fish in all  
5 three locations. So there were fish there, there  
6 were fish utilizing it, and the composition wasn't  
7 unexpected from what we would have expected. There  
8 were, however, a lot of young of the year and a lot  
9 of juvenile fish there.

10                               And this, I put in this extra  
11 photograph here just to show the comparison of what  
12 the model versus reality. And this is the slump  
13 shortly after it occurred, and you can see the  
14 total suspended sediment coming off the toe and it  
15 kind of follows the shoreline. You've still got  
16 that cleaner water coming through the middle. And  
17 this is what the model just can't -- it can't  
18 predict. So if there is an avoidance behaviour of  
19 different species, there is and will be habitat  
20 here.

21                               You can also see this dune, this  
22 was a shallow dune that came right across here when  
23 this came out and actually pushed the river across  
24 and eroded a lot of this dune out.

25                               So the material is highly dynamic



1 and it does move around a lot.

2                               Again, in terms of total  
3 phosphorous, not an order of magnitude, still  
4 within the existing total phosphorous range that  
5 exists there today. A little bit higher than the  
6 mean. And, again, like I say, it will occur more  
7 throughout the open ice-free period than it does  
8 now but not a substantial increase in all the three  
9 sections of the reservoir. And of course the  
10 farther downstream you go the more sand you have in  
11 the shoreline so you get a higher pulse.

12                              Again water temperature same as  
13 the other one; a little bit more change in terms of  
14 the shift in temperature in the Muskrat Falls  
15 Reservoir, but again, well within the temperature  
16 preferenda of fish, and again, we've got that same  
17 delay.

18                              Very quickly the ice formation;  
19 ice formation is predicted to occur similar to what  
20 would occur in Winakapau, it will form and thaw in  
21 place. It will occur on average 15 days later. It  
22 will form an ice cover between early and mid-  
23 December, which is a little bit later than Gull,  
24 and a little bit earlier -- it will break up a  
25 little bit earlier than Gull.

1                   In terms of the habitat quality,  
2   the habitat quality in Muskrat Falls is probably  
3   the one that will be changed the most, not so much  
4   in terms of the substrates and the flows and the  
5   velocities but more in terms of the total suspended  
6   sediments and the bank stability.

7                   There's a greater challenge, I  
8   think, here in terms of bank stability because it  
9   is the area that has the greatest sand and the  
10  greatest change in water levels.

11                  What I'd like to show is that when  
12  you look at the existing habitat now this is an  
13  image of the post-project habitat. The light blue  
14  is the inundation. The dark blue is the existing  
15  river.

16                  There were two areas that will be  
17  changed from intermediate fast velocity habitat to  
18  a slow velocity habitat, and they're located right  
19  here, just below Edwards Brook. Edwards Brook is  
20  right here. There's one right here, and then  
21  there's one just at the outflow of Gull Lake at  
22  Pena's River.

23                  And in terms of the utilization  
24  for these two areas, species such as brook trout,  
25  northern pike, round whitefish, white sucker,

1 Ouananiche and burbot, they're equally capable of  
2 using slow- and fast-velocity habitat based on the  
3 catches.

4 But there were species such as  
5 longnose dace, Lake Whitefish, longnose sucker and  
6 Lake Chub, based on the catches, would have reduced  
7 utilization of the slow velocity habitat.

8 And the reason I put these circles  
9 on here is that these are the locations of the fish  
10 habitat compensation that are proposed in the  
11 strategy and they are located, particularly, the  
12 delta habitat at Edwards Brook and the delta  
13 habitat at Penners River very close to the altered  
14 habitat.

15 And that's been done for a reason,  
16 and the reason is that, for example, when we did it  
17 at Granite Canal, we replaced habitat -- we put it  
18 fairly close to the habitat that was lost and the  
19 fish had no trouble finding it or adapting to it.

20 So we've included those areas as  
21 close as possible to the affected habitat so that  
22 we can help out these fish species that may have a  
23 somewhat reduced utilization of the slow-velocity  
24 habitat.

25 The other thing to keep in mind

1 with the Muskrat Falls reservoir is that there  
2 still will be an increase in TSS. And like I said,  
3 it's within the realm of what exists now, but it  
4 won't be in that same pulse in the spring and then  
5 a decrease and an increase in the fall. It'll be  
6 more dome-shaped.

7                   So we need to take that into  
8 consideration when we're looking at some species  
9 that don't particularly like suspended sediment or  
10 particularly sedimentation on spawning areas.

11                   And they would include species  
12 such as brook trout and Ouananiche. And again, the  
13 areas here at these deltas will be formulated.  
14 They can take advantage of the cleaner water that's  
15 coming out of the plateau area and they will be  
16 constructed so that they're spawning habitat for  
17 these species as well.

18                   We're also, as we've said before,  
19 looking at where we can put the roads here so that  
20 we can provide stabilization as fast as possible,  
21 so putting a bench so that we kind of start that  
22 stabilization process as soon as possible.

23                   The other two areas, this area  
24 here has a series of islands that is not sand.  
25 They're cobble and rubble. And they were

1 identified by, actually, DFO in Ottawa when we flew  
2 the river as potential areas for spawning when we  
3 looked at the amount of water that would be over  
4 and then the velocities. We've looked and included  
5 those.

6 As well, once you get above the --  
7 this is the deep area here in Gull Lake. Once you  
8 get above that area, this is all cobbles and  
9 gravels and boulders. It's not that sandy area.  
10 And this would be a key area as well for spawning  
11 because it will be within the Muskrat Falls  
12 Reservoir as well.

13 And we've looked and still  
14 identified a portion of this habitat as  
15 intermediate and having substantial flows.

16 Just very quickly, the two  
17 different habitat types that we've got in the  
18 Muskrat Falls Reservoir are slow and intermediate,  
19 and what you can see is that the slow habitat will,  
20 indeed, get deeper and it will, indeed, get slower,  
21 so it goes from 0.65 metres per second to 0.12.

22 The intermediate habitat up closer  
23 to the tailrace includes that shoal spawning area.  
24 It doesn't get substantially deeper, but it does  
25 get slower. And what you can see is I've thrown up

1 some of the suitabilities here for brook trout in  
2 terms of velocities.

3                   They're both well within the  
4 suitability and the utilization, so there's not  
5 going to be a challenge in terms of what the  
6 habitat characteristics will be in terms of these  
7 fish species using it. And where we have  
8 identified potential challenges in terms of  
9 sedimentation and whatnot, we've incorporated that  
10 into the compensation strategy.

11                   So this is the catch per unit  
12 effort in the Muskrat Falls Reservoir, and again,  
13 you can see we've got some brook trout, some  
14 Ouananiche and the lake whitefish.

15                   There will be an increase, I  
16 believe, in the amount of phytoplankton and  
17 zooplankton than that currently exists now. And  
18 again, that species such as Ouananiche, brook  
19 trout, the lake whitefish to some extent, the dwarf  
20 lake whitefish and the round whitefish would be  
21 able to take advantage of that.

22                   The longnose sucker and the white  
23 sucker will continue to eat off the sand on the  
24 bottom, so again, we don't predict any major change  
25 in terms of the catch per unit effort and the

1 habitat utilization of these species, especially  
2 when you take into account the compensation works  
3 that are involved.

4                               When we look at the Gull Island  
5 Reservoir, this is a long stretch of river. And  
6 when you look at the initial habitat surveys,  
7 you've got basically three different pieces of  
8 habitat.

9                               You've got from the Gull Island  
10 dam up to Lake Winokapau. You've got Lake  
11 Winokapau itself and you've got upriver of Lake  
12 Winokapau. And of those three sections, the area  
13 directly behind the dam is going to be affected the  
14 greatest. That's going to have a large increase in  
15 water depth and a reduction in water velocity.

16                              Winokapau not so much and, in  
17 fact, upstream of Winokapau even less change in the  
18 habitat types. I'll just go through some of the  
19 same parameters that we discussed in the other two  
20 areas.

21                              This area still has an erosion  
22 potential, but it's much lower than that found in  
23 the Muskrat Falls Reservoir, basically because of  
24 the substrate composition.

25                              So if you look at some of the

1 material, you've got bedrock in Winokapau, you've  
2 got gravels and boulders. You don't have that same  
3 sand composition.

4 But the predicted time for  
5 stabilization is still 10 to 15 years because there  
6 are areas that are steeper and they still will need  
7 to develop that bench or that stable shoreline  
8 habitat, particularly in that section behind the  
9 Gull Island dam.

10 Again, flows water-in, water-out.  
11 They will be the same flows. There will be changes  
12 in velocity and we'll see those in the slide that  
13 has some of the numbers.

14 I'm not going to say a whole lot  
15 about the total suspended sediment, but what you  
16 can see is that the predicted total suspended  
17 sediment is .3 to .6. Right now it's 1.3 to 12.  
18 And if you look at the different blocks or boxes  
19 that are in the Gull Reservoir, you can barely see  
20 the increase.

21 And that's, again, an indication  
22 of the type of habitat that's there and the type of  
23 shoreline material, so no real change in suspended  
24 sediments. And I put this in here just to show  
25 what the total suspended sediments looks like at 3



1 milligrams per litre.

2                               This was the set just upstream of  
3 the Edwards slope.

4                               And again, total phosphorus, not a  
5 great increase in total phosphorus again because  
6 the amount of inundation, the amount of vegetation  
7 that would be inundated is less.

8                               Obviously, the higher number is  
9 down towards the Gull Lake area as opposed to up  
10 into Winokapau or above Winokapau.

11                              Water temperature shows the same  
12 trend. It's still got the same peak. It does have  
13 a change in the timing. And this is the model at  
14 the Gull Reservoir, so down at the Gull Lake, and  
15 this would be the area that would have the greatest  
16 change in temperature because it's going from a  
17 fast flowing river up to a -- basically a lake.

18                              But it's still within the  
19 temperature preferenda of many of the species.

20                              And in terms of any species that  
21 use the tributaries, the tributary water  
22 temperature, in terms of timing for spawning, will  
23 still not be affected by the project. That same  
24 water temperature will become an off the plateau.

25                              Again, ice formation will form and

1 thaw in place.

2                               So again, if we look at the  
3 overall reservoir with the Gull Island dam down  
4 here working our way up through this what we called  
5 Section 3, you can see that there's lake-like  
6 habitat up to about kilometre 187. Cash River is  
7 right here, so it's just down the river of Cash.

8                               You've got a section of slow water  
9 which still has velocities greater than .15 metres  
10 per second. Then you have Lake Winokapau, and then  
11 you've got your Section 5.

12                              And Section 5 actually still has  
13 areas that were considered intermediate and fast.  
14 Intermediate, fast habitat types.

15                              So the habitat quantity and types  
16 will change, but there's a lot more variable  
17 habitat types in this reservoir. The biggest  
18 change, as I said, will be down at the -- just  
19 behind the Gull Island dam. There will be a  
20 thermocline that will form there. There will be  
21 the greater retention time, so we'll have the  
22 phytoplankton and zooplankton that now come out of  
23 the Smallwood Reservoir will have the time to  
24 establish themselves, both in Winokapau and in the  
25 lake that will be behind the dam. So there will be

1 a shift in food availability for species that can  
2 feed on that.

3                   There won't be much of a  
4 difference in terms of total suspended sediments or  
5 in terms of the nutrients. A lot of the nutrients  
6 that, again, similar to the other sections of river  
7 that are coming off the plateau will still be  
8 available.

9                   There are changes, of course, to  
10 the water depth and water velocity, and we can get  
11 into a bit of a description.

12                   The circles here identify  
13 locations that -- in terms of the compensation  
14 strategy, the time that it will take the lake to  
15 stabilize in terms of shoreline, the big circle  
16 represent areas where we will go in and use the  
17 roadways to create benches that will assist in  
18 stabilizing this area faster than under natural  
19 conditions.

20                   We do have delta habitat creation  
21 at Mininipi, and we have what we've called the  
22 plateau, down here, which is a huge area that will  
23 have almost a combination between lake-like  
24 shoreline habitat with a little bit of flow to it  
25 or velocity.

1                   So that will be an important area  
2 for spawning species that like shoreline habitat,  
3 particularly Lake Trout that may not be able to  
4 take advantage of some of this area until it gets  
5 stabilized.

6                   And upriver here we have a series  
7 of deltas, such as Elizabeth mentioned and Wes  
8 mentioned, that again will serve the same purpose  
9 as the increased spawning habitat for salmon and  
10 lake chub and other species that like gravels.

11                  So again, just quickly, to put  
12 some of the habitat conditions in perspective, this  
13 slow habitat type is that slow area just down river  
14 of Winokapau. It's going to go from about eight to  
15 nine metre water depth to 16 to 36, so it is going  
16 to be deeper and the velocity is going to be  
17 reduced somewhat, but not a whole lot because the  
18 flows are still so high.

19                  The intermediate-fast habitat that  
20 I have here is the habitat that's up in the upper  
21 section above Winokapau, and what you see is that  
22 the water depth will go from a mean of 10 to a mean  
23 of 12 and that the velocities will go from 0.8 to  
24 0.14 to 0.88. So you won't have those very high-  
25 velocity areas but you'll still have very

1 reasonable velocity, especially in terms of the  
2 species that are there, and if you look at some of  
3 the suitability's, well within the range of what  
4 the species would require.

5                   Winokapau Lake is going to get  
6 about 11 metres deeper and stay about the same  
7 velocity. I think the difference in the model  
8 velocity is just because some of those -- the  
9 backstream or the downstream areas where they're  
10 not quite as deep as this, they are a little bit  
11 deeper, but they're a little bit faster so  
12 basically the same velocities. And Winokapau will  
13 have the same substrates in the areas that are now  
14 termed to be spawning locations with gravels,  
15 because Winokapau will still act as a sink to any  
16 total suspended sediment from upstream.

17                   And as I've said, behind Gull dam  
18 will be the largest increase. It will go from  
19 about eight to nine metres in water depth to on  
20 average 69 metres and it'll actually be, I think,  
21 89 or 90 metres right at the dam. And it will go  
22 from fairly fast habitat down to what we're  
23 considering lake habitat; certainly less than 0.15  
24 metres per second is what we've delineated as what  
25 would be lake habitat.

1                   But again, all these species are  
2 well adapted and living in the Churchill River and  
3 they'll be able to take advantage of this habitat.

4                   And this slide is a breakdown of  
5 the catch-per-unit-effort in the three sections  
6 that I just described. So we've got the Lower Gull  
7 Island Reservoir which is the lake down below Gull  
8 Island. This is what is there now. Winokapau Lake  
9 and the Upper Gull Island Reservoir which is above  
10 Winokapau.

11                  And I just want to describe, I  
12 guess, in terms of a basic description of how the  
13 species would change. What you can see, for  
14 example, here for brook trout, is you have a high  
15 catch-per-unit-effort in section 3. So it's in  
16 that fast area, when you actually get your catch-  
17 per-unit-effort, it's fairly good.

18                  In Winokapau, catch-per-unit-  
19 effort is a lot less because they're cruising,  
20 looking for food; a little harder to catch.

21                  We expect that the utilization  
22 down below the Gull Island Dam will decrease and it  
23 will be similar to the standing water or the Lake  
24 Winokapau habitat.

25                  Upstream, don't expect any change

1    whatsoever, and that same trend, you can kind of go  
2    through all the species. So the lake trout will  
3    actually increase in that area downstream of the  
4    Gull -- or upstream of the Gull dam similar to  
5    Winokapau. No real change predicted upstream --  
6    well, lake chub, there's not enough of them there  
7    to -- there won't be much change.

8                   Lake whitefish, there'll be an  
9    increase down by the Gull dam.

10                   Here, in terms of longnose sucker,  
11    there will be a decrease and a lot of these,  
12    there's not a whole lot of difference between the  
13    two.

14                   Round whitefish may see a  
15    decrease.

16                   But again, with the compensation  
17    facilities and considerations that are in there, we  
18    still don't see any significant changes,  
19    particularly in the sustainability of all the  
20    populations.

21                   And in terms of the biodiversity  
22    of the fish species, they will all still be there.  
23    They'll still be capable of using this habitat.  
24    They're all adaptable species. They've shown that  
25    just by surviving in the Churchill River with the

1     velocities and the variability that's there.

2                     So again, with the compensation  
3     strategy and the plan and the construction of the  
4     works that will assist in the transition period, we  
5     don't see any change in the fish assemblage. There  
6     may be some isolate or changes in the catch-per-  
7     unit-effort or the ability of some of these species  
8     to take advantage of the habitats, but in the  
9     reservoirs as a whole, they will all still be  
10    there.

11                    Thanks.

12                    CHAIRPERSON GRIFFITHS: Well,  
13    thank you very much, Mr. McCarthy, for your  
14    presentation; very comprehensive.

15                    So the panel we have some  
16    questions for you and then we'll proceed with  
17    questions from the floor.

18    --- QUESTIONS BY THE PANEL:

19                    CHAIRPERSON GRIFFITHS: I just  
20    want to ask just a couple of clarification  
21    questions, first of all, so that I know that I'm  
22    understanding what you're telling us.

23                    So when you put up the slides with  
24    the catch-per-unit-effort, my first question is  
25    you're now confident that -- because, you know,



1 originally in the EIS, you described problems with  
2 -- technical challenges with the ability to  
3 actually sample fish -- to catch fish -- the  
4 limitations.

5 Are you now confident that these  
6 -- so these are showing the existing catch-per-  
7 unit-information that you have in the different  
8 areas -- this is existing, not predicted -- and  
9 you're confident now that this is a pretty accurate  
10 depiction of the current fish assemblage in these  
11 different areas.

12 Is that right or what's the sort  
13 of level of certainty around that?

14 MR. MCCARTHY: Yes and again, if I  
15 wanted to show the breakdown by lifecycle stages  
16 and habitat types, we get back to those five tables  
17 that nobody seems to like, but yeah, I did go back  
18 and look at the catches, in particular the young of  
19 the year, and we did catch a lot of young of the  
20 year of a lot of the different species. So yeah,  
21 that's an accurate representation of what's there.

22 Could it be an over estimation?  
23 Yeah, I think so. I think we've been conservative  
24 in estimating the -- where we've caught those fish  
25 in those habitat types are probably the areas that

1 have the highest utilization, so they're in areas  
2 of backwater, of less-velocity habitat so yeah, I  
3 think so.

4 CHAIRPERSON GRIFFITHS: And so  
5 this will form a reasonable baseline against which  
6 you could then compare your catch-per-unit-effort  
7 figures post-project, is that right, as Dr. Steele  
8 was asking for in St. John's?

9 MR. MCCARTHY: Yes they will, yes.

10 And what I've shown there is the  
11 mean catch-per-unit-effort. We have confidence  
12 limits around those and we've used that in our  
13 habitat-utilization indices and that same  
14 confidence interval.

15 Every time we go out and set a net  
16 and catch fish, we're incorporating that into our  
17 database so that we have a range of catch-per-unit-  
18 efforts that we now have the baseline so that we  
19 have in our post monitoring, if we see any of these  
20 changes kind of moving either above or below, we  
21 have the ability to detect any unexpected changes,  
22 yes.

23 CHAIRPERSON GRIFFITHS: And then  
24 when you spoke to each of these slides showing the  
25 catch-per-unit-effort for the different areas, you

1    were giving us a kind of narrative description of  
2    what some of the factors that you expect might  
3    affect different species.

4                                So you're predicting -- I mean I  
5    know you said this; I just want to be absolutely  
6    clear, because sometimes it seems like the bottom  
7    line is that there will be no species lost; right?

8                                But you're going beyond that.  You  
9    are predicting that the relative abundance within  
10   the existing assemblage will be more or less the  
11   same.  Is that a fair statement ---

12                               MR. MCCARTHY:  Yes, it is.

13                               CHAIRPERSON GRIFFITHS:  --- of  
14   what you're predicting?

15                               MR. MCCARTHY:  Yes, it is.

16                               And as I've said in the narrative,  
17   you know, there are instances where we think that  
18   some of the species will go down in certain areas;  
19   for example, that large lake area behind the Gull  
20   dam.  The brook trout utilization of that habitat  
21   right now is higher than what we predict it will be  
22   as a lake.

23                               So if we were to compare the  
24   catch-per-unit-effort in that lake versus what was  
25   caught there in that same area post project, we

1 think it will go down. But will it be any  
2 different than the lake area that we've sampled  
3 right now? No, that's what we would use as our  
4 criteria -- we would say -- in terms of the  
5 monitoring program.

6 CHAIRPERSON GRIFFITHS: And this  
7 prediction that you're making, this prediction is  
8 for 15 years out, is it, once the habitats have  
9 stabilized?

10 I think -- maybe we didn't ask for  
11 it exactly, but what I thought we might get back  
12 from you is a prediction regarding the future fish  
13 assemblage. I mean, I think, you know, the CPEU is  
14 useful.

15 I can understand that, but I  
16 thought you might be able to provide that to us at  
17 sort of different stages during the transition  
18 period.

19 Do you anticipate -- are you  
20 predicting that, in fact, the assemblage is going  
21 to go through some considerable change during that  
22 -- when I say the assemblage, I don't mean the fact  
23 that all the fish species will still be represented  
24 there, but the relative abundance of them.

25 Do you anticipate that that's

1 going to change materially during that transition  
2 period? Is this a sort of stabilized end result  
3 that you're predicting here with a bunch of change  
4 in -- before?

5 MR. McCARTHY: Yeah, principally  
6 that is the stable assemblage because even though  
7 there's not going to be an order of magnitude  
8 change in terms of phosphates and TSS, there is a  
9 recognized phenomenon in reservoirs with trophic  
10 upsurge. And we've seen it in a number of  
11 reservoirs, for example, Rose Blanche  
12 hydroelectric.

13 What you'll get is you will get an  
14 increase. And we don't want to take any of that  
15 upsurge noise in terms of identifying, you know,  
16 everything is going great, everybody is going  
17 gangbusters so we can reduce our monitoring.

18 There is an identified increase in  
19 the Rose Blanche reservoir. The brook trout  
20 numbers two years after inundation were  
21 unbelievable. They were very high because of that  
22 retention and the upsurge and what happened there.

23 So yeah, that is more the 15 years  
24 out stable, but what the compensation strategy does  
25 is identify the potential challenges and addresses

1 those challenges so that we can make sure we don't  
2 kind of lose any of them in the noise in that  
3 stabilization period.

4 CHAIRPERSON GRIFFITHS: The  
5 prediction of the final fish assemblage in the  
6 stabilized system obviously -- and there's a  
7 question mark at the end of this statement --  
8 obviously incorporates, in your prediction, the  
9 existence of effective working physical  
10 compensation works?

11 That this assumes that all of  
12 those compensation works that you're planning are  
13 in place and they're working and that's what brings  
14 about this sort of stabilized similar fish  
15 assemblage; is that right?

16 MR. MCCARTHY: Yes. Yes, those  
17 structures will allow those species to get through  
18 the challenges that we've identified in terms of  
19 TSS and whatnot, yeah, changes in substream.

20 CHAIRPERSON GRIFFITHS: Well, I'd  
21 just like -- before I ask other people with  
22 questions, I'd like to look at some of the  
23 specifics of the habitat, the types of habitat, the  
24 specific life changes that you are saying will be  
25 lost upon inundation and then you indicate will be

1 replaced. Because I think -- I mean, it would  
2 obviously appear that's a fairly critical process  
3 if you're going to lose the habitat over a month  
4 and then -- yes, how long and how it's going to be  
5 replaced.

6 We were looking at Table 3.9 in  
7 the compensation strategy and I don't know whether  
8 you want a moment to find it.

9 (SHORT PAUSE)

10 CHAIRPERSON GRIFFITHS: Well,  
11 maybe while you're looking for it -- did you like  
12 it? No, I mean, maybe it isn't absolutely crucial  
13 you pull it up because I'll -- to be honest -- so  
14 this -- I'm going to describe it for other people  
15 who haven't got it in front of them.

16 This is a comparison of existing  
17 and predicted post-project habitat equivalent units  
18 available for each species within the two  
19 reservoirs. And it's essentially on one side is  
20 the species and underneath subdivided by the  
21 different life stages spawning under the year  
22 juvenile adult and then the table shows the  
23 existing habitat in an area format and then the  
24 post situation. So you know the one we're talking  
25 about, okay.

1                               So it shows the change and so what  
2 we did -- and I'd love to put it up, but we can't,  
3 so -- is that we just used your figures. And I  
4 know you would want to double check that we've done  
5 our math correctly, which is always wise, so let's  
6 not make any assumptions about that.

7                               But anyway, just for the purposes  
8 of the conversation, we looked at the percentage --  
9 we just did the percentage calculation for the  
10 various losses, and I just wanted to give a couple  
11 of examples.

12                              And I think the question behind  
13 this is that before compensation it appears to us,  
14 if we've done our figures correctly, that there's  
15 some very high percentage loss of certain life  
16 stage habitats.

17                              I'll highlight a few which -- that  
18 really doesn't help putting that table up, does it,  
19 not one bit.

20                              Anyway, so I can read out the sort  
21 of percentages that appears to us and it seems like  
22 high percentages for some species for some life  
23 stages. And what I'm going to ask you is what -- I  
24 don't really understand is that habitat gets wiped  
25 out, like, you know, in a month or 15 days or



1    whatever, under inundation, it just goes.

2                               And then just how complicated is  
3    the process of reproducing the various types of  
4    habitat required. And I don't know how different  
5    they are. I don't know whether each life stage has  
6    a very specific -- and you know, I don't know  
7    whether we're talking about there being 15 types of  
8    habitat or three or whatever.

9                               And how long will it take for that  
10   to stabilize and really be useful, and what's  
11   likely to happen in the interim period?

12                              So that's kind of the area of  
13   inquiry that I don't really understand at this  
14   point. And an example, burbot, this is our  
15   calculation so somebody will -- anyway, for the  
16   spawning, the amount of spawning habitat, that 88  
17   percent of the spawning habitat will go under  
18   inundation, for young of the year 90 percent, so  
19   those are pretty high, it seems, and that's burbot.

20                              White sucker, the adult stage, 99  
21   percent loss. Northern pike. Now, the northern  
22   pike, the interest there is that your table  
23   indicates that there will be high percentage losses  
24   as in 81, 94, 99, 99 for all four stages, spawning,  
25   young of the year, juvenile and adult.

1                               And another one that I just wanted  
2   to highlight was three spine stickleback, I gather  
3   -- I don't know, I am told, is a prey species which  
4   -- so fairly important for the others. And that's  
5   showing for three life stages losses of 84, 97, 83  
6   percent.

7                               So these look like high  
8   percentages to a non-fish biologist; do they look  
9   high to a fish biologist?

10                              And so the question is, if we took  
11   the pike situation, all four life stages, there's a  
12   lot of habitat that disappears. Can you talk a bit  
13   about that, how -- what's involved in trying to  
14   really replicate the specific conditions that these  
15   fish are going to need in these different life  
16   stages and how long will it take that you feel  
17   confident you'll have habitat that -- replacement  
18   habitat that's really working properly?

19                              MR. MCCARTHY: Okay. No, that's a  
20   good question, and pike is a really good example of  
21   drastic reduction in the habitat equivalent units.

22                              First of all, though, if I could  
23   just back up and explain where those numbers are  
24   derived from and the key reasoning behind those  
25   numbers.

1                   The existing habitat equivalent  
2 units is based primarily on the catch data, so it  
3 represents the utilization that is currently in the  
4 river now as well as the utilization for northern  
5 pike. For example, anywhere where there is a fine  
6 substrate type, we use the literature and  
7 methodology that's used by DFO here in Newfoundland  
8 and Labrador to come up with a utilization index.

9                   So they are representative of the  
10 utilization that's there now.

11                  The post habitat utilization if --  
12 I just want to show again the presentation. In  
13 terms of predicting the post utilization habitat,  
14 if I could just bring up this one here. Sorry,  
15 guys.

16                  What we've done for the predicted  
17 future is where the habitat is going to change  
18 substantially compared to what's existing, what we  
19 had originally proposed was that we would use the  
20 slow velocity habitat utilization indices for all  
21 the slow habitat so we would have a comparison of  
22 the catch with the actual habitat and the catch  
23 with the new habitat. But that doesn't work.

24                  When you look at the habitats that  
25 are here, that dark blue, when you look at the

1 generation of a utilization habitat for the post or  
2 for the proposed project, what we found was we  
3 didn't feel comfortable that we could use the  
4 existing data in terms of catch to represent this  
5 habitat type because, in fact, this habitat type is  
6 greater, deeper than any habitat type that we  
7 actually sampled in the Lower Churchill River.

8                               So we didn't feel comfortable that  
9 we would just transfer that catch data and that  
10 pike would use this habitat, if pike is our  
11 example, as similarly as the existing habitat.

12                              So what we did is we went back to  
13 the methodology that's used by DFO in terms of  
14 quantifying the habitat that's existing if you were  
15 doing a project on any other river and not  
16 incorporating so much the catch data, but the  
17 species preference data.

18                             So there's one document that has  
19 all the species' life cycle stages and all their  
20 preferences for velocities, all their preferences  
21 for depths and all their preferences for  
22 substrates.

23                             And there's two -- there's  
24 actually two documents; one for a lake, and one for  
25 a river. And for Muskrat Falls Reservoir, for

1 example, this is still a river. It doesn't qualify  
2 as a lake because it doesn't have a thermocline,  
3 it's not deep enough. It's still got fairly good  
4 velocity, so it's still a river.

5                   So when you go through the  
6 calculation of what the post project suitability  
7 would be based on the description of -- by DFO, all  
8 that blue area comes out as a zero. It's not used  
9 by pike because it's greater than 16.5 metres or 11  
10 metres deep.

11                   So all that area, the only thing  
12 that's actually in that post project habitat  
13 description is the light blue border. And that  
14 occurs for almost every species, that that  
15 reservoir -- when you look at that post project  
16 utilization values, that deep water is a zero.

17                   So we've assumed -- we've been  
18 absolutely conservative. We didn't say, "Well, you  
19 know, it's deep; well, maybe it's a lake".

20                   No, it's flowing water. If the  
21 requirements for that species based on that table  
22 says that it's not usable, it's not usable.

23                   Do we think that fish are going to  
24 use that habitat? Absolutely.

25                   But in terms of being able to use

1   that table to identify -- there's a challenge.  
2   There's a big difference. We were as conservative  
3   as possible and identified just the locations.

4                   So anyway, in terms of the  
5   majority of the habitat that's in the Muskrat  
6   Reservoir, all zero.

7                   The other thing that incorporates  
8   in to pike is the fact that pike spawning requires  
9   vegetation and that the adults require -- they're  
10   an ambush predator.

11                  So when you go through the  
12   calculations, you do get that low index. And this  
13   is, in fact, one of the ones that we had discussed  
14   with -- actually, with both the workshop, technical  
15   workshop, and there were concerns that pike were  
16   not the desired species in the reservoirs. They  
17   didn't want pike and sucker dominated.

18                  But talking to -- with the  
19   regulators, we wanted to ensure that pike would be  
20   there and we did investigate certain things that  
21   can be done, and it is incorporated into the  
22   compensation plan in terms of vegetating -- and not  
23   so much even just providing vegetation, but even  
24   cut trees.

25                  When you look at the spawning

1 ability of pike, they don't need the grasses. They  
2 just need something to spawn on. They spawn near  
3 vegetation and the eggs stick to the vegetation.

4 And before the water level gets a  
5 chance to drop, the eggs hatch and the fish swim  
6 away, so they like these areas that have vegetation  
7 or something for the eggs to stick on.

8 So we have incorporated into the  
9 plan these structures, cut trees. And I think  
10 we'll have a lot of cut trees around that we can  
11 put in to these mat areas.

12 So that table was really a way of  
13 looking at the post -- the pre and the post to be  
14 able to identify what species are going to have a  
15 challenge in terms of utilization, keeping in mind,  
16 though, that the calculations of the post are very  
17 conservative.

18 And in terms of even the habitat  
19 going up through the majority, for example, the  
20 Gull Reservoir, when you get up into that slow  
21 habitat that's between Winokapau and the lake  
22 that's at Gull, and again, the habitat that's up  
23 between Winokapau and Churchill Falls, if it was  
24 deeper than that 16.5 metres, we considered it  
25 zero. Absolutely not utilized.

1                   And we know that that's not -- I'm  
2 fairly confident that that's not the case. As part  
3 of this year's sampling regime, we did go up and we  
4 sampled Gull Lake, which is deeper than that 16, to  
5 see what species are there, and we do have species  
6 using those habitats.

7                   But in order to be conservative  
8 and to be able to clearly identify where the  
9 potential challenges are, that's why we generated  
10 that table.

11                   So is that the absolute  
12 utilization? No. But it gives us a very good  
13 indication as to where we need to focus our  
14 attention in terms of the strategy.

15                   CHAIRPERSON GRIFFITHS: Okay.  
16 Well, fair enough.

17                   But the -- can you just, first,  
18 tell me generally that deeper water that you're  
19 saying just didn't show as being a habitat, is that  
20 generally -- are we generally talking about the  
21 adults' life stage, adult and juvenile, as the  
22 spawning -- would young of the year be in the  
23 deeper waters as well?

24                   Spawning, presumably not.

25                   MR. MCCARTHY: It would depend on



1 the species. But in terms of the breakdown of  
2 what's in the DFO methodology or the DFO document,  
3 it does identify the depth for all the life cycle  
4 stages.

5 But pike, for example, they do  
6 spawn in shallow water in weedy areas and the young  
7 of the year will stay in that area and then slowly  
8 move out into deeper water as they get bigger and  
9 capable of catching bigger prey.

10 So it depends on the species, but  
11 yeah, for pike, you're more talking the juveniles  
12 and the adults here.

13 CHAIRPERSON GRIFFITHS: Okay. So  
14 that deep water that you say didn't make it into  
15 the usable habitat post project will moderate these  
16 -- some of these percentages for some life stages  
17 of some species. Okay. Got that.

18 All right.

19 MR. MCCARTHY: Yes.

20 CHAIRPERSON GRIFFITHS: Sorry.  
21 I'll try to get to the end of this, and I'm almost  
22 there, I think.

23 Yeah. Well, I guess it's -- the  
24 remainder of my question is about the specific  
25 compensation that you say that Nalcor is proposing

1 to do for the specific problems that are identified  
2 in the table.

3 How long is it going to take for a  
4 specific habitat type to address one of these high  
5 percentages for spawning or for juvenile, whatever?  
6 How long are you estimating it's going to take  
7 before it's ready to go?

8 I guess it's going to depend on  
9 the type of habitat, but are we talking a year, two  
10 years, six months?

11 MR. MCCARTHY: Well, first of all,  
12 in terms of when the compensation needs to be built  
13 and ready to go or ready to be utilized, in all the  
14 projects that I've been involved with so far DFO  
15 has required that the habitat be built and ready to  
16 go before the other habitat that's going to be lost  
17 or altered is lost or altered so that you've got as  
18 quick a possible turnover in terms of habitat  
19 types.

20 Again, with Granite Canal, we went  
21 down there in September of 2003. The river habitat  
22 that was built had never had water in it. It was  
23 totally constructed in the dry.

24 We lifted the stop logs, had water  
25 flowing through it. Within three weeks, the

1    invertebrate sampling, almost every species that  
2    was in the control stream was there and in October  
3    we had the first reds, ouananiche were up there  
4    spawning within five weeks.

5                                So I don't anticipate there being  
6    any trouble or challenges in terms of these fish  
7    species to be able to find it.

8                                Will that particular fish that's  
9    down towards the lower part of Muskrat come all the  
10   way up to Edwards Brook, maybe not, but the fish  
11   will identify and find those sites fairly quickly.

12                              And in terms of the pike, the  
13   location of the spawning areas can be mapped in  
14   terms of where we found the greatest catch per unit  
15   effort for that species.

16                              CHAIRPERSON GRIFFITHS: Thank you.

17                              MEMBER JONG: I'm wondering if I  
18   could start with a question or maybe it's more of a  
19   clarification on the impoundment side of things  
20   which was slide 4.

21                              I guess the first question I've  
22   got is around that -- the business of fish  
23   relocation and your comparison with the Granite  
24   Canal work that you did, and I guess I'm wondering  
25   if you could explain to me or clarify for me the

1 difference in scale between Granite Canal and the  
2 downstream reach from Muskrat Falls. I'm thinking  
3 it's a fairly big difference.

4 MR. MCCARTHY: Yeah, in terms of  
5 Granite, it was about 14 kilometres from where the  
6 water was cut off at the outflow of Granite Lake  
7 and down to Meelpaeg Reservoir.

8 But in terms of the challenges  
9 this was a -- eight, eight and a half kilometres of  
10 it was a sheer bedrock wall and in terms of a  
11 compensation flow we had very little compensation  
12 flow; it was water off. So we had to have the  
13 ability to get these fish moved as fast as  
14 possible.

15 In terms of getting them out of  
16 the ravine, we had people with harnesses up above  
17 with buckets with the fish, so as soon as we caught  
18 them they were being lifted up and carried out to  
19 trucks to get them to location.

20 So even though it's a smaller  
21 scale there was some very significant challenges at  
22 Granite Canal. And I will say that when we first  
23 started it we had a crew of, I don't know, eight or  
24 10 folks, within two days Nalcor came back and said  
25 double your crew. So, you know, we adjusted on the

1 fly as we saw the need, you know, in terms of  
2 covering the area and having fish isolated in  
3 pockets of water, we wanted to get them moved as  
4 fast as possible.

5 I would imagine with the Muskrat--  
6 with the area that's below Muskrat it would be a  
7 lot more in terms of helicopter movement of people  
8 and fish would be more supported by a more large  
9 scale group.

10 I mean, the challenges would be  
11 different but I don't see it as an insurmountable  
12 challenge.

13 MEMBER JONG: And just a quick  
14 follow-up too on the -- that's the first  
15 impoundment. The second impoundment which would be  
16 Gull Island, at some point down the road, you talk  
17 about the flexibility that you'd got for the first  
18 one in terms of controlling flow of the 500-odd  
19 cubic metres per second isn't quite enough you can  
20 just spill it through for the downstream reach.

21 When you go to do the Gull Island  
22 one it's anywhere from 54 to 58 days and you've got  
23 a habitat in the Muskrat Falls reservoir that  
24 presumably is adjusting to having been impounded  
25 and maybe in some cases -- from a fish perspective

1 -- still not optimal or on its way to adjusting.

2                               So I'm assuming you don't want to  
3 play with that too much and you've got the  
4 downstream reach below Muskrat Falls that is going  
5 to go through round two of impoundment.

6                               So can you describe to me what you  
7 see as kind of the implications for that second  
8 impoundment and what flexibility or what mitigation  
9 you might be able to look at for that?

10                              MR. MCCARTHY: Yeah, sure.

11                              In terms of the Muskrat Falls  
12 reservoir being there, that reservoir can't be  
13 lowered any lower than the low supply level. So we  
14 still only got that half-metre of fluctuation.

15                              So the water that would be  
16 provided for the compensation flow downstream of  
17 the Muskrat reservoir would still have to come from  
18 the Gull, the Gull system.

19                              In terms of the flow that would be  
20 required there, I'm not sure what the capacity  
21 would be on the outflow. There's a specific  
22 structure that needs to be built for the bypass  
23 water because the spillways are just too high. If  
24 we had to wait until the water got to the spillway  
25 we would have no flow release for a certain amount

1 of that impoundment time. So there is a structure  
2 being designed and built specifically to release  
3 the flow.

4 And based on, I would think, what  
5 we find and learn about the amount of water,  
6 whether it's different than 30 percent from the  
7 Muskrat Falls reservoir, you know, maybe it's 40  
8 percent, there may need to be a consideration of  
9 whether that 40 percent -- that design incorporates  
10 that 40 percent so that we've got the same  
11 situation or the same conditions for both the  
12 reservoir fillings downstream of Muskrat Falls.

13 MEMBER JONG: But will you know  
14 what's -- yeah, you won't have finalized those  
15 designs -- like I'm thinking the timeframe is ---

16 MR. MCCARTHY: That's why I need  
17 the engineers to come.

18 MR. G. BENNETT: I can touch base.  
19 If there were an issue we'd have time to deal with  
20 it. I think that's the key point. The  
21 compensation structure at Gull Island, it is an  
22 important feature of the project but it's not  
23 something that we couldn't look at and say, okay,  
24 well if it needs to be 40 percent then we can adapt  
25 to that, but we'll have time to take that into

1 consideration.

2 MEMBER JONG: Thank you.

3 Next question is around the  
4 temperature changes that you're predicting, I think  
5 it was slides 13 and 35 maybe.

6 And I guess the first question  
7 I've got about that, you give the range which as  
8 you say it's a bit cooler, which is generally good  
9 news for fish, but certainly in your document you  
10 talk about for September and October temperatures  
11 are actually going up -- are predicted to go up by  
12 2.4 to 2.5 degrees, depending on where you are in  
13 the -- and I guess, first of all, can you tell me  
14 what impact that may have on fish that are spawning  
15 at that time of year, is that likely to be a  
16 problem for them?

17 And then the second question is  
18 when you were doing those calculations or you're  
19 figuring that out, was climate change factored into  
20 that? And if climate change wasn't, what would be  
21 the additive effect, particularly for that warming  
22 period? I'm not too concerned about the cooler  
23 time but it's the warmer time.

24 MR. MCCARTHY: In terms of the  
25 first question, yeah, species that spawn in the



1 fall they respond to a number of cues and  
2 temperature is one of them. Photo period is  
3 another; that's when they start to move. Flow is  
4 another trigger.

5                               In terms of the -- for example,  
6 brook trout or ouananiche, if they are spawning  
7 near the tributaries the temperature that would be  
8 at those tributaries won't be affected by this  
9 change in water temperature.

10                              That water temperature is coming  
11 off the plateau, that's still the same water  
12 temperature that would trigger, I guess, one of the  
13 cues for spawning.

14                              This change in temperature may  
15 affect the timing period, yeah, it may delay  
16 spawning for a period of time. Yeah, that could be  
17 an effect on the fall spawning species for sure.

18                              In terms of the climate change,  
19 I'd have to go back and check but I don't think  
20 that these models incorporate a climate change, but  
21 what they do is -- this is just one year's worth of  
22 model run, so you run a whole bunch of them and  
23 they did do a -- similar to the ice dynamics --  
24 actually, this was part of the ice dynamics, is you  
25 do a warm year and a cold year and an average year.

1                               So in terms of the overall  
2 changes, they have incorporated a certain amount of  
3 variability in the temperature.

4                               MEMBER JONG: I guess the concern  
5 is that if -- climate change is generally predicted  
6 to bump temperatures up not down, so if this is  
7 what's being predicted, chances are if you add  
8 climate change to it it will be -- for that  
9 particular period it may be warmer.

10                              Okay, thank you.

11                             MEMBER DOELLE: Okay, my first  
12 question is a follow-up question to Lesley's. Can  
13 you talk a bit about -- I just want to get my head  
14 around the follow-up, really, to what you discussed  
15 with Lesley, and that is, so we have a situation  
16 where significant habitat for a particular species  
17 is made unsuitable by the impoundment and we have  
18 created new habitat elsewhere.

19                             So in a situation where that new  
20 habitat turns out to be not suitable, not used, so  
21 there's a problem for a particular species, I'm  
22 trying to get a handle on how much time do you have  
23 to fix the problem and what do you have in mind for  
24 doing that?

25                             MR. McCARTHY: Well that would be

1 where the adaptive management would come in.

2 But in terms of how much time, I  
3 guess the maximum amount of time you have is the  
4 lifespan of the adults, the lifespan of the  
5 spawning population.

6 I mean, if you've got, for  
7 example, reservoirs in Quebec, they have done  
8 monitoring on lake trout and what they found is,  
9 you know, the biomass isn't changing but when you  
10 look at the age structure, you've got fish getting  
11 older and older and bigger so they're compensating  
12 for the biomass, but you don't see the recruitment  
13 and these are reservoirs where the fluctuation in  
14 water levels are up to 10, 15 metres. So they have  
15 gone in and adjusted that in some situations.

16 So I think the time limit is the  
17 adult spawning population and what we can do for  
18 them depends on what species that is, I guess, and  
19 whether the limiting factor is, in fact, the  
20 habitat or the substrate or the flows itself or  
21 it's a water quality issue. So I think it would  
22 really depend and what we have in the plan is a  
23 series of criteria that will need to be met during  
24 the monitoring so that we can identify as early as  
25 possible so that we have as much time as possible

1 to make whatever corrections are needed for that  
2 species.

3 But again, in terms of the Pike --  
4 the example -- I mean we quickly -- when we  
5 identified it with the regulators, you go to the  
6 literature and it's a relatively simple putting in  
7 the substrate and they will spawn on it.

8 MEMBER DOELLE: But you could  
9 actually lose multiple years without threatening  
10 the sustainability of the population?

11 MR. MCCARTHY: In terms of -- it  
12 would mostly be well, spawning and juveniles.  
13 Well, yeah, in terms of the population and the  
14 sustainability of the population; yeah, I think so.  
15 But I mean you want as many age classes there as  
16 possible. If you look at some of the models that  
17 are done for species at risk, in actual fact what  
18 you can do is you can play with some of the  
19 parameters and you can take out almost 90 percent  
20 of the spawning habitat and still keep the same  
21 adult population, but the real bottleneck for a lot  
22 of populations is the juvenile rearing.

23 The juvenile is the one that -- is  
24 one of the key lifecycle stages in terms of  
25 maintaining the adult population.

1                               MEMBER DOELLE:   Okay, the other  
2   area that I wanted to explore with you is that --  
3   and I'm sure you'll correct me if I have the wrong  
4   impression, but the impression I have is that  
5   you've looked at a number of impacts based on  
6   measurable parameters.   So you've looked at the  
7   impact of sediment.   You've looked at nutrients.  
8   You looked at water depth.   You looked at water  
9   velocity, temperature, the impoundment process, the  
10   turbine effects, but I don't have the impression  
11   from the undertaking and your presentation that  
12   you've looked at the combined effect.

13                           And I'm wondering whether you  
14   can tell me whether my impression is accurate or  
15   not and if it's not accurate, tell me how you've  
16   looked at the combined effect for individual  
17   species and for the ecosystem as a whole through  
18   this transition period?

19                           MR. McCARTHY:   It's not correct.  
20   Again, in terms of calculating out the habitat  
21   equilibriums and the suitability, you incorporate  
22   all the physical parameters that are involved; the  
23   velocity, the depth, the substrates and that will  
24   give you that habitat equivalence for the physical  
25   habitat.

1                               And again, the results that we've  
2 shown in terms of the productivity and the TSS and  
3 the temperatures have been taken into account in  
4 terms of phytoplankton and zooplankton and in terms  
5 of some of the challenges that we see in just the  
6 behavioural aspects of the species so in terms of,  
7 you know, avoidance of TSS and whatnot. So we have  
8 incorporated a lot of that stuff and the water  
9 quality information plays a key role in the  
10 modelling and predictions that we've done in terms  
11 of the change in the community or the availability  
12 of foodstuffs in terms of the phytoplankton and the  
13 zooplankton turnover.

14                              So we have incorporated, I think,  
15 all of the information into our determination of  
16 what the final habitat will be like, how the fish  
17 species can use it and how the water quality and  
18 those other non-habitat-related parameters play a  
19 role in terms of the transition period, what will  
20 be the challenges, what do we need to do in order  
21 to maintain those populations through the  
22 challenges so that we have a suitable and  
23 sustainable population at the end of the day.

24                              MEMBER DOELLE: I guess -- and  
25 again, in your answer, my impression is that you've

1   done it in terms of looking at the stabilized  
2   situation 15 years out, but have you looked at it  
3   from the perspective of saying, "Okay, here is a  
4   species. It's going to lose x-percent of its  
5   habitat during the impoundment. Then it's going to  
6   have to find habitat elsewhere. At the same time  
7   here are the changes in sediment. Here are the  
8   changes in nutrients. Here are the changes in  
9   water temperature. Here are the changes in terms  
10  of predator-prey relationship that this species  
11  will encounter."

12                               So have you looked at the combined  
13  effect on each of the species, not in terms of the  
14  finalized, stable scenario after 15 years, but in  
15  terms of looking at how this species will do  
16  through this transition period where it's going to  
17  get hit with a number of changes?

18                               MR. MCCARTHY: Yeah, sure. Again,  
19  a lot of those changes were the impetus for the  
20  incorporation of the physical works that we've got  
21  in the compensation plan. So the identification of  
22  any of those situations through the stabilization  
23  period that would affect those species have been  
24  incorporated.

25                               I guess the challenge is maybe in

1 the wording or the description in the document as  
2 to how we -- you know, did we go through every  
3 species and lay it out verbally? No, but if you go  
4 through the list of tables and the identified  
5 challenges and the water quality and the  
6 zooplankton descriptions, it's all there. It just  
7 may not be in the same format as a species-by-  
8 species blow of what would happen in the  
9 stabilization, but it's all been incorporated,  
10 yeah.

11 MEMBER DOELLE: Is there any way  
12 that you can describe to me the process you went  
13 through for a particular species or generally of  
14 how you did that?

15 MR. G. BENNETT: I've been  
16 listening to the conversation and I just want to  
17 circle back because I think, you know, the idea  
18 that the population is hit with anything; I think  
19 we may have to touch on that because I think the  
20 point that Mr. McCarthy was making here is that the  
21 factors that we're looking at are well within the  
22 range of variability on the river system today. So  
23 maybe, Jim, it might be helpful just to talk about  
24 that transition in some more detail and the, you  
25 know, creation of the reservoir and those factors



1     that you're looking at and how they relate back to  
2     fish health.

3                             MR. McCARTHY:   Yeah, sure.   Sure,  
4     the -- again, I know that we've shown the predicted  
5     peaks would be well within the range of  
6     variability.   We have identified that the  
7     concentrations would extend through the ice-free  
8     period, but in terms of an example for a species,  
9     well, let's say brook trout.

10                            Brook trout, we've looked at the  
11     utilization of a habitat that's there now.   We've  
12     looked at the post-project habitat and let's look  
13     at it first from a final, stable habitat so we know  
14     what the slower water substrates will look like  
15     because we've got total suspended sediment kind of  
16     settling on there so we know that that's a soft  
17     substrate type.   We know from the geotechnical work  
18     what the shorelines will look like and we know the  
19     composition of the majority of the tributaries.

20                            So we have an idea of what's there  
21     beforehand.   We've done this.   We set a  
22     conservative calculation of the post-project taking  
23     into account the literature-based habitat  
24     utilizations or suitabilities where the habitat is  
25     different than anything that we've sampled before.

1 So we have a whole series of conservative  
2 estimates.

3                               Then we looked at the change in  
4 these parameters; so, for example, total  
5 phosphorous and TSS. The TSS values are not  
6 predicted to be much beyond the predicted  
7 quantities, but in particular, if you look at  
8 Muskrat Falls Reservoir, that's the area we will  
9 have the greatest amount of instability in the  
10 shoreline in increases or persistence of TSS. And  
11 in terms of looking at what brook trout need, the  
12 more sensitive lifecycle stages for that TSS and  
13 the stability; they will spawn on shorelines, but  
14 not if it's shifting, not if it's moving. They may  
15 spawn there, but the success may not be that great,  
16 especially if there's sedimentation happening. And  
17 that is part of the impetus of looking at areas, in  
18 particular the delta habitats, that would provide  
19 the spawning habitat that would avoid the high TSS  
20 areas because you've got this unaffected water  
21 coming down into the deltas so we've incorporated  
22 that for brook trout, for Ouananiche, that would  
23 help have those lifecycle stages persist while the  
24 other habitat is stabilizing. And when I say  
25 stabilizing I mean, again, the predicted range.

1 We're not going to have zero TSS at the end of the  
2 day. They're dealing with TSS now. They will deal  
3 with TSS in the future. So I think we have  
4 incorporated it throughout the whole stabilization  
5 period.

6 CHAIRPERSON CLARKE: Yes, Mr.  
7 McCarthy, thank you.

8 I just have a couple of very quick  
9 questions on your presentations -- technical ones  
10 and this wasn't the slide I was looking at, but  
11 this would be a good example.

12 Like, in the numbers at the bottom  
13 you're using, say, the existing range and the  
14 existing mean, then you do a prediction of a peak,  
15 and then you conclude that well there's not a  
16 significant difference, and I didn't understand how  
17 you could do that just from the numbers. I take it  
18 I have to look at the graph, do I?

19 Because, you know, your predicted  
20 peak doesn't -- it tells me the upper limit of a  
21 range and it doesn't tell me the mean so I can't  
22 really relate it to the existing numbers you're  
23 using.

24 MR. MCCARTHY: I guess the main  
25 point of using the numbers is just to show that the

1 predicted peak in total phosphorous, in this  
2 example, isn't in order of magnitude it's not 1,000  
3 milligrams per litre or 2,000 milligrams per litre,  
4 it's in the range that's being experienced by the  
5 species now.

6 And I did try to explain -- yeah,  
7 this graph shows each year, the increase, and I --  
8 there was another graph that the existing  
9 phosphorous range actually peaks in the spring and  
10 comes down and then peaks again in the fall.

11 That's not what's going to happen  
12 here. I'm not saying that this will be exactly the  
13 same or there's no significant or a change in total  
14 phosphorous.

15 If you take this year, for  
16 example, the phosphorous increases over the year  
17 and then drops down because ice forms so you don't  
18 have the erosion and release of material.

19 So there are changes but the key  
20 thing was to just put it in context in terms of  
21 what's experienced on the river now, that it's not  
22 orders of magnitude increase or decrease.

23 CHAIRPERSON CLARKE: Okay, so I'd  
24 have to use the graph to calculate the mean  
25 predicted, for example?

1                   MR. McCARTHY: Yeah, the mean  
2 would be a little bit misleading, I think, in this  
3 because you would get -- you've got a high peak  
4 here and then during the ice period you've got very  
5 little, so it would actually bring -- you know, it  
6 would pull the mean down and the mean wouldn't mean  
7 a whole lot.

8                   CHAIRPERSON CLARKE: Okay, the  
9 other one was on your graph -- just very quickly --  
10 number 39 and this is the one where you showed the  
11 catch per unit effort in the three areas above Gull  
12 Reservoir. And I think I understand the catch per  
13 unit effort thing.

14                   But when you were talking you were  
15 indicating after post-project you would be  
16 expecting like an increased abundance of a  
17 particular species or a decreased abundance and you  
18 weren't getting that from the graph, this was your  
19 -- or am I not reading the graph properly?

20                   MR. McCARTHY: No, I was trying to  
21 get it from the graph, yeah.

22                   CHAIRPERSON CLARKE: Okay.

23                   MR. McCARTHY: But again, as an  
24 example, this green bar here for brook trout,  
25 that's the catch per unit effort in Section 3.

1 That's that fast section of river from Gull Island  
2 up to Winokapau. The purple is Winokapau. So  
3 Winokapau is a slower more lake-like environment.

4 So in terms of what the catch per  
5 unit effort would be in that post-project habitat  
6 behind the Gull dam, I would expect it to be closer  
7 than what was found in Winokapau.

8 So, for example, this green would  
9 then come down and we would use the catch per unit  
10 effort from Winokapau as our criteria for that  
11 area.

12 So, yeah, it's come up in the  
13 graph but I just didn't do a very good job of it.

14 CHAIRPERSON CLARKE: No, no, I  
15 understand. Yes, thank you.

16 MEMBER IGLOLIORTE: I'm just  
17 trying to understand the effects of sedimentation a  
18 bit better. So on the one hand, depending on the  
19 time of year, depending on the fish species,  
20 sedimentation may have a negative impact. But did  
21 you also say that the studies show that it, in some  
22 cases, may add nutrients to the system overall?

23 MR. MCCARTHY: The erosion and the  
24 degradation or the rotting decomposition of the  
25 vegetation is where the nutrients would come from.

1 So there'd be material coming off the shorelines as  
2 well as the material that would be decomposing  
3 would be where the nutrients would come from.

4 MEMBER IGLOLIORTE: And in the  
5 case of instances like mass slumping, does that  
6 have any bearing as well on adding nutrients?

7 MR. McCARTHY: I would think  
8 that's more adding suspended sediment, not so much  
9 nutrients, because that would be -- when we look at  
10 that slide that happened at Edwards, it wasn't a  
11 lot of the organics that came down it was actually  
12 the material, that clay and sand material that came  
13 down.

14 So it could cover up habitat. It  
15 could definitely alter habitat. We had -- I can't  
16 remember what the amount is -- probably 50 hectares  
17 of what was river is now no longer river, it's a  
18 low-lying clay escarpment. So it can change  
19 habitat.

20 But what we wanted to do this year  
21 was to get in there and actually see whether fish  
22 were using it just to kind of give -- have some  
23 more comfort in our own mind that, you know, is  
24 this a total write-off of habitat or is there still  
25 the ability for fish to use it. And they were

1     there they were there in good numbers.

2                             MEMBER JONG:   I think this is my  
3     last question.   And I'm trying to get my head  
4     around the downstream, particularly the estuary  
5     area.   And I realize that you haven't done the  
6     thermal modelling and the ice modelling in that  
7     area, but even just -- you describe in your  
8     Undertaking 54 your expectation that the changes  
9     there are going to be localized and small and it's  
10    tidal; there's going to be thorough daily mixing of  
11    the waters.

12                            And I've looked through your  
13    hydrology studies, and the picture I came away with  
14    of that estuary area was more of a layer of  
15    freshwater, I think up to three metres deep, on top  
16    and then saline underneath that kind of stays that  
17    way.

18                            So I didn't get a message of  
19    mixing within the estuary and I'm trying to picture  
20    the phosphorous and the sediments and the mercury  
21    and the stuff coming down from the freshwater and  
22    then sitting in that nice three layers on top of  
23    the estuary, what does that mean?

24                            So am I way off-base on this or  
25    can you explain to me how I've got this wrong, if I



1 do?

2 MR. McCARTHY: No, it's right and  
3 wrong. When you look at the hydrology -- actually,  
4 if you back up and look at the oceanography study  
5 that was done in '98, what they found when they  
6 measured the currents was at the mouth of the river  
7 there's a turbulent zone, so the freshwater comes  
8 out and it actually acts as a pump and draws  
9 saltwater out so you've got kind of a circular  
10 motion happening as it comes out. So at that area  
11 you don't have that nice separated layer, but as  
12 you move away from that you still have the density  
13 and the temperature differences that it will  
14 reform.

15 And again, when you get down to  
16 Goose Bay Narrows with that tidal action the same  
17 thing happens, the freshwater layer goes out over  
18 and it does this pumping action and it circulates,  
19 but then once it moves away from there you get that  
20 re-establishment again. And that's where a lot of  
21 the nutrients and the marine productivity is  
22 initiated is that actually drawing up from the  
23 nutrients that are down in that colder marine  
24 environment so you get that drop.

25 And a lot of fish will cruise that

1 area because there's a lot of the phytoplankton and  
2 zooplankton that are coming from the freshwater.  
3 When they get in 2 parts per 1,000 they die.  
4 They're definitely dead by 10 parts per 1,000. So  
5 when they get out to Goose Bay Narrows they're  
6 starting to die and drop out and you've got fish  
7 kind of cruising that area, but once you move away  
8 from that area you'll get the establishment of that  
9 freshwater 2 to 10 percent salt or 2 to 10 parts  
10 per 1,000 layer again, yeah, sitting on top. So  
11 there is that turbulent mixing there.

12 And when we responded to  
13 Undertaking 38 with the modellers for the  
14 temperature in the ice, that's where that  
15 temperature -- if there's any temperature  
16 difference because of the reservoirs it comes and  
17 gets up-welled and mixed with that marine water.

18 MEMBER JONG: So it all gets  
19 washed out or gets sorted out in that mixing that  
20 takes place at the mouth of the river is what  
21 you're saying? The temperature change -- like  
22 there's enough mixing ---

23 MR. MCCARTHY: The temperature  
24 change, yeah, it's ---

25 MEMBER JONG: --- at the mouth of

1 the river to eliminate that or fix that, is that  
2 it?

3 MR. McCARTHY: Yeah, that's the  
4 description that -- well, that's what the  
5 oceanographers have there and that's what  
6 Undertaking 38 describes, is that cold sink of  
7 water underneath that's being moved around as soon  
8 as it comes in contact with that freshwater layer  
9 and the mixing, that it quickly will dissipate any  
10 of the temperature -- any temperature increases,  
11 whatever is there.

12 MEMBER JONG: Thank you.

13 CHAIRPERSON GRIFFITHS: Okay,  
14 thank you.

15 I think we really will need to  
16 take a break at half past 10 because we've been  
17 sitting here for two hours and we'll need that  
18 break.

19 I'd like to see -- could people  
20 put up their hands if you either want to ask a  
21 question of the presenter or if you have some views  
22 you want to share with the panel on this topic so I  
23 know how many people wish to talk in this section.

24 Yes, Ms. Benefiel. Anyone else?  
25 And Mr. Davis.

1                               You have five minutes each.

2                               Yeah, well, no, that's what I --  
3       sorry -- Meinhard's asking -- no, we'll do it right  
4       now and go till half past.

5                               Ms. Benefiel?

6       --- QUESTIONS BY THE PUBLIC:

7                               MS. BENEFIEL:   Hi.   It's Roberta  
8       Benefiel.

9                               Mr. McCarthy, I wondered if you  
10       were at all involved, along with Jacques Whitford,  
11       in the Star Lake and the Duck Pond projects?

12                              MR. MCCARTHY:   No.

13                              MS. BENEFIEL:   Okay, then you  
14       won't know what the rare fish species that was  
15       extirpated from that project.

16                              We're looking at the Star Lake  
17       project as a failure, obviously, and Duck Pond as  
18       well, and that gives us again a lack of confidence.  
19       Those were small projects, very small compared to  
20       this one, so it gives us a lack of confidence that  
21       this huge, huge area can be recreated with fish  
22       habitat.

23                              So that's all I needed to say.  
24       Thanks.

25                              CHAIRPERSON GRIFFITHS:   Okay,

1     thank you.

2                     Mr. Davis.

3                     MR. DAVIS:   Good morning.   This is  
4     Eldred Davis.

5                     I have a lot of questions.   I  
6     don't know if I could have them fitted in here.

7                     But I know that we've been told  
8     before that this so-called project would turn this  
9     river into a pike, sucker dominated community.   I  
10    know DFO agreed to that.

11                    And I guess with the so-called  
12    mitigations that are proposed now, it may mitigate  
13    that to some degree.   But I have to think that  
14    pike, which is -- currently, in faster water, pike  
15    are not particularly fond of it.   They don't travel  
16    as much as they normally would.

17                    I mean, you put a dam and create a  
18    reservoir, you slow down the water.   Everybody  
19    knows that.

20                    That actually gives pike far more  
21    mobility.   They will be able to go all over this  
22    potential reservoir and they will seek out any fish  
23    that are in their diet at the moment and probably  
24    even more.

25                    I would say that it's self-

1 explanatory where they would be a dominant species  
2 in a reservoir. And yet there's not much credit  
3 given to that.

4 But as far as the suckers, I think  
5 they're mostly bottom feeders. They probably are a  
6 little bit below the range of pike, which are  
7 mostly surface or near surface feeders.

8 And I don't think that the  
9 mitigation for water nation would be effective. I  
10 think the -- well, referring to the Muskrat Falls  
11 Reservoir, you have Edwards Brook, which is  
12 susceptible to slumping. It's right -- it's full  
13 of sand bars where the river flows in to the Grand  
14 River.

15 And upstream, it's all sand. Very  
16 large cliffs or banks, I suppose, that are very  
17 mobile, or they can be once flooding takes place.

18 Painters River is -- it would be  
19 near the highway. It would be a real attraction  
20 for people who wish to get out on the reservoir and  
21 fish. I think any fish in that area would not  
22 survive the onslaught.

23 The east end of Gull Island Lake,  
24 I'm not really certain about that, but it looks to  
25 me to be very turbid, a great deal of sediment

1 flowing out there. I don't know how well that  
2 would do for spawning.

3 And as far as the gravel and  
4 cobble shoals on the western end of Gull Island  
5 Lake, you know, that's supposed to be immediately  
6 downstream of Gull Island dam, which will have a  
7 tailrace which will attract all kinds of fish  
8 eaters.

9 And the fact is that a few  
10 kilometres away, you're considering the rocky and  
11 cobbly shoal to be a prime breeding area or  
12 spawning area, and yet within a few kilometres you  
13 have all the predators in the immediate area for  
14 certain which would include that, would be there to  
15 eat the fish chowder that's come through the dam,  
16 the tailrace.

17 So I really -- you paint a pretty  
18 picture again, but I really don't think it's going  
19 to be very effective. I don't think it's going to  
20 work. Same as in Star Lake.

21 You know, Roberta didn't mention  
22 it, but apparently there's a run of char there  
23 that's either extinct now or extremely reduced in  
24 numbers. And there was mitigation done there, and  
25 it was totally ineffective.

1                   To give you another example of how  
2     pike can dominate a fairly small -- a fairly slow-  
3     moving area, there's a little lake just south of  
4     Travespine here that -- I'm putting a little bit of  
5     local knowledge.

6                   I know you don't pay much  
7     attention to that, but when I was just young, I  
8     remember being at Uncle Bob Michelin's house and  
9     there were some fishermen there that had just come  
10    out of that lake and they talked about the nice  
11    trout that used to be in there.

12                  And somehow or other, some pike  
13    got in there and they aren't any trout there any  
14    more. At least there wasn't then. I'm talking  
15    about 50 years ago, probably.

16                  Well, maybe not 50. I'm not quite  
17    that old. I'm 60 now, but I wasn't 10 then. I  
18    might have been 12, 13.

19                  And I remember seeing that lake  
20    the first time and the water was crystal clear and  
21    there was clam shells all along the beach. You  
22    could see them maybe 10, 20 feet in the -- deep in  
23    the water; it was that clear.

24                  Didn't look like pike territory,  
25    but I did see a pike there. I didn't see any char.



1 A friend and I were fishing there, and there  
2 weren't any trout there. You know, we'd been told  
3 before.

4 And actually, what happened was  
5 slow moving water, pike got in there, and they ate  
6 up all the trout. And now I don't know if there  
7 are any fish there at all now. Maybe the pike ate  
8 themselves out.

9 But that is what I would think  
10 would happen in at least the Muskrat Falls  
11 Reservoir. It's slow and it's not suitable for  
12 ouananiche, as you said.

13 In fact, I think one of the Lower  
14 Churchill Development Corporation mitigation  
15 measures was to stock it with ouananiche, which I  
16 would think would be totally ineffective. And I  
17 guess you guys are not even considering that now.

18 I don't think that's practical to  
19 say that --you know, that fish assemblies wouldn't  
20 be changed. Obviously there's going to be change.  
21 I don't know how you can come up with a sentence  
22 like that.

23 But actually, after -- I remember  
24 reading the results that -- of a workshop we had  
25 here in Goose Bay where we proposed some of those

1 same things, including the Gull Island plateau  
2 section.

3 And somebody, I don't know if it  
4 was you or somebody else, wrote in the report that  
5 was -- that appeared in the EIS or one of the  
6 reports afterwards, I guess, that people were so  
7 glad to hear that there was going to be a lot more  
8 trout around to catch, or something to that effect.

9 And I just couldn't believe what I  
10 was reading. You know, it was totally against what  
11 we had brought up at that meeting.

12 I know there was a meeting in St.  
13 John's on the same subject. Maybe those people  
14 were fooled. But we certainly weren't.

15 Anyway, I have more questions, but  
16 I'm losing my train of thought. I'm just getting  
17 pissed off at this.

18 Thank you.

19 CHAIRPERSON GRIFFITHS: Thank you  
20 very much, Mr. Davis, for your statement.

21 It is -- do you have a comment?

22 No?

23 It's half past ten. I think we  
24 will now take a break.

25 Thank you for presenting and

1     answering the questions, Mr. McCarthy.

2                     This now concludes this topic for  
3     this morning's session.

4                     And when we come back at quarter  
5     to eleven we will switch gears and move on to the  
6     second topic on the economic justification and the  
7     alternatives.

8                     So thank you. We'll see you in 15  
9     minutes.

10    --- Upon recessing at 10:30 a.m.

11    --- Upon resuming at 10:48 a.m.

12                     CHAIRPERSON GRIFFITHS: I think  
13     we're ready to resume the session, and we're going  
14     to begin by asking Nalcor to make a presentation  
15     with respect to their letter in answer to the  
16     panel's questions about the economic justification  
17     and the alternatives.

18                     Mr. Bennett.

19    --- RESPONSE TO PANEL'S INFORMATION REQUEST OF  
20    MARCH 21, 2011 FROM NALCOR BY MR. GILBERT BENNETT:

21                     MR. G. BENNETT: Great. Thank  
22     you, Madam Co-Chair.

23                     And just before we start, I'll --  
24     we've changed over some members on our team here,  
25     so I'll introduce the new people that are here.

1                   You've already met Mr. Rob Hull  
2 before, but just for continuity. Rob is a  
3 chartered accountant. He obtained a designation in  
4 1992, has about 20 years of experience in that  
5 practice. And his responsibility is the  
6 preparation and evaluation of the business case for  
7 the project.

8                   To Rob's immediate right is Mr.  
9 Rob Henderson. And Rob is the manager of system  
10 operations for Newfoundland and Labrador Hydro, so  
11 he's responsible for the operation of the  
12 electrical system, both within Newfoundland as well  
13 as within Labrador.

14                  He's also responsible for customer  
15 service for our direct customers, so those would  
16 include residential, commercial as well as our  
17 large industrial customers. And he also, within  
18 Hydro, has responsibility for our conservation and  
19 demand management program.

20                  Of course, we do that on an  
21 industry basis in consultation with Newfoundland  
22 Power.

23                  To Rob's right is Mr. Paul  
24 Humphries. And Paul is the manager of system  
25 planning for Newfoundland and Labrador Hydro and he

1 has responsibility for generation, transmission and  
2 distribution planning as well for the island  
3 system, as well as for the Labrador inter-connected  
4 system and their isolated diesel systems.

5 So he's responsible for monitoring  
6 and forecasting demand forecasts and load forecasts  
7 for the system, ensuring that the systems have  
8 capacity to meet our projected requirements.

9 And I should have mentioned that  
10 both Mr. Humphries and Mr. Henderson are both  
11 professional engineers and have approximately 30  
12 years' experience in the industry.

13 I know that the letter that we  
14 submitted on April 1<sup>st</sup> has a lot of detail in it, so  
15 rather than, I guess, re-create a new presentation  
16 with a subset of that, I thought it might be  
17 helpful if we just run through the highlights in  
18 that letter and then we can maybe make as much use  
19 of our time to deal  
20 with some questions that may fall out of that.

21 So we have the letter available on  
22 the projector here. I just want to go through some  
23 of the highlights.

24 Certainly, there's a lot of  
25 material in here with respect to our process; the

1 way that we're approaching alternatives to the  
2 project, and I think it's important for us to  
3 consider that the objectives that we're trying to  
4 meet with the project, both with Gull Island and  
5 Muskrat Falls, fall from the energy plan and there  
6 was extensive consultation on the energy plan when  
7 the province rolled it out back in 2007-2008.

8                   So our objective with the  
9 development of this project is fourfold: It's the  
10 development of the province's natural resources for  
11 the benefit of the province and its people; to  
12 address demand for hydroelectric generation within  
13 the province; to provide an electric supply for the  
14 sale of third parties; as well as to ensure there's  
15 a long-term renewable source of energy for the  
16 province.

17                   So when we look at our  
18 justification, Gull Island and Muskrat Falls are  
19 both integral parts of that planning, and we see  
20 those both as an important part of the project.

21                   Muskrat Falls has taken, I guess,  
22 a dominant view in the media. We're hearing lots  
23 about it today and it's an important piece of our  
24 domestic planning, but it shouldn't be considered  
25 to be the entire rationale for the project.

1                   We provided some additional  
2 analyses and information as requested by the panel,  
3 and certainly we're happy to go through that in  
4 some more detail this morning.

5                   I just want to touch on some of  
6 the assumptions that were presented, and I'm sure  
7 we will be talking some more about these, but the  
8 first one I wanted to look at was the output of  
9 Muskrat Falls displacing Holyrood and we have some  
10 numbers here in unit costs. So we see 7.7 cents  
11 for generation and 14.3 for delivery price. Both  
12 numbers are correct, but they're used in different  
13 contexts so we may want to take some time and  
14 explain how the analysis fits together this  
15 morning.

16                   Certainly the 7.7 cents per  
17 kilowatt hour number, we'll look at that as the  
18 bust bar generation cost at Muskrat Falls as a  
19 levelized unit price. But when we're doing our  
20 forecasting in the delivered scenario to the  
21 island, we're actually looking at the cost of  
22 energy for what's actually needed on the island to  
23 meet the demand that would be displaced by Holyrood  
24 so it may not be all of the production from the  
25 project.

1                               So when you look at those two  
2 numbers in those two different contexts, you come  
3 up with two different outcomes.

4                               Insofar as the output of Muskrat  
5 Falls, one thing we wanted to note there was that  
6 we are getting value for that energy that's being  
7 worked with Emera, that we get access to capacity  
8 on the Maritime link and we get access to markets  
9 both within the Maritime Provinces as well as into  
10 the U.S.

11                              So we just wanted to be sure that  
12 we would clarify this point; it wasn't just a  
13 revenue question, that there was -- there's  
14 actually an exchange of value.

15                              In the third assumption, we look  
16 at the 40 percent of output from Muskrat Falls. I  
17 guess the point that we were focusing on here is we  
18 don't view those markets as uncertain.

19                              We have access to the construction  
20 markets. There's a mechanism for getting in and  
21 selling into those markets so we were concerned  
22 with the point that those markets might be viewed  
23 as uncertain.

24                              Insofar as the energy for Gull  
25 Island goes -- and this is something that I didn't



1 address in the letter so I should make sure we do  
2 that now -- we look at the -- you know, the  
3 decision on Gull Island, it may not be simply a  
4 question of committing all of the energy. What we  
5 do know is that we have established a threshold for  
6 economic feasibility, the extent to which that  
7 portfolio was committed to a long-term sale to a  
8 short-term market and market access held in  
9 reserve.

10                   Actually, what actual percentage  
11 of that revenue would be committed is something  
12 that we want to deal with at sanction. The  
13 critical part for us is that we need to clear that  
14 threshold for economic feasibility in order to make  
15 a sanction decision.

16                   And, certainly, in the modelling  
17 that we presented, we have looked at a scenario  
18 where we said that, yes, that production is going  
19 to market, and we've identified a market access  
20 mechanism to get there.

21                   The part A of the letter, we talk  
22 about financial benefits, return and equity. There  
23 are a series of assumptions that were made in terms  
24 of the financing, debt-equity ratios, interest  
25 rates, and so on. Those are consistent with what

1 we've demonstrated or we've used, rather, in JRP  
2 146.

3                   The methodology that we use when  
4 we look at the financial benefits and the cash-flow  
5 analyses are consistent with what we presented in  
6 146, and the graphs that fall out of this so that  
7 Figures 5 through 11 are calculated in the same  
8 manner.

9                   And we've also, of course, as  
10 requested, presented the outcome of the scenarios  
11 that were presented by the panel. So those are  
12 here in this letter.

13                   We have some comments on where  
14 those scenarios -- how we view those scenarios, and  
15 I think there were some situations where we would  
16 see those as being extreme situations, but that is  
17 -- I think that's just a perspective on our side,  
18 certainly that the scenarios as requested have been  
19 presented. We can talk about those in some more  
20 detail.

21                   We started looking at alternatives  
22 on the island. I think that the first observation  
23 that I would make there is that there are  
24 considerations other than simply the financial  
25 analysis that become very important parts of this

1 question.

2                               And, certainly, we've got the  
3 right expertise here this morning, from our side,  
4 to talk about these in some more detail, but it's  
5 -- at the outset, it's important for us to say that  
6 these alternative generation approaches on the  
7 island; these opportunities to meet a portion of  
8 our domestic requirements don't replace the  
9 project.

10                           There's no way that we can come up  
11 with 3,000 megawatts capacity, 16.7 terawatt hours  
12 per year that could earn an attractive rate of  
13 return to the province which ultimately fulfils our  
14 energy plan commitment to replace production from  
15 Holyrood. We can see these as parts of a scenario  
16 where you could, on an isolated basis, displace  
17 some generation from Holyrood.

18                           But it's important to point out  
19 that if we go down this road, Holyrood will be  
20 there. Its successor facilities will be there. We  
21 will have a significant exposure to oil price  
22 volatility, and we will be continuing to invest in  
23 that plant and the successor facilities for decades  
24 to come.

25                           In terms of hydro and its system

1 planning, I think one important point that we need  
2 to make here, of course, is that hydro is a  
3 regulated utility and it earns its return on  
4 investment for whatever investments are prudently  
5 incurred in that business.

6                   So our approach to analysis looks  
7 more at the least cost analysis, so which analysis  
8 has the lowest net present value or as we use in  
9 this report, the cumulative present worth of those  
10 costs is the important consideration.

11                   So in respect of the return in  
12 equity that hydro would earn on various scenarios,  
13 ultimately, as a regulated utility, whatever it  
14 invests would earn it's regulated return on equity.

15                   And so the approach that we're  
16 using here, the invested principle, is -- it also  
17 falls right out of the energy plan as well, that  
18 least cost power is the primary objective for rate  
19 setting.

20                   So when we look at our isolated  
21 scenario with a cumulative present worth of \$8.8  
22 billion, the Muskrat Falls alternative being \$6.6  
23 billion, that is a significant net present value  
24 advantage.

25                   And I think it's important to

1 point out here that there were some assumptions  
2 made in this analysis that, again, in a similar  
3 manner to many of our other pieces of work were  
4 conservative. So there's no cost for greenhouse  
5 gas emissions in our thermal analysis in the  
6 isolated island scenario. And there were also no  
7 restrictions on the life of the existing facility,  
8 Holyrood.

9                               If we look at messages that have  
10 been sent by the federal government in respect of  
11 coal-fired generation facilities, at different  
12 points in time, the federal government has  
13 indicated that when coal-fired facilities reach the  
14 end of their design life, they may have to come out  
15 of the system.

16                           Now, that hasn't shown up yet in  
17 final regulations, but the message has been sent  
18 fairly clearly to the industry that the continued  
19 reliance on fossil generation is not something that  
20 we should be counting on. We haven't made that  
21 assumption in this analysis so right now Holyrood  
22 is out in the 2035 timeframe, but if that were to  
23 be advanced that would be a significant increase in  
24 cost in the isolated scenario. And for the purpose  
25 of this analysis, we didn't include those factors

1 in the analysis.

2                               There's certainly a fair bit of  
3 interest in conservation and demand management. I  
4 think it's important at the outset for us to say  
5 we're fully supportive of these initiatives.

6                               We appreciate and understand and  
7 agree with the importance of conservation and using  
8 our resources effectively. And notwithstanding  
9 that effort, if you look at it as a marketer, we  
10 would say that anything -- any energy that's  
11 conserved is available for sale into an export  
12 market, so it's another way to derive value for it.

13                              So we're fully supportive of these  
14 initiatives, and I think the key point that I want  
15 to make here is that our participation and uptake  
16 and acceptance by customers of the CDM initiatives  
17 requires participation from our customers.

18                              And I think the key theme that is  
19 worth reiterating here is that our customers have  
20 not had a lot of experience, haven't seen the --  
21 and it's demonstrated in some of the numbers here  
22 that the participation by our customers is not  
23 where we would like it to be in terms of our  
24 targets.

25                              But that's an evolution, you know.

1 It's an evolution in all of our collective  
2 thinking. It requires behaviour -- behaviour  
3 change on the part of everybody and we're trying to  
4 facilitate that, but it would be difficult for us  
5 to make long-term predictions based on a limited  
6 set of experience.

7 And some might say, well, let's  
8 look at it in a more forceful manner. Let's force  
9 things to happen by changing rates and encouraging  
10 conservation more directly. That approach at this  
11 point in time conflicts with our approach of  
12 delivering energy at least cost.

13 So there's a -- I think the point  
14 I'm trying to get at here is that there is an  
15 evolution, we look forward to seeing that  
16 evolution. We intend -- we're committed to  
17 encouraging that into the long term.

18 But at this point in time, we  
19 can't see that as a means of replacing demand for  
20 electricity on the system.

21 Another important consideration is  
22 electric heat, and it's along the least cost theme  
23 as well.

24 Maybe, Peter, if you can get me  
25 Figure 12, it might be helpful there.

1                               This is an interesting situation.  
2   Consumers in the province don't have access to  
3   natural gas, so the two major competing  
4   alternatives for home heating are electric heat and  
5   oil-fired heating.

6                               Electric heat, for many years, has  
7   been more expensive than oil on an operating basis,  
8   but what we find is that people do value the  
9   convenience and they also value the lower initial  
10   cost of an electric baseboard heating system  
11   compared to forced air or hot water.

12                              And certainly we've heard the  
13   theme about the convenience of electric heat in  
14   representations here to the panel, particularly  
15   from folks from some of the coastal communities,  
16   who say, "Well, I would really like to be in a  
17   position where I could have electric heat", and  
18   that convenience is borne out in these numbers.

19                              The other -- and I think the other  
20   point that's worthy to note here is that in the  
21   long term we see that, on a real basis -- and this  
22   graph is in 2010 dollars per gigajoule -- we see in  
23   the long-term that with interconnection electric  
24   heat becomes less expensive than oil heat. And  
25   that's an important consideration from a least cost



1 energy supply.

2 And those factors, you know, all  
3 together, would see us continuing to predict an  
4 increase in the penetration of electric heat in the  
5 residential markets, in the residential market  
6 space.

7 The whole question of -- the  
8 question of small hydro, other renewables, there  
9 are some important technical, operational and  
10 planning considerations that come along with those.  
11 And I think that the biggest question that we would  
12 have to come to grips with on an isolated basis is  
13 that those resources are difficult to time during  
14 the period of our peak demand.

15 And our peak demand is  
16 historically in the winter. Demand during the  
17 winter periods could be double our demand during  
18 the summer. So it'll be important for us to make  
19 sure that our generation resources are available  
20 when we need them.

21 And that's one of the reasons why  
22 -- or one of the key reasons why our non-  
23 dispatchable renewables don't integrate well into  
24 the system. We may find out that we put non-  
25 dispatchable renewable resources on the system and

1 we find out that we're spilling water from our  
2 reservoirs. And that turns out to be not a  
3 productive investment at the end of the day.

4 But it is essential that we have  
5 the resources on the system that can not only  
6 delivery capacity during the winter period, but  
7 they also had to be able to deliver energy. And  
8 that means that that energy has to be available  
9 from storage on a firm basis when we get our peak  
10 winter demand.

11 And that's one of the key reasons  
12 why we look at some of the smaller scale renewable,  
13 small hydro, wind in particular and say, well, it  
14 doesn't integrate well into the system.

15 And we've got our daily demand as  
16 in Figure 13 in the report. There it is there.  
17 And there's the, in round numbers, 2:1 relationship  
18 between our peak in the summer and our peak in the  
19 winter.

20 And unfortunately, we don't have  
21 interconnections to other markets so we don't have  
22 the ability to move this energy into another market  
23 and export it and get value for it when it's  
24 appropriate, nor do we have unlimited storage.

25 And what we find -- if you go to

1 Figure 14, Peter, we're finding that -- and this is  
2 the past five years of operational experience in  
3 the system, we're very close to spill here.

4 And Rob, I suspect that there may  
5 be times in here that we actually did spill water  
6 and we're literally at the top of the curve.

7 So the storage is finite. We  
8 don't have readily available sources where we can  
9 add to the storage on the island system, so that  
10 becomes an important operational constraint.

11 So what happens here is that if we  
12 put more renewables on the system, we still find  
13 out that we need the thermal facility to deliver  
14 energy when it's required during the winter peak,  
15 and that's a difficult challenge to deal with.

16 If we look at the Harvest Centre  
17 study, I think it's important to look at this as a  
18 screening study and I think it's important to point  
19 out that that study looked at a number of  
20 opportunities. Certainly can't be considered to be  
21 a feasibility study.

22 We looked at some of the costs.  
23 We found some significant issues in there, and  
24 these are projects that we had looked at with our  
25 consultant.

1                   The numbers are standardized.  
2   They don't bear any -- there's no investigation of  
3   the site-specific issues associated with these  
4   sites. They look at a catalogue of other similar  
5   projects and, from our perspective, you would have  
6   to put a significant contingency on those numbers.

7                   When you start doing that, you  
8   start running into the economies of scale of these  
9   projects and the cost goes from something that was  
10   presented in that presentation as being in the  
11   order of \$90 a megawatt hour that when you start  
12   putting contingency on that and transmission  
13   interconnection and escalation out to 2017 to get  
14   to a common baseline with Muskrat Falls or Gull  
15   Island, if you find that it's much closer to \$200 a  
16   megawatt hour.

17                  And notwithstanding those numbers,  
18   there are a number of other issues. I talked about  
19   the storage one, the significant issues with  
20   transmission interconnection. We talk about the  
21   limited transmission capacity on the system today  
22   from Baie d'Espoir to the Avalon Peninsula and  
23   ultimately into St. John's.

24                  But that system is constrained  
25   today. It certainly is designed with capacity that

1 assumes that the Holyrood facility is in place and  
2 today Holyrood is almost 500 megawatts.

3 If you're going to replace  
4 Holyrood, then you had to come up with 500  
5 megawatts more transmission from central  
6 Newfoundland onto the Avalon because the renewable  
7 resources that have been identified, for the most  
8 part, are not on the Avalon Peninsula where the  
9 population is.

10 So our system planning team looked  
11 at the cost of those interconnections. And very  
12 quickly, when you start running up towards a  
13 billion dollars in transmission just to integrate  
14 these renewables.

15 So with an energy cost that's  
16 substantial with an interconnection cost, actually,  
17 when you look at the interconnection plus the  
18 upgrades that still would be required at Holyrood,  
19 it starts coming up close to the cost of the  
20 Maritime link. And you haven't even built any  
21 generation yet. So those are some significant  
22 impediments.

23 I think it's important to look at  
24 tidal for a second. You know, we don't see that as  
25 an alternative. It's just not there today;

1 economic, technical, feasibility, that alternative  
2 is unproven.

3 Certainly in some of the locations  
4 that have been raised during this proceeding, I  
5 mean, tidal installation in the Strait of Belle  
6 Isle, significant ice issues in that area, a very  
7 harsh environment as we're seeing in our planning  
8 for the transmission link.

9 There's no evidence that would  
10 even begin to be technically economically feasible  
11 and I haven't even started to talk about the  
12 environmental issues that might go along with that.

13 So we really can't see that as an  
14 alternative to the project.

15 So those were the key points that  
16 I just wanted to raise here this morning, that  
17 there are significant operational, technical issues  
18 associated with these alternatives.

19 But in terms of the smaller scale  
20 opportunities that we've had, if we look at our  
21 isolated scenario, we do have approximately 100  
22 megawatts of renewables that were integrated into  
23 that alternative, and that represents the extent to  
24 where we can take the isolated system.

25 So maybe with that introduction,

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1 this is probably a good point for us to pause and  
2 we can address any questions that you may have.

3 CHAIRPERSON GRIFFITHS: Thank you  
4 very much, Mr. Bennett.

5 I think what we're going to do is  
6 the panel does have a couple of questions, and then  
7 I think we will go and ask for questions from other  
8 people present, and then the panel may have some  
9 follow-up questions. So we'll proceed in that  
10 manner.

11 --- QUESTION BY THE PANEL:

12 CHAIRPERSON CLARKE: Thank you,  
13 and thank you, Mr. Bennett, for your presentation.

14 I have two areas of questions.  
15 Well, I have more than that, but two to start with.

16 But, first of all, I thought I'd  
17 -- because you highlighted the comments that had  
18 been made about the sale to Nova Scotia, the 20  
19 percent, I just thought I'd just put that in, in  
20 our perspective at least. And I understand what  
21 you were saying about the fact that there is  
22 benefit, the additional benefit to having the  
23 interconnection with Nova Scotia. I think our  
24 point was in terms of at least that amount of  
25 energy is not making a contribution to the cash

1 flow from Muskrat Falls.

2 And the second point having to do  
3 with the markets being uncertain was more not a  
4 question of the access but it was a question as to  
5 which markets and which price would you use in  
6 terms of looking at -- so we're looking at it from  
7 a cash flow from the Muskrat Falls project.

8 And the other comment about the  
9 sale of 100 percent from Gull Island and that was a  
10 -- I'm sure Mr. Hull will recall that that was his  
11 response to a question that I had raised during the  
12 topic specific section where he didn't feel that it  
13 was conceivable that Gull Island could get through  
14 a sanction and decision without having markets for  
15 all of the power.

16 So that was the nature of the  
17 assumptions that we have put in there.

18 The first question has to do with  
19 -- I want to better understand the 14.3 cents per  
20 kilowatt hour, and I understand it's a levelized  
21 thing and it's related to the amount of power. But  
22 can -- because it's similar to another number  
23 that's being used as being the price that would be  
24 paid by ratepayers in the province come 2017.

25 And I guess my question is that,



1 is the 14.3 percent the cost of the proportion of  
2 Muskrat Falls power that's used in Newfoundland  
3 that would be to the ratepayer, or is it the  
4 integrated rate that if you integrate the -- you  
5 take out Holyrood, you put in a contribution from  
6 Muskrat Falls and the resulting integrated rate to  
7 the taxpayer in 2017 is 14.3 percent? So that's my  
8 question.

9 MR. G. BENNETT: That's a good  
10 question, because there were a lot of numbers that  
11 are being discussed. And what I'm going to do is  
12 I'm going to turn to Mr. Hull here just to take us  
13 through because there are -- we've looked at the  
14 wholesale rate that we would sell to our customers,  
15 we've looked at retail rate, we've got the cost of  
16 the Muskrat plus transmission, and then we can  
17 compare it to the cost of Holyrood, and all those  
18 numbers are sort of in the range of this 14 cent  
19 number.

20 So maybe at this point I'll turn  
21 to Mr. Hull to put some clarity around this.

22 MR. HULL: Good morning.

23 I apologize to the panel and to  
24 members of the public; I'm suffering through a flu  
25 so please bear with me this morning.

1                   I guess the \$143 per megawatt hour  
2 is, in the first instance, is an escalating supply  
3 price commencing in 2017 and it is comprised of two  
4 components. It's comprised of the generation  
5 component that would be used to service the island  
6 on a per unit basis and represents the cost of  
7 transmission obviously from Labrador back to the  
8 island.

9                   So you may recall I guess in the  
10 discussions we had earlier in the hearings a number  
11 of 7582 which was an escalating supply price  
12 commencing in 2010.

13                   So to back up on that I guess, the  
14 143 being a 2017 price I want to take just a second  
15 just to convert that 7582 into something that  
16 represents a 2017 price.

17                   So the 7582 I guess, taking into  
18 account seven years of inflation, would give you a  
19 price of approximately \$88 to \$90 -- I haven't  
20 worked out the exact number but it's that range --  
21 per megawatt hour. On top of that you would have  
22 line losses of we're estimating approximately five  
23 percent from Labrador back to the island that you  
24 would add on to that to get the overall generation  
25 component.

1                               So adding on five percent to  
2   roughly, say \$90, would give you a number in the  
3   order of magnitude of \$95 megawatt hour delivered  
4   to the island with respect to the generation  
5   component. The remainder, the 143 minus that  
6   component, which would be \$48, would comprise the  
7   transmission component. And that would be the all  
8   in-price that the island ratepayer would pay for  
9   output from Muskrat Falls.

10                           CHAIRPERSON CLARKE: Okay, then my  
11   follow-up question is related to that, because --  
12   and I know I'm talking about today's dollar versus  
13   2017, but in approximate terms, as I understand it,  
14   the current integrated -- the price rate now is in  
15   the order of 9.5 or 9.2 cents, or something like  
16   that, to the ratepayer.

17                           So you project that out so far to  
18   2017, and then in 2017 -- like our current system  
19   is based upon mostly hydro in the province and a  
20   little bit of wind and a little bit of the gas  
21   turbines and Holyrood. So you back out Holyrood,  
22   which is the most expensive, as I understand it,  
23   and you bring in Muskrat Falls, and your result  
24   after all of that is that rather than, say the  
25   current nine cents or 9.2 cents per kilowatt hour,

1    which you take out Holyrood, which seems to me  
2    would go down to six or seven, or something like  
3    that, you bring in Muskrat and that brings up the  
4    integrated rate to 14.3.

5                               So that to me, mathematically, it  
6    seems then that Muskrat contribution is much, much  
7    higher than the 14.3 in order to get that 14.3  
8    number.

9                               MR. G. BENNETT: Well, there's a  
10   lot of puts and takes, because today Holyrood costs  
11   about \$150 a megawatt hour just for the price of  
12   oil alone from that facility.

13                              So, you know, those price  
14   increases, the increasing demand on the island  
15   system, as it plays out over the next seven years,  
16   is going to actually get us to a price in 2017  
17   where the price with or without Muskrat Falls would  
18   be awash, and what we see in the longer term is  
19   that Muskrat is less expensive. Muskrat  
20   transmitted to the island turns out to be less  
21   expensive than the continued investment in  
22   Holyrood.

23                              CHAIRPERSON CLARKE: Okay, so that  
24   confirms then. So Muskrat Falls is much higher  
25   than 14 cents just by itself but is not as high as

1     \$150 as Holyrood is?

2                             MR. G. BENNETT:  No, just to be  
3     clear, Muskrat by itself in 2017 would be the 143.

4                             MR. HULL:  So the overall blended  
5     rats on the island would be somewhat lower because  
6     obviously you've got the existing hydro, the  
7     existing wind and so forth that will still be part  
8     of the mixed service on the island.

9                             MR. G. BENNETT:  Just maybe  
10    there's a piece of clarification that might be  
11    missing here, and I'm just thinking through this.

12                            Our wholesale rate in 2017 is more  
13    like \$100 megawatt hour, and the difference here is  
14    Newfoundland power and the distribution cost, which  
15    gets loaded onto our energy cost before it shows up  
16    to our retail customers.  Our end user rate is  
17    projected in 2017 to be in the order of \$160 or 16  
18    cents a kilowatt hour, but that includes  
19    distribution costs.

20                            When we look at our generation  
21    costs, we look at Holyrood today for fuel just by  
22    itself without counting any other maintenance  
23    expense in that facility being in the order of \$150  
24    megawatt hour.

25                            CHAIRPERSON CLARKE:  Okay, having

1 said all of that, the integrated rate to the  
2 consumer in 2017 is 14.3 cents?

3 MR. G. BENNETT: No, it's actually  
4 -- I think it's about 16. Muskrat's delivered  
5 energy cost is 143 and then that gets averaged with  
6 our other generating assets, of course, data sphere  
7 is a very inexpensive asset, but they all get  
8 averaged and then you add the distribution cost on  
9 top and it gets to about 16 cents for our  
10 customers.

11 CHAIRPERSON CLARKE: Okay, thank  
12 you for that.

13 Now, my second area of question is  
14 related, I think, to Figure -- the assumptions you  
15 used for the cash-flow for Muskrat Falls on Figure  
16 2. There may be something that I'm not  
17 understanding.

18 But in the first instance you've  
19 got an equity -- a debt equity ratio of 5941 for  
20 Muskrat, which is different then the equity for  
21 Gull Island. And you might want to comment on that  
22 at some time, but I'll go to the next part of my  
23 question.

24 The way I understand it is that in  
25 2017 your -- from a cash-flow point of view, you're

1 assuming that you're going to get your 7.2 cents  
2 per kilowatt hour for every one of the kilowatt  
3 hours, the three or four terawatt hours that are  
4 coming from the system from Muskrat Falls.

5                   And my question was that given  
6 what I just said about, you know, the 20 percent  
7 that's going to Nova Scotia is not going to give  
8 you any cash flow and you may get a full amount or  
9 less amount or whatever from the 40 percent of  
10 export, when from a cash-flow-point of view from  
11 Muskrat Falls you're getting your 7.2 cents, does  
12 that mean -- on average, does that mean you're  
13 selling half of the power at 14.4 cents to Muskrat  
14 or does it mean that you're selling all of the  
15 power somewhere at the 7.2?

16                   And then the next part of the  
17 question is that, as I understand it, that's just  
18 your generation -- that's just the cash flow for  
19 the generation component, that doesn't include  
20 anything to do with the cost of transmission lines  
21 or the cost of transmitting the power.

22                   So my question is, first of all,  
23 about the dead-equity ratio, and the second one is  
24 that if they -- as a generation project, you're  
25 getting for every terawatt hour -- every kilowatt

1 hour you're getting the 7.2 cents where is that  
2 coming from?

3 MR. HULL: The first question with  
4 respect to the dead-equity ratio, I guess, from a  
5 planning perspective with Muskrat Falls, I think we  
6 may have indicated in previous sessions that we've  
7 passed through decision gate two and are proceeding  
8 towards decision gate three which is the sanctioned  
9 decision.

10 Between decision gate two and  
11 decision gate three, from a financing perspective,  
12 yeah, we'll undergo certain activities in terms of  
13 market sounding and arranging -- you know, our lead  
14 arranger is to put together a financing package and  
15 so forth to get us to a financial close that, you  
16 know, times pretty much around the time of the  
17 sanctioned decision that could be slightly after or  
18 whatever, but somewhere around that timing, and I  
19 guess, because on the planning cycle with respect  
20 to Muskrat Falls, we're further down the road  
21 having gone through decision gate two.

22 You know, we've certainly got a  
23 much better view in terms of -- based upon the  
24 revenue streams and the cash flows that will be  
25 generated in terms of what levels of debt that we



1 may achieve on Muskrat Falls versus the equity  
2 component. And the fact that it says 59-41 is  
3 certainly putting a different level of precision on  
4 it than something that's like a 70-30-type split.

5                   So that certainly explains the  
6 difference between the two. Gull Island's  
7 certainly been, you know, at much more of a  
8 planning level and as we evolve through our  
9 decision-gate process and we firm up inputs and get  
10 a better view as to what the revenue stream may  
11 look like, certainly, we'll be able to put a better  
12 level of precision on that as well.

13                   With respect to the \$72 per  
14 megawatt hour, that would comprise the sales price  
15 for the generation component only. So I believe I  
16 did hear you, Mr. Clarke, say something about the  
17 143, you know, as you were explaining that.

18                   So really that includes the 7582  
19 in 2010. Escalate that forward to 2017, so an  
20 amount of somewhere around \$88 to \$90 dollars, as I  
21 had indicated in the previous response. So let's  
22 say \$90. And then that gets averaged out with --  
23 there is a piece left over, that's for export. The  
24 export prices are based upon our current market  
25 views -- based upon the -- our projections, and

1 they are lower then -- based upon those views, then  
2 what we see ourselves selling to the island. So  
3 the 72 is an average of those two components.

4 MR. G. BENNETT: And maybe the  
5 other dimension on that is that the market volume  
6 doesn't include -- actually it includes the 20  
7 percent that's allocated for Nova Scotia is backed  
8 out of the numbers.

9 So if we look at the total  
10 production from Muskrat to be in the order of 4.9  
11 terawatt hours, we're showing 3.7 going into the  
12 market so we've backed out that piece.

13 CHAIRPERSON CLARKE: Okay, that's  
14 a good clarification for me to understand.

15 So that amount there is just the  
16 demand on the island plus the export and not the  
17 Nova Scotia 20 -- okay, then.

18 MR. G. BENNETT: That's right.

19 CHAIRPERSON CLARKE: Okay.

20 And on the -- just back to the --  
21 this is my last question, Madam Chair.

22 On the debt to equity, that  
23 component -- so the shareholder is putting in like  
24 a billion dollars, but that's only for the  
25 generation component, right?

1 I mean to say you're silent with  
2 respect to the transmission in terms of the numbers  
3 that are there?

4 MR. G. BENNETT: Right, in terms  
5 of this analysis, we're silent on transmission.  
6 We're looking at the cash flow to the generation  
7 project.

8 From a financing perspective, the  
9 message from our shareholder -- from the province  
10 -- is that they're able to put a reasonable amount  
11 of equity into the transmission line and it's  
12 within their capacity, and I think that that would  
13 be treated as a regulated asset, not unlike what we  
14 do for Hydro today.

15 CHAIRPERSON CLARKE: Okay, so then  
16 when Mr. Hull says that 7.2 cents or the \$72 for --  
17 the 7.2, that's the -- based on what you're getting  
18 from the province for 40 percent, what you're  
19 getting in the export market, that's an integrated  
20 -- that's a weighted average rate, whatever it is,  
21 but it assumes that you've already taken from what  
22 you're getting in the marketplace sufficient to pay  
23 for your transmission and your transmission line  
24 and all that type of thing. All of that's backed  
25 out.

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1 MR. G. BENNETT: That would be all  
2 backed out; that's right.

3 CHAIRPERSON CLARKE: Thank you.

4 CHAIRPERSON GRIFFITHS: Well, I'd  
5 now like to get an idea of who present here would  
6 be interested in either asking questions or giving  
7 some views.

8 I see Mr. Raphals, Ms. Benefiel  
9 and Ms. Baikie and Mr. Davis.

10 Mr. Raphals -- oh, I'm sorry,  
11 Karen. So we'll take them in -- so there are five  
12 people. We'll take them in that order.

13 Mr. Raphals?

14 --- QUESTIONS BY THE PUBLIC:

15 MR. RAPHALS: Good morning. How  
16 do you do?

17 I have a number of questions, but  
18 I think it probably makes most sense to start with  
19 these data questions that we've been talking about  
20 here to try to get some more clarity here. It does  
21 now start to make sense. I appreciate very much  
22 the numbers that were provided this morning and --  
23 it's not clear where to start.

24 If we could look at the tables  
25 that were provided this morning which are the -- I

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1 don't -- what is this -- supplemental information,  
2 cash-flow-data. Is that something we can see on  
3 the screen?

4 (SHORT PAUSE)

5 MR. RAPHALS: Maybe while we're  
6 waiting, Mr. Bennett, I think I noted in your  
7 document that there's no Figure 3 or Figure 4. Is  
8 that just a typo or is there a revision or are  
9 there pages missing?

10 MR. G. BENNETT: Yeah, it looks  
11 like there was a typo there. I'm going to have to  
12 call Mr. Gates on that one.

13 So Peter, it's the second one down  
14 there; so 1251 is the supplemental information.

15 MR. RAPHALS: Okay, and if we  
16 could go to the page that refers to Figure 8 --  
17 cash-flow-detail for Figure 8, which is apparently  
18 the fourth page or fifth page of the document I  
19 think.

20 Now, it's my understanding that  
21 this is the detail of the graph that was presented  
22 in your response as Figure 8, which is Muskrat  
23 Falls base case. Is that correct?

24 MR. G. BENNETT: Yes, that's  
25 right.

1                   MR. RAPHALS: The average  
2 portfolio price per megawatt hour here, I believe,  
3 is the same as the one that was in Figure 2 that we  
4 were just looking at which -- is that right?

5                   MR. G. BENNETT: Yes, I would  
6 agree.

7                   MR. RAPHALS: Yeah, which I  
8 understand from the response you just made is  
9 actually a blend of the price to the island  
10 consumers and the portion of the energy that you  
11 expect to sell at export based on your expected  
12 export sales price?

13                  MR. G. BENNETT: Our sales  
14 portfolio for Muskrat, yes.

15                  MR. RAPHALS: Right.

16                  On page 36 of your response  
17 letter, in response to one of my questions, you  
18 indicated that the price per megawatt figures  
19 provided in U-27 represent the price at which power  
20 would be sold from Nalcor to Hydro and those  
21 figures are higher.

22                  So as I understand, that's one of  
23 the two components of this price series. There's  
24 the price at which power will be sold for  
25 consumption in Newfoundland are the prices that are

1 shown in UL-27 and this is a blended price  
2 including that and the export component. Is that  
3 right?

4 MR. HULL: Yeah, I would agree.

5 MR. RAPHALS: Now, back to this  
6 table, the debt service line shows a constant  
7 amount that starts in 2017 and continues to 2046 at  
8 an amount of \$167.9 million per year.

9 My understanding is that you've  
10 essentially modeled your financing as a simple  
11 mortgage with a flat payment from beginning to end,  
12 even though I think as you mentioned the last time  
13 we were here that in reality things can be more  
14 complicated.

15 But am I understanding correctly  
16 what you've done here?

17 MR. HULL: Yeah, that's correct.  
18 It has been modeled as a mortgage-style debt.

19 Mr. RAPHALS: Right.

20 Now, I've tried to figure out what  
21 are the parameters of that mortgage, it's a 30-year  
22 mortgage. I'm assuming the rate is the 7.3 percent  
23 that you indicated as an interest rate.

24 I'm trying to deduce what the  
25 principal is. If that's -- that would, according

1 to my version of Excel that results in a principal  
2 of \$2.023 billion of debt. Is that right?

3 MR. HULL: I don't have the  
4 components between principal and interest here.

5 MR. RAPHALS: No, no, I'm just  
6 talking about the capital, the initial amount.

7 MR. G. BENNETT: The capital was  
8 reported back in JRP 165, 166, we presented both of  
9 those numbers.

10 I guess the question I'm sort of  
11 interested in is where -- are we trying to analyze  
12 this forecast, like where are we going from a  
13 planning perspective I guess is the general  
14 question?

15 MR. RAPHALS: Well, I as an expert  
16 hybrid intervenor am simply trying to make the  
17 model that I've built, which I've been working with  
18 for months now, finally I have the tools to bring  
19 it in line with yours so then it would be possible  
20 to talk about it and draw certain conclusions which  
21 is a little late process to be doing all this, I  
22 agree, but I don't really have any choice.

23 So if that number was -- I didn't  
24 go back and look last night at JRP 165, but if you  
25 could -- can you tell me what the principal amount



1 is on this debt?

2 MR. G. BENNETT: It's actually on  
3 page 5 of the letter, \$2.5 billion in 2010, for  
4 Muskrat Falls.

5 MR. RAPHALS: Sorry, could you  
6 repeat that, please?

7 MR. G. BENNETT: Yeah, it's on  
8 page 5 of the letter, 2.5 billion is the capital  
9 cost for Muskrat Falls.

10 MR. RAPHALS: But is the full  
11 capital cost treated as debt?

12 MR. HULL: No, it's not, it's  
13 5941.

14 MR. RAPHALS: Exactly. So 59  
15 percent of that, of -- that's what I assumed you  
16 were doing too, so I took 2.5 billion as the  
17 capital cost and 59 percent of that as the debt  
18 amount and that results in a debt amount of 1475.  
19 But 1475 over 30 years is 17.3 percent; it does not  
20 give you 167 million or even close.

21 MR. HULL: The 2.5 billion is 2010  
22 dollars. So as we construct, through the  
23 construction period there will be inflation and  
24 changes in the general marketplace, so we've  
25 incorporated, obviously, escalation.

1 MR. RAPHALS: So there'd be --

2 MR. HULL: Excuse me.

3 MR. RAPHALS: Yes, sorry.

4 MR. HULL: Another key element  
5 obviously of a long build, significant like Muskrat  
6 Falls and I'm sure you'd be aware, would be  
7 interest during construction.

8 So there obviously -- there are no  
9 cash flows during the construction period to  
10 finance the debt. So as the debt is being  
11 incurred, you know, interest is being accrued to  
12 that and adding to that.

13 So the ultimate debt figure --  
14 although I have to admit, I don't have that number  
15 here in front of me this morning, I can certainly  
16 get it but I do not have it in front of me this  
17 morning -- will be the number that would certainly  
18 be higher than the number that Mr. Raphals is  
19 quoting to you.

20 MR. RAPHALS: In my understanding,  
21 you typically use an overnight construction amount  
22 as the capital figure as if you had built the  
23 project overnight in 2017.

24 So yeah, that's the figure that  
25 we're missing here but it's -- I mean since you

1 show in this table -- you show the equity amounts,  
2 of course that's not construction amounts, it would  
3 be really helpful to have that amount, simply to  
4 make the numbers work.

5 Now, I mean I can -- I've back-  
6 calculated and it comes to 3.4 billion as the  
7 amount that the debt would have to be in order to  
8 produce that annual payment.

9 I'm not -- I can check, but I  
10 think that's more than what you get inflating 2.5  
11 billion over seven years.

12 MR. HULL: I guess the only  
13 response I can make to this question without  
14 obviously having the benefit of seeing Mr. Raphals'  
15 analysis and not having I guess our own figures in  
16 front of me, is that these have been tested, these  
17 numbers, have been in use for a considerable time  
18 and have been tested by our external financial  
19 advisors, right, rating agency presentations and so  
20 forth. I have a high degree of confidence based  
21 upon the models that we're using that the numbers  
22 that are being portrayed in these data tables are  
23 indeed correct.

24 MR. RAPHALS: Well, the number  
25 that's simply missing is the amount of capital on

1   that loan and it shouldn't be that hard to figure  
2   out. I mean I have until 4 o'clock to respond so I  
3   appreciate it if it's possible to verify that  
4   rapidly. It really isn't a very complicated  
5   question.

6                   And frankly, the question was  
7   asked in my earlier letter when I asked for  
8   detailed calculations to derive the unit costs with  
9   all data and assumptions necessary to reproduce the  
10   calculations is a fundamental element of that and I  
11   was referred to your answer on page 4.

12                   CHAIRPERSON GRIFFITHS: Mr.  
13   Bennett, is this number that Mr. Raphals is  
14   requesting, is it something you're unwilling to  
15   provide or something you haven't got right now or  
16   what's involved in this?

17                   MR. G. BENNETT: I guess it -- I  
18   mean it becomes an important question maybe in  
19   terms of where Mr. Raphals is going with this  
20   analysis.

21                   I mean I don't think that it's --  
22   you know -- I don't think we are looking for an  
23   audit of our financial advice.

24                   And I guess when we look at the  
25   process that we're in, that being a planning

1 process and demonstrating that we have a feasible  
2 project and we have to look at where this question  
3 is taking us. I can appreciate that he may wish to  
4 reproduce our internal financial analysis but we  
5 get to the point where those become important  
6 considerations from us from a competitive  
7 positioning, those are important internal planning  
8 activities that we're undertaking and I'm not sure  
9 how helpful that information is to the panel.

10 I think the panel had given  
11 guidance on this back when we talked about JRP 5-  
12 25S, that we were interested in order of magnitude  
13 estimates, financial analyses, risk assessments,  
14 and sensitivities that are relevant at feasibility  
15 analysis of a project.

16 And what I'm hearing here is going  
17 far beyond that and is an invitation to reproduce  
18 our financial model.

19 CHAIRPERSON GRIFFITHS: I think,  
20 Mr. Raphals, I'd like to ask you to make the case  
21 to us for what kind of input and presentation you  
22 wish to make to us that will be helpful to us, all  
23 emphasis on the task that we have.

24 I realize we're right down the  
25 wire and that's frustrating for you, frustrating

1 for everyone else as well, but obviously we'd like  
2 to make the best use of the time we have and the  
3 best use of your expertise and the fact that you  
4 came back. We appreciate that, that you're here in  
5 person.

6 So can you talk to us for a  
7 moment, rather than to Nalcor and tell us what it  
8 is that you would like to share with us that you  
9 think will be helpful to us and then maybe from  
10 that we can proceed.

11 MR. RAPHALS: Okay, but first just  
12 let me say that given all the financial information  
13 that's been presented, we're talking about crumbs  
14 here, we're talking about last details that simply  
15 will allow me to speak more intelligently.

16 It's always easier to be able to  
17 refer to precise calculation and know that it's the  
18 same one they used, than having to invent and  
19 explain the differences and the questions, it's not  
20 sure.

21 So that's really all I'm looking  
22 for here, is clarity. And we already have a great  
23 deal of clarity. I think there are really just a  
24 couple of small elements that are missing to that.

25 CHAIRPERSON GRIFFITHS:

1     Nonetheless, maybe you can give me -- sorry, give  
2     us a sense of where you are going with this. It  
3     would be very helpful.

4                     MR. RAPHALS: Yes, I'd be happy  
5     to.

6                     CHAIRPERSON GRIFFITHS: And then  
7     we'll see whether we go and ask for one more crumb  
8     from Nalcor.

9                     MR. RAPHALS: Yes, I'd be happy  
10    to.

11                    We were told in the response that  
12    the regulatory treatment of this project will  
13    essentially be the same as if it were a regulated  
14    entity, which means that cost to consumers have to  
15    be based on actual costs incurred by the utility.

16                    And I'm very sceptical of the way  
17    that this analysis has been prepared, in that we've  
18    essentially taken a real price which -- I'll get to  
19    the details on that too later -- but which seems to  
20    be 7.7 cents a kilowatt hour as a real cost which  
21    escalates over time.

22                    And I have no problem with that as  
23    a planning tool, it's an essential planning tool,  
24    utilities everywhere use that kind of cost to  
25    evaluate, to compare one thing with another, but

1 it's very different from a ratemaking cost.

2                               And so to take that cost of 7.7  
3 cents in 2010 dollars and then escalate it with  
4 inflation to where it becomes -- where it becomes  
5 \$200 a megawatt hour in 2060 -- 2050-2060 -- and to  
6 say that that's the amount that island ratepayers  
7 are actually going to pay for this energy coming  
8 out of Muskrat Falls project at a time when the  
9 mortgage is all paid off and the real cost of  
10 maintaining this project becomes like that of Upper  
11 Churchill.

12                            I mean, if it really is going to  
13 be treated like a regulated project and if the  
14 regulator is going to apply standard cost of  
15 service principles in determining what rates to  
16 charge, I really don't see how the regulator is  
17 going to allow these phenomenal profits to be  
18 handed to the province for a built and paid off  
19 hydro facility.

20                           In the same way -- I mean, it's a  
21 long complicated subject here, but under  
22 traditional ratemaking the reason why the regions  
23 of the continent that have large old hydro  
24 facilities have low rates is precisely because the  
25 costs -- the accounting costs which are used for



1 regulatory purposes of those facilities has become  
2 very low.

3                               So you have Tennessee Valley, you  
4 have the pacific northwest, you have British  
5 Columbia, you have Manitoba who all have very low  
6 electric rates because under traditional ratemaking  
7 you can't charge more for the power than what it  
8 cost you that year.

9                               Now, bit for instance here, Hydro  
10 Quebec's rates are low for that reason too but  
11 Hydro Quebec has made a very strategic move, very  
12 controversial move 10 years ago now which has the  
13 effect of trying to extract profit from those old  
14 hydro facilities, which by the way includes Upper  
15 Churchill. And so rates in Quebec have gone up  
16 quite substantially over the last 10 years thanks  
17 to this new structure that's been designed.

18                              But, you know, that's not what  
19 Newfoundland and Labrador's regulatory structure is  
20 -- its cost of service ratemaking -- and I really  
21 don't see how these prices really lead to costs,  
22 really lead to rates in a regulated process.

23                              And so I'd like to tell you  
24 something concrete about that but to tell you  
25 something concrete about that I need numbers that

1 actually make sense.

2                               And I mean, really, we've come a  
3 long way, it's taken a long time to come this long  
4 way, but with this, that I've had to play with  
5 since this morning, I start to see -- for instance,  
6 now I know where the IRR comes from; it's very  
7 simple, you take the net cash flow to equity series  
8 here and you apply the IRR function to it and  
9 that's the number you get.

10                              So I understand where their IRR  
11 figure comes from. I understand where a lot of  
12 these figures come from and there's just a few  
13 little things that don't quite make sense.

14                              So it's either because I don't get  
15 it or it's because there's an error or it's because  
16 there's another explanation that we need.

17                              But frankly, I find it extremely  
18 frustrating to be talking about this on the last  
19 day of the hearing instead of the first day.

20                              I would like to have something  
21 intelligent to say to you and not to be wasting you  
22 time with all these little data requests.

23                              CHAIRPERSON GRIFFITHS: Okay,  
24 thank you.

25                              Just a moment, please, Mr.

1 Raphals.

2                               Given that explanation, I mean  
3 that's very helpful, Mr. Raphals, for us to have  
4 the scope under the concept which you're working on  
5 and what you would like to present to us.

6                               I'd just like to come back to  
7 Nalcor. I realize everybody is feeling this sort  
8 of stress of the last day, but are you prepared and  
9 able to -- based on that, to give that -- is it one  
10 piece of information we're now ---

11                              MR. RAPHALS: I think there are a  
12 couple of other small, very specific and really not  
13 complicated questions that will flow of this  
14 nature.

15                              MR. G. BENNETT: My sense is that  
16 we've drifted way off topic.

17                              Now we're not talking about  
18 justification of the project, now we're talking  
19 provincial energy policy, rate setting approaches,  
20 you know, the approach the province may use with  
21 respect to energy policy.

22                              We know that this project is not  
23 regulated but we are looking at it as a power  
24 purchase agreement and we're following generally  
25 accepted principles.

1                   And Mr. Raphals has already  
2   indicated what some jurisdictions, like Quebec, do  
3   in this matter.

4                   So this is a -- these are policy  
5   questions that are interesting but not terribly  
6   relevant, in my perspective.

7                   The other point of course that's  
8   worth making here is that when we compare the cost  
9   of this alternative against that of Holyrood our  
10   ratepayers are far ahead of where they would be  
11   with the other alternative.

12                  But these are interesting topics  
13   but, you know, don't help support justification of  
14   the project.

15                  MR. RAPHALS:   May I ---

16                  CHAIRPERSON GRIFFITHS:   Just one  
17   second.

18                  I mean, could we look at it,  
19   though, in terms of relevance to the issue of  
20   benefits and the benefits to the provincial  
21   revenues.   I mean, that ---

22                  MR. G. BENNETT:   Right and it  
23   certainly becomes an interesting question here  
24   because the sequence that we've laid out is what we  
25   have discussed with the province, so the province

1 would be expecting to see those benefits.

2 If you looked at it another way  
3 you may say, well, you know, those benefits are  
4 going to be in the hands of ratepayers and I think  
5 that's a hot topic right now with the province and  
6 I think it's been discussed in the legislature.

7 Those are important policy  
8 questions and I think as Premier Dunderdale has  
9 said, for, you know, the government of the day,  
10 when those benefits are to actually be distributed,  
11 and that too becomes a policy question as to  
12 whether the benefit should be directed towards  
13 electricity customers or whether it should be  
14 directed towards taxpayers and other social  
15 programs to the people of the province. And I  
16 think she said fairly clearly that that's a  
17 question that would be undertaken at the  
18 appropriate time by that particular government.

19 CHAIRPERSON GRIFFITHS: I think  
20 the most appropriate thing right now is for the  
21 panel to take just a very short break so we can  
22 just confer about this.

23 So I think we'll take a -- I'm  
24 sorry, Mr. Raphals -- patience.

25 MR. RAPHALS: I just -- let me

1 just follow-up as part of your reflections.

2 CHAIRPERSON GRIFFITHS: Yes, in a  
3 second and then -- then I think that's what we will  
4 take, about a five minute break or whatever then  
5 we'll come back, so don't anyone go away please but  
6 I think it would be good for us to have a short  
7 conversation.

8 So you wanted to finish something?

9 MR. RAPHALS: Just to respond to  
10 what Mr. Bennett just said.

11 First of all, in terms of  
12 relevance, simply understanding the coherence of  
13 information that has already been presented to the  
14 panel seems to me is by definition relevant and  
15 that's all that we're really talking about here.

16 Secondly, on page 37 of the  
17 response, in response to the question: "Please  
18 explain how the cost of island customers will be  
19 different if the Muskrat Falls project were  
20 included in the rate base and at least for  
21 regulatory purposes", the Proponent responded  
22 "There would be no material difference for island  
23 ratepayers. If the Muskrat Falls asset was  
24 developed directly within NLH it was precisely at  
25 the regulated cost of capital."

1                   I think we just heard something  
2 different. I've been going on the assumption that  
3 this is correct and that it will be treated as if  
4 it were a regulated entity. Now if we say that it  
5 could be treated as a power purchase agreement of  
6 course that's a totally different animal.

7                   But finally, it seems to me that  
8 rate impacts are a fundamental element of the  
9 justification of this project and so it's been  
10 discussed into great length and all of this is  
11 about trying to really understand what those are,  
12 both in the short term and the long-term.

13                   So it seems to me I have to  
14 disagree with Mr. Bennett, I think it is entirely  
15 relevant to the question of justification.

16                   CHAIRPERSON GRIFFITHS: Mr.  
17 Raphals, can you just tell me like in one, two,  
18 three points, what is the information that you  
19 would like to have?

20                   MR. RAPHALS: Yes, the -- what  
21 we'll call the overnight construction amount, which  
22 is to say the construction expenses brought forward  
23 with interest to the date of commissioning; the  
24 portion of that which is to be financed as a debt  
25 instrument, and the discount rates and any other

1 details necessary to understand the LUEC  
2 calculations which were presented on page 4 of the  
3 letter.

4 CHAIRPERSON GRIFFITHS: The what  
5 calculations?

6 MR. RAPHALS: LUEC, on page 4.

7 CHAIRPERSON GRIFFITHS: Page 4 of  
8 the ---

9 MR. RAPHALS: Page 4 of the  
10 response.

11 CHAIRPERSON GRIFFITHS: Of the  
12 response, those are the ---

13 MR. RAPHALS: The 7.7 and 14.3  
14 which are the levelized unit energy costs, LUEC and  
15 there's a very cursory explanation provided, which  
16 is fine because it is a well known concept but  
17 again, I would like to ask them the discount rates  
18 that they used.

19 CHAIRPERSON GRIFFITHS: Okay,  
20 thank you.

21 So we're going to very briefly  
22 retreat, five minutes, hopefully, and we'll be back  
23 and then we'll carry on.

24 Thank you.

25 --- Upon recessing at 11:50 a.m.



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1 --- Upon resuming at 11:59 a.m.

2 CHAIRPERSON GRIFFITHS: Thank you  
3 for your patience in waiting.

4 Mr. Raphals, I'm just going to ask  
5 you. Come forward and sit at the table, would you,  
6 with all your stuff? I hate to see you juggling  
7 your laptop and ---

8 Obviously the panel has just  
9 discussed this and I first of all want to say, and  
10 as we said before, the panel is really interested  
11 in hearing from you, Mr. Raphals, and hearing -- I  
12 said that before. You know my message, okay. You  
13 got my message so we we're looking forward to that  
14 happening soon that you'll be able to do that.

15 We are also very appreciative of  
16 the fact that, Nalcor, you have provided responds  
17 to questions and provided a lot of information,  
18 some of which I suspect you didn't really feel was  
19 necessary for us, but thank you anyway, we  
20 appreciate that.

21 And so we understand some of the  
22 concern there. What it seems to us is that in  
23 terms of a couple of the pieces of information Mr.  
24 Raphals is asking for, they're probably fairly  
25 minor in terms of you being able to provide them

1 and the LUECD issue on page 4, if you can make a  
2 brief response on that and if you could provide the  
3 information on the discount rate; if you could just  
4 do that and that enables Mr. Raphals to move ahead  
5 and start to talk to us, which is what we're hoping  
6 for. That would be much appreciated.

7 In terms of the capital cost in  
8 2017, if that's something that you feel  
9 uncomfortable in sharing, is too sensitive, okay so  
10 be it, and Mr. Raphals you go on with your  
11 assumption and you know, if it's a way off-base,  
12 we'll expect Nalcor to tell us that.

13 So I hope that's a compromise that  
14 works for both parties, but as I say, we're eager  
15 to hear your points to us and I think the panel is  
16 vis-à-vis your concern, Mr. Bennett, that this has  
17 all gone beyond areas of interest, I think the  
18 panel, one of the panel's fundamental interests is  
19 to see just the division of cost and benefits with  
20 respect to ratepayers and taxpayers.

21 It does seem to us to be a  
22 relevant thing for us to look at. I hand it over  
23 to you, Mr. Bennett.

24 MR. G. BENNETT: Thank you, Madam  
25 Co-Chair.

1                               Yes, I agree. I think we were  
2   talking about that. It's entirely appropriate for  
3   the panel to provide comments, if it sees fit, to  
4   the Province in terms of how that distribution  
5   might happen. I guess from our perspective, we're  
6   not in a position to put something forward one way  
7   or the other. We're the tail on this one.

8                               Insofar as the financial  
9   information goes, we have a problem. We are at the  
10  limit of the information that we can disclose. In  
11  some areas we would have situations where we've had  
12  advice maybe not to go as far as we have.

13                              So the questions about interest  
14  rates, short-term interest rates, discount rates,  
15  those factors, we are planning to go to the market  
16  and providing guidance or numbers in that area are  
17  a real problem for us.

18                              What I would suggest here is that  
19  Mr. Raphals use his expertise, use his knowledge,  
20  use his assumptions that he thinks are reasonable  
21  and then he can present his case as he sees fit but  
22  it shouldn't be construed as an audit of our  
23  process, but rather his opinion on what he thinks  
24  these numbers mean.

25                              CHAIRPERSON GRIFFITHS: Okay,

1     thank you, Mr. Bennett.

2                     Mr. Raphals, I realize you're  
3     somewhat frustrated by this but can you make the  
4     best of the situation and present your ideas and  
5     views and concerns to us and we'll be well aware  
6     that you didn't have all of the information that  
7     you would like to have had.

8                     MR. RAPHALS: The problem really  
9     is that the numbers of 7.7 and 14.3 are numbers  
10    that have been presented and we're asked to rely  
11    on, and that's fine. It's certainly not my  
12    position to come and say they're wrong, it's not  
13    7.7, it's 7.2 or it's 9.3, you know. I have to  
14    understand the information that -- you know, it's  
15    their data, it's their project, it's their numbers.  
16    I have to understand what that is in order to be  
17    able to reason from that.

18                    So for me to come and say -- now  
19    what I can do I suppose, is say, "Well, given the  
20    numbers that have been presented, the only way that  
21    7.7 makes sense is if you do this. So I'm going to  
22    have to assume that's what they did." It seems to  
23    me it's a very -- you know, once you say what your  
24    -- once you say that your levelized unit energy  
25    cost is 7.7 cents and you say that the methodology

1 that you're using is the standard methodology  
2 dividing present value of cost divided by present  
3 value of output, there's only one question left  
4 which is exactly when you say present value is that  
5 with a real discount rate; is it with a nominal  
6 discount rate? Which discount rate did you use?

7 Now, this really isn't an affair  
8 of state and it's information that is normally  
9 presented; it's just the information that goes with  
10 that number. If really our friends at Nalcor think  
11 it's just too sensitive and it's just  
12 inappropriate, then, yes, I can make up the numbers  
13 that I think make that fit but frankly I just don't  
14 see it. I can't understand what the problem is.

15 You know, in terms of what number  
16 you used to generate an annual interest payment of  
17 167.9 million, I can't understand in what way that  
18 is problematic, but it's up to you.

19 CHAIRPERSON GRIFFITHS: Mr.  
20 Bennett, are there any of the four items that Mr.  
21 Raphals listed before we went out on the break that  
22 you're willing to provide?

23 MR. G. BENNETT: Just so we're  
24 clear, can we just run through those four items  
25 again?

1                   CHAIRPERSON GRIFFITHS: Overnight  
2 construction amount; these are just the words I've  
3 written down. Yes, there were more words but I  
4 didn't write them down. Proportion finance by debt  
5 instrument.

6                   MR. RAPHALS: The proportion we  
7 know is 59 percent, but the amount is finance.

8                   MR. G. BENNETT: Well, that comes  
9 from the application of the overnight discount  
10 rate, which is a problem. The short-term interest  
11 rates are a big problem for us.

12                  CHAIRPERSON GRIFFITHS: The  
13 discount rate is a big problem for you?

14                  MR. G. BENNETT: Yeah.

15                  MR. RAPHALS: The discount rate  
16 for construction costs.

17                  MR. G. BENNETT: Yes.

18                  MR. RAPHALS: I see.

19                  CHAIRPERSON GRIFFITHS: And the  
20 fourth thing I had down here was the LUECD on page  
21 4.

22                  MR. HULL: Can I maybe take a  
23 moment just to explain why we view that as being  
24 problematic because it might certainly help?

25                  As I indicated earlier, we're in

1 the stages now where we're going to market sounding  
2 in short order with Muskrat Falls for financing  
3 purposes and then the process we will put together  
4 a lead arranger, then based upon terms and  
5 conditions, we will go off and will sell that debt  
6 into the market, put together a syndicate and so  
7 forth to ultimately see us raising the financing to  
8 a financial close.

9 I think it would be a very safe  
10 assumption for me to make that our financial  
11 advisers have given us advice that some of the  
12 information that we provided in this response is  
13 probably prejudicing that discussion that we're  
14 going to have, and I'll tell you why.

15 In particular I guess, the  
16 interest rate because from our perspective, we're  
17 going to be going out and looking for the most  
18 favourable terms and conditions that we can receive  
19 on behalf of the ratepayers and behalf of the  
20 shareholders on the debt that we're going to be  
21 raising in the marketplace.

22 Maybe I can liken the example is  
23 that if I was looking for a car loan tomorrow and I  
24 walked down to a bank and I walked in and I said,  
25 "I would like to have a car loan from you and I

1 would like to have that car loan at a rate of 8  
2 percent," what kind of interest rate do you think  
3 I'm going to receive back from that bank; it's  
4 going to be 8 percent.

5                               We've disclosed a number here of  
6 7.3 percent. We believe that's within a range but  
7 the concern is that you know, bidders are going to  
8 be coming and looking at our debt, right, are going  
9 to be shopping after that 7.3 percent. What we  
10 would like to be able to do, obviously, if I was  
11 going in and looking for a car loan, is I would  
12 show them my credit record. I would show them my  
13 net worth. I would show them characteristics  
14 similar to in this project, characteristics of our  
15 revenue stream, characteristics of the markets  
16 we're selling into and obtain the most competitive  
17 and best-terms conditions that we could receive.

18                               So to give any more information  
19 around discount rates, you know, what we may see in  
20 terms of costs during the construction period from  
21 an interests perspective and so forth, I truly  
22 believe is going beyond where we should be going  
23 from a competitive position given that we are on  
24 the heels of going out and doing financial raising  
25 for the Muskrat Falls facility.



1                   CHAIRPERSON GRIFFITHS: Thank you,  
2 Mr. Hull.

3                   MR. RAPHALS: I certainly have no  
4 interest in asking you to divulge anything that  
5 would create problems on that level. That's really  
6 not what this is about. It's simply trying to -- I  
7 mean, it's clear to me what flows from what you've  
8 presented, if the construction costs -- if the  
9 mortgage payment is 167 and it's at -- I mean,  
10 obviously 7.3 percent is a number that you picked  
11 when you wrote this and I'm sure that it's not  
12 going to bind you with the bank.

13                   But please can I go on?

14                   You know, I can back-calculate all  
15 of that and determine that then the construction  
16 costs -- anyway, I understand what you're saying.  
17 I will work with whatever numbers you're giving me.  
18 It's fine. I think we're wasting way too much time  
19 on this because there's much more important things  
20 to talk about, and there's other people too.

21                   CHAIRPERSON GRIFFITHS: So what do  
22 you now propose to do, Mr. Raphals? Have you got  
23 something ---

24                   MR. RAPHALS: I have a couple ---

25                   CHAIRPERSON GRIFFITHS: Some

1 points or something that you would like to share  
2 with us, because we're eager to hear them.

3 MR. RAPHALS: No, I'll do that in  
4 writing later today and tomorrow morning.

5 CHAIRPERSON GRIFFITHS: You're  
6 going to do it in writing?

7 MR. RAPHALS: I do have a couple  
8 more questions on other subjects, if I may, but I  
9 know there's other people too.

10 CHAIRPERSON GRIFFITHS: Questions  
11 to Nalcor is this?

12 MR. RAPHALS: Yes.

13 CHAIRPERSON GRIFFITHS: Sure, a  
14 couple more questions. And then we can expect to  
15 receive your input by four o'clock this afternoon?

16 MR. RAPHALS: That's right.

17 CHAIRPERSON GRIFFITHS: Okay,  
18 thank you.

19 MR. RAPHALS: Thank you.

20 Okay, quickly, with respect to  
21 integrated resource planning, the panel asked you  
22 -- I can't find it -- I believe the panel asked you  
23 to summarize what's going on with integrated  
24 resource planning and your response was that the  
25 PUB declined to ask you to carry out integrated

1 resource planning in anticipation of the energy  
2 plan in 2007. I haven't seen anything more recent  
3 than that.

4 Is there anything actually  
5 underway with respect to implementing an integrated  
6 resource planning process either for NP or for NLH?

7 MR. G. BENNETT: Our Public  
8 Utilities Board has not implemented a process  
9 further to the decision that we quoted in our  
10 response.

11 MR. RAPHALS: Okay.

12 MR. G. BENNETT: That's within  
13 their domain. They'll call it. I mean, they're  
14 following their least-cost approach to regulatory  
15 oversight.

16 And maybe I'll turn to Mr.  
17 Henderson to see if he has anything he can add to  
18 that.

19 MR. HENDERSON: No, I don't have  
20 anything to add. This is the last word that we've  
21 had from the Public Utilities Board.

22 MR. RAPHALS: Right, but from the  
23 utilities themselves, to your knowledge, are they  
24 busy trying to present, trying to develop a  
25 planning process for the next rate filing or is it

1 simply dead in the water?

2 MR. HENDERSON: They haven't given  
3 any indication that they're working on something  
4 presently.

5 MR. RAPHALS: Okay. Thank you.  
6 That's what I suspected but I wanted to know that  
7 for sure.

8 Now, under scenario two the  
9 panel's question three, which I summarize, based on  
10 the Marbek study and the avoided costs -- maybe I  
11 should find it in the originals -- well, time is  
12 short. Based on the Marbek study and the avoided  
13 costs, based on Holyrood operating costs, could you  
14 specify the economic CDM potential 2014, 2019, 2024  
15 and 2029? To the best of my knowledge, you didn't  
16 provide any of that information, I gather, because  
17 you don't feel able to do that.

18 Is there anything that you can  
19 tell us about the implications of substantially  
20 higher avoided costs on the CDM potential?

21 MR. G. BENNETT: Just at the  
22 outset, I think it's important to point out that  
23 the Marbek study didn't consider that higher  
24 threshold, it established -- it considered the  
25 threshold that was established in the study.

1 I mean, it's difficult to provide  
2 a quantitative view to what the impact of raising  
3 that threshold would be, and the reason that it's  
4 difficult to predict is that what we're seeing  
5 right now is that because customers, within the  
6 island in particular, are in a transition as the  
7 CDM program is being introduced and people are  
8 getting experience and behavioural change is  
9 beginning to take hold.

10 What we're saying here is that  
11 it's difficult to make a prediction 10, 15 years  
12 hence, as to what that outcome might be based on  
13 the limited experience that we have with the  
14 program to date.

15 Rob, I'll turn to you to build on  
16 that if you have any more comments that are  
17 important here.

18 MR. HENDERSON: Just to add to  
19 what Gilbert said and specifically to the question  
20 of the economic potential, in order to do that  
21 would take quite a bit of work. The Marbek study  
22 was not done overnight or within two weeks, it was  
23 done over several months, probably close to a year,  
24 and that took a lot of analysis and that sort of  
25 thing.

1                               So in order to change the marginal  
2 costs that would be applied and look at all the  
3 technologies that would be available and that sort  
4 of thing, it's a considerable piece of work, and  
5 for that reason it's not practical to provide an  
6 answer in the short term.

7                               MR. RAPHALS: I agree with you,  
8 and I certainly couldn't provide an answer to that  
9 question either quantitatively, but I think --  
10 certainly I think it's safe to say qualitatively  
11 that if Marbek came back and redid the study with  
12 an avoided cost based on what you expect the  
13 avoided cost to be in a few years down the road,  
14 which is, what, 50 to 100 percent higher than the  
15 avoided cost they used, based on my experience,  
16 it's clear that the potentials would be very  
17 dramatically higher.

18                              And I've looked at a lot of these  
19 studies in my regulatory work in Quebec. The  
20 avoided cost is the ceiling about what kinds of  
21 measures can be used. When the avoided cost is  
22 significantly higher, it means that things are  
23 economic that before were just left off the study  
24 because they weren't economic.

25                              So it seems to me obvious that if

1 the study were redone it would lead to  
2 significantly higher potentials, and I wonder if  
3 you have an opinion about that.

4 MR. G. BENNETT: Go ahead, Rob.

5 MR. HENDERSON: It could or it  
6 could not.

7 MR. RAPHALS: Sorry?

8 MR. HENDERSON: It really depends  
9 on the technologies that are available and the cost  
10 of the technologies as to whether they become  
11 economic. There's many variables that go into it.

12 So to say ---

13 MR. RAPHALS: If there's nothing  
14 that has a cost between nine cents and 25 cents  
15 then obviously it won't change anything, but ---

16 MR. HENDERSON: That's part of it.  
17 The other thing is the assumptions and everything  
18 that were used in the previous analysis have to be  
19 tested again now. So there's a whole lot of  
20 variables that go in there. It would make it  
21 difficult to make an assumption that it would be  
22 way more.

23 MR. RAPHALS: Even a little more?

24 MR. HENDERSON: Well, it could be  
25 more.

1                   MR. G. BENNETT: You may find that  
2 there is a technology that's economically  
3 appropriate, it makes sense economically, but is a  
4 significant barrier -- there is another barrier to  
5 adoption; for example, the magnitude of the  
6 investment. The business case looked at in a  
7 number of years the payback may look nice but it  
8 may be a significant expense that people might not  
9 do it.

10                   So, you know, a conversion of a  
11 heating source, for example, might be one case in  
12 point where yeah, you look at the study, you say,  
13 oh, this is economic now, but the size of the  
14 investment for consumers or the effort that they  
15 have to undertake to gain that benefit may not be  
16 justifiable in their mind.

17                   MR. RAPHALS: Well, that's right.

18                   MR. G. BENNETT: So it's difficult  
19 to draw conclusions as to what the outcome of this  
20 change may be when there are other factors simply  
21 than the unit cost that come to bear.

22                   MR. RAPHALS: But ---

23                   MR. G. BENNETT: You know, putting  
24 words around is it significantly greater, is it  
25 much more, those are difficult conclusions to draw.



1                   MR. RAPHALS: The question was  
2 about the potential and the potential is indeed  
3 there. The question of whether you can realize it  
4 or not has to do with program design, and indeed  
5 there are lots of barriers.

6                   But, I mean, in Quebec and in many  
7 other regions there are very substantial subsidies  
8 for installing ground source heat pumps, for  
9 instance, which have a huge effect on electric  
10 heating costs.

11                  MR. G. BENNETT: I just want to  
12 circle back, though, because we talked about  
13 potential in that question, but the other one was  
14 -- there were two questions, the economic potential  
15 to reduce capacity and energy requirements. And we  
16 think about that in the context of the planning  
17 process it's more than simply the economic  
18 potential, it is actually the potential to actually  
19 result in a change in capacity or energy demand.  
20 And I guess what we're saying is we really don't  
21 have enough information, enough experience to  
22 properly answer that question.

23                  MR. RAPHALS: Yes, but that leads  
24 to the panel's next question, which you also didn't  
25 answer, which is assuming CDM and smart good

1 investment levels of 1.5, 3, and 5 percent of  
2 annual electric revenues, what portion of the CDM  
3 potential identified in number three could be  
4 expected to be realized by these different dates.

5 Effectively, how much you're  
6 willing to spend and how cleverly you go about  
7 spending it makes a huge difference on what part of  
8 the potential you actually can achieve.

9 MR. G. BENNETT: Yeah, I ---

10 MR. RAPHALS: Just a second, I'm  
11 not finished.

12 In you response on page 20 your  
13 Table 2 identifies the economic potential for each  
14 of these years, which I believe is from the Marbek  
15 study, the upper achievable and lower achievable,  
16 also from the Marbek study, and then you say  
17 achievable as a percentage of the economic  
18 potential. Well, the percentages that you indicate  
19 as achievable are indeed the percentages of the  
20 lower achievable amount.

21 So how big an effort you're going  
22 to make affects how much you're likely to achieve.  
23 And the panel's question, I think it's a very good  
24 question, is given that your CDM investment level  
25 right now is very low, under .3 quarters of a

1 percent of revenues I believe, and in the  
2 comparisons that you cited and that I'm going to  
3 cite, really dramatically low compared to the rest  
4 of Canada and the U.S.

5                   Given that they are so low, if  
6 they were to be increased to reasonable levels,  
7 again reasonable compared to similarly situated  
8 utilities, how much could we actually expect to  
9 achieve, and I think that is a reasonable question.

10                   MR. G. BENNETT: And it's a good  
11 question and we've provided an answer to that  
12 question and explained why it is difficult to  
13 answer that question today.

14                   We talked about the other  
15 behavioural factors that are relevant, first, and  
16 the second point on that, .75 percent of utility  
17 revenue was half what's expended from CDM in your  
18 home jurisdiction, in Hydro Quebec, so it's not an  
19 unreasonable number as we ramp into a longer term  
20 program.

21                   The other point that's relevant  
22 here is that, as you've agreed, the Marbek study  
23 didn't include this different economic threshold  
24 that you're pointing out. You've acknowledged as  
25 well that it would take considerable effort to get

1     there.

2                     So while the answer to the  
3     question, I would disagree, that we did answer the  
4     question to the best of our ability and we put  
5     context around the explanation.

6                     You might not agree with the  
7     answer to the question, I appreciate that, but the  
8     point is, there are a number of factors at play and  
9     the investment that goes into CDM is one that  
10    ultimately will be determined by Newfoundland and  
11    Labrador Hydro as Newfoundland Power's regulator  
12    and they will be -- they're in the position to  
13    monitor the outcome of that program.

14                    So for us to put a quantitative  
15    number on the record given those issues that are  
16    outstanding and those gaps that would have to be  
17    filled and the experience it would have to play out  
18    in order to manage that program over the longer  
19    term.

20                    It is very difficult to say yes,  
21    this is what we think, we'll come off -- you know  
22    capacity, energy requirements 15 or 20 years from  
23    now.

24                    MR. RAPHALS:   Mr. Bennett, I  
25    really agree with you that it is very hard to -- it

1 would be very hard to answer these questions  
2 quantitatively without the further studies that  
3 would be required but I don't think it's  
4 inappropriate to look for qualitative recognition  
5 that the achievements in conservation demand  
6 management so far in the province are really at a  
7 very, very low level compared to all of your  
8 neighbours and peers.

9                               And that -- because -- and this is  
10 a -- I think it goes to the heart of the  
11 justification question if -- if there were a change  
12 of provincial policy and policy from the -- I don't  
13 whose policy, but there was a dramatic decision on  
14 the part of shareholders and government to invest  
15 massively, to reduce demand, energy and capacity  
16 demand as much as possible. I think something very  
17 different -- the situation could be very different  
18 in five or 10 years.

19                               And I don't see any recognition of  
20 that fact or of even the awareness that there is a  
21 problem.

22                               CHAIRPERSON GRIFFITHS: Mr.  
23 Bennett, you make your brief response and then I'm  
24 going to say, Mr. Raphals, would you -- we'd love  
25 you to present to us.

1 MR. RAPHALS: Yes, I'm sorry.

2 CHAIRPERSON GRIFFITHS: Because I  
3 think now you're really getting into things that --  
4 you're telling us that we need to hear which is a  
5 message I'm trying to give you and the extended  
6 debate is interesting but -- and as you say, we do  
7 have some other people.

8 So I think Mr. Bennett, and then  
9 I'm going to ask you if you would like to -- I know  
10 you're going to give us a written presentation but  
11 before you go are there some key messages that you  
12 want to share with the panel.

13 Mr. Bennett?

14 MR. G. BENNETT: Thank you, Madam  
15 Co-Chair.

16 You know from our perspective, the  
17 CDM program that Newfoundland-Labrador Hydro and  
18 Newfoundland Power have implemented is under the  
19 authority of the Public Utilities Board which is  
20 both utilities' respective regulator. It is a  
21 relatively new program; they introduced it in 2008.

22 They are growing into that  
23 program, they are managing -- they're adaptively  
24 managing our customer base in terms of optimizing  
25 and increasing participation in those initiatives

1 and that's a process that will play out.

2 And I think the question for the  
3 panel is does that -- is there any level of  
4 certainty that that program could displace Holyrood  
5 and there's no practical way to conclude to draw  
6 that conclusion and as I said earlier this morning,  
7 CDM customer efficiency, increasing energy  
8 efficiency, reducing demand are all good things and  
9 they're all important and they're built into our  
10 forecast.

11 But they're built into our  
12 forecasts at a state -- to an extent that's  
13 representative of the experience that our customers  
14 are currently having.

15 Will that continue, will those  
16 efforts continue, will they be changed and modified  
17 to increase participation; yes of course they will  
18 and that will happen over the coming years.

19 But for us in this process, to say  
20 that CDM can displace the need for this project in  
21 terms of displacing Holyrood, we can't draw that  
22 conclusion. There's -- we talk about certainty,  
23 there is absolutely no certainty that that's going  
24 to happen.

25 CHAIRPERSON GRIFFITHS: Thank you.

1 Mr. Raphals?

2 MR. RAPHALS: I think I really  
3 need to step back and put my thoughts together and  
4 other people have questions to ask.

5 If there's time at the end of the  
6 day I'll come back and if not, tomorrow morning.

7 CHAIRPERSON GRIFFITHS: So you'll  
8 say you'll step back, you're putting in your  
9 written submission by 4:00.

10 MR. RAPHALS: Yes.

11 CHAIRPERSON GRIFFITHS: So, and  
12 then you'll be able to address it tomorrow in  
13 closing remarks; yes?

14 MR. RAPHALS: Yes, that's right.

15 CHAIRPERSON GRIFFITHS: All right,  
16 well thank you very much, we really appreciate your  
17 coming forward.

18 Ms. Benefiel?

19 MS. BENEFIEL: Yes, Mr. Gilbert or  
20 whomever would wish to answer this. Ed Hearn, the  
21 former director of Newfoundland and Labrador Hydro,  
22 expressed his extreme scepticism that Nalcor could  
23 construct the Muskrat dam without cost overruns.

24 Now, he makes a couple of --  
25 states a couple of examples, he says, for example



1 the oil sands project in Alberta, the water and  
2 sewer treatmt plant in St. John's, the Nalcor  
3 drilling program for oil and gas on the northern  
4 peninsula and we also have a note that Bob Marsden  
5 with the *Montreal Gazette* made a mention in an  
6 article a couple days ago that Hydro Quebec  
7 overruns, average 26 percent.

8 So according to Mr. Hearn these  
9 cost overruns are in the range of 50 percent,  
10 that's not unprecedented according to him.

11 So the question is; is Muskrat  
12 Falls affordable if such cost overruns occur and  
13 how do you respond to Mr. Hearn's concerns?

14 MR. G. BENNETT: I think the whole  
15 question of how we approach a project, it's  
16 important to step back and look at the processes  
17 that we do follow.

18 So one of the fundamental  
19 underlying principles with our approach to planning  
20 this project is what we call front-end loading and  
21 start right from the earliest stages of our  
22 planning for the project and make sure that we get  
23 as much information as we possibly can and that has  
24 been -- that has been, I guess, managed in our  
25 planning through our early efforts and field

1 investigations, our early geotechnical programs and  
2 understanding the project early on in the design  
3 phase so that we know what the situations are and  
4 we can understand those early in our planning so  
5 that we mitigate the potential for having a cost  
6 and schedule issue later on once the design becomes  
7 more committed.

8                               That approach is a proven  
9 technique for managing cost and schedule risk. In  
10 a broader context we look at our planning process,  
11 our decision gate process that I've talked about  
12 earlier in the proceeding as being another  
13 important tool where we make sure that we have all  
14 of the work done necessary before we move to more  
15 detailed activities.

16                              Our efforts in risk mitigation,  
17 our efforts in terms of our project planning, risk  
18 assessment, both strategic and tactical risk have  
19 been developed using mega-project best practices.  
20 We have international advice in both of those  
21 areas.

22                              We've completed independent  
23 project reviews at multiple stages through our  
24 planning process. We've got good recommendations  
25 from our advisors and we've incorporated those into

1 our planning.

2                   The conclusions that were drawn by  
3 our advisors was that consistently across the board  
4 we have used best practices for mega-project  
5 planning and our planning processes, the personnel  
6 that we have, the expertise that we have, the way  
7 that we're undertaking the work, the diligence  
8 that's being employed is consistent with best  
9 practices in project planning.

10                   And that's been confirmed by  
11 multiple advisors. We have a consultant who  
12 specializes in mega-project risk, the principal of  
13 that company is a former president of the American  
14 Association of Cost Engineers, he's given us great  
15 advice.

16                   We have other independent analysts  
17 and external advisors who have looked at the way  
18 we're approaching the project and we're pleased  
19 that -- they're concurring with the approaches that  
20 we're taking in this area.

21                   So, you know, projects have a  
22 certain level of uncertainty in them but from our  
23 perspective, you know, we think we're dealing with  
24 those risks in an appropriate manner.

25                   And I can't speak to other

1 projects that may or not may be using all of the  
2 best practices and sometimes that experience  
3 demonstrates itself in the form of a cost overrun.

4 But from our perspective we're --  
5 we think we're doing the right steps.

6 CHAIRPERSON GRIFFITHS: Okay,  
7 thank you, Mr. Bennett, thank you, Ms. Benefiel.

8 Ms. Goodfellow-Baikie?

9 MS. GOODFELLOW-BAIKIE: Yes, Robin  
10 Goodfellow-Baikie.

11 I did read the response as  
12 requested and I went against the rules, I looked at  
13 the energy plan again and the consultations and I  
14 noticed that there were alternative power  
15 suggestions made such as Ventus, the 1,000  
16 megawatts near Churchill Falls, the Avalon Wind  
17 Farm; 600 megawatts.

18 I don't know whether I would say  
19 the energy plan is anachronistic and I wondered if  
20 Nalcor has a fear of private entities putting up  
21 wind farms. I wish to point out, however, that  
22 Hydro-Québec, as they're on their last big river  
23 damming, La Romaine, they now have calls out for  
24 4,000 megawatts on a wind farm -- in wind farm, 22  
25 projects. Additionally, the wind farms are better

1 in the north.

2 Back to those figures, my  
3 understanding is that Holyrood needed only 360  
4 megawatts. I know the 3,000 megawatt amount from  
5 Muskrat Falls is perhaps a siren call.

6 Former Finance Minister, P.C.  
7 Minister, John Collins, recently suggested in the  
8 news that a transmission line only be built from  
9 here to take the 300 megawatt surplus, or whatever  
10 it is, from Churchill Falls and then supplement  
11 that with alternative wind projects on the island,  
12 thereby, saving the money that it would cost to put  
13 in Muskrat Falls.

14 I'd just like to add, too, that on  
15 the comment about wind and the demand in the  
16 winter; well, the wind in the winter is stronger, I  
17 read.

18 I do, like Ms. Benefiel, wonder if  
19 Quebec averages 26 percent cost overruns and  
20 they've certainly done enough hydro projects to  
21 have a best practice, whether that should be  
22 factored in.

23 My last point is I am a councillor  
24 in the Town of North West River and I note that the  
25 councillors there feel that the adjacency principle

1    should be followed.  They're not unlike Grand  
2    Falls-Windsor, in that they feel that if the river  
3    is damaged and the environment is affected that  
4    they, near it, should benefit and I wondered if  
5    those costs have been factored in.

6                   CHAIRPERSON GRIFFITHS:  Thank you,  
7    Ms. Goodfellow-Baikie.

8                   I mean I take what you've said --  
9    most of what you've said as a statement, but you  
10   finished with the question.  Is that right?  You  
11   would you like Nalcor to respond to that question?

12                   MS. GOODFELLOW-BAIKIE:  I did want  
13   to make the statement.  Yes, they could answer  
14   that.

15                   CHAIRPERSON GRIFFITHS:  And that  
16   statement, you're officially making that on behalf  
17   of the council of the Town of North West River?  Or  
18   you're ---

19                   MS. GOODFELLOW-BAIKIE:  I'm a  
20   councillor of ---

21                   CHAIRPERSON GRIFFITHS:  I know  
22   you're a councillor, yes.

23                   MS. GOODFELLOW-BAIKIE:  And I'm a  
24   part of that, you know, demand.

25                   CHAIRPERSON GRIFFITHS:  M'hm.  Mr.

1 Bennett?

2 MR. G. BENNETT: Thank you, Madame  
3 Co-Chair.

4 There are a couple of questions  
5 there that I think are worth circling back on.

6 Certainly, if we look at wind  
7 development, Newfoundland and Labrador Hydro has  
8 contracted with the private sector for the two wind  
9 developments that are currently in service in St.  
10 Lawrence and Fermeuse so there's no innate or  
11 inherent fear in dealing with the private sector.

12 I think, though, if we look at the  
13 mandate of Nalcor that was articulated in the  
14 energy plan that the important point here is that  
15 the profit that can come from such a development  
16 should be -- is better directed towards the  
17 province, as opposed to the private shareholders in  
18 some of these potential developments.

19 So when we look at large-scale  
20 activities, Lower Churchill being an example --  
21 it's one of the reasons we're here is because the  
22 province has concluded it was important for the  
23 public sector to be involved in those activities.  
24 So we take a similar view to large rent, that if  
25 there is a substantial export opportunity

1 associated with that business, then that's probably  
2 an opportunity where the people of the province  
3 should benefit.

4 In respect of Dr. Collins'  
5 comments, the notion of building a transmission  
6 line using -- which is probably more like 150  
7 megawatts of surplus that might be left over from  
8 Churchill Falls and supplementing that with wind,  
9 you still get down to the economic issue that wind  
10 development by itself is more expensive than  
11 Muskrat Falls. Muskrat Falls is a very attractive  
12 energy source and would be more expensive than the  
13 hydro alternative and also has a series of  
14 operational limitations with it that we've talked  
15 about before.

16 The question of adjacency for  
17 energy developments and energy resources, I think  
18 the premier's been pretty clear on that point and  
19 provincial policy is that the distribution of those  
20 benefits is a -- it will be a decision of the  
21 province at the end of the day in terms of where  
22 priorities are, what social programs are required  
23 in certain areas, what initiatives may be  
24 priorities. And sometimes, in many cases, the  
25 priorities that we see on a provincial basis don't



1 necessarily line up with who happens to be adjacent  
2 to the development. So it certainly has been an  
3 issue in Central Newfoundland and government was  
4 clear that that would be a policy decision  
5 undertaken by cabinet, ultimately, when budgets are  
6 established.

7                               And you can make the same point  
8 for the off-shore and on the Grand Banks that  
9 although the Avalon Peninsula is closest to it,  
10 that the province looks at it and says, "Well, this  
11 is a determination that had been made on behalf of  
12 the interests of the entire province."

13                           CHAIRPERSON GRIFFITHS: Thank you.  
14                           Ms. Goodfellow-Baikie?

15                           MS. GOODFELLOW-BAIKIE: The impact  
16 if this proceeds is now, not 2041.

17                           As well, just judging all this by  
18 being again profitable only is anachronistic too.

19                           CHAIRPERSON GRIFFITHS: Thank you,  
20 very much.

21                           Mr. Davis?

22                           MR. DAVIS: Thank you, Madame  
23 Chair. It's Eldred Davis.

24                           I'd like to speak on the fact that  
25 the promoter -- proponent seems to think CDM is not

1   working very well because a large portion of the  
2   increase in consumption of electricity in  
3   Newfoundland is electric heat and they're -- I have  
4   a quote here, but it was up on the board earlier so  
5   I don't know if I'll bother to read it out.

6                   But they figure it's not working  
7   very well and they don't know how to implement it  
8   properly or whatever, but I suggest that there's  
9   already a working example in place now and it's on  
10   the coast of Labrador where communities are powered  
11   by diesel generation electricity.

12                   And the fact is that most of them  
13   have had to avoid electric heat and the reason is  
14   if they consume a certain amount of electricity,  
15   the price just goes through the roof. And it has  
16   served to make harsh conditions for a lot of  
17   people. Like, they have to have fuel oil or furnace  
18   oil or wood to heat their homes, for the most part,  
19   and they can't leave for any length of time in the  
20   cold part of winter because they come back to a  
21   frozen icebox.

22                   Why that would not work in their  
23   island, I really can't understand. There's an  
24   opportunity here to get people thinking that you  
25   can't just forever keep on using more and more

1 electricity. They have to be told that there's a  
2 limit to the generation capacity on their island  
3 and if nobody -- if somebody is misunderstanding  
4 me, I'm totally against any more dams on this river  
5 and that's why I'm arguing this point.

6                   The fact is that there's another  
7 outfit in Newfoundland. Ms. Goodfellow-Baikie  
8 mentioned some ago there was the Halifax Global  
9 report talked about alternate sources for wood  
10 production -- wood usage, including by-products.

11                   Right now in Roddickton there's a  
12 factory or a plant that's producing wood pellets.  
13 It's a reasonable alternative to electric heat for  
14 many, especially the rural communities or customers  
15 of Nalcor and Newfoundland Power, I believe it is,  
16 they should -- there could be an incentive to use  
17 wood pellets to convert the regular wood or fuel  
18 cells or throw them out and put in wood pellet  
19 stoves and there could possibly be a financial  
20 incentive from these people rather than spend 6.2  
21 billion before inflation on a dam and a power line  
22 to bring Newfoundland power from Labrador.

23                   So there's a huge financial cost  
24 there. It could probably be avoided if they would  
25 not automatically reject every other alternative to

1 find ways -- to find problems with everything  
2 that's ever been suggested even though other places  
3 are coming up with ideas.

4 Germany, for instance, I just read  
5 recently; they have 60,000 megawatts of wind power.  
6 They're cutting their nuclear generation by a huge  
7 amount, probably half. So to say that they're  
8 limited to 80 megawatts of wind power, they should  
9 have sufficient knowledge and engineers to come up  
10 with a method to incorporate more than that. You  
11 know, other jurisdictions are doing it. It is  
12 something that's available. When they look at the  
13 10 megawatt EnCurrent or in-stream turbine as  
14 proposed for Scotland, they just dismiss it out of  
15 hand. It's only 10 megawatts. It's not worth  
16 anything. Well, you use multiples. One windmill  
17 is not going to produce 60,000 megawatts of power  
18 either. You have to use multiples. You have to  
19 provide installations that will work. It's going  
20 to have to come. I mean, the future is not going  
21 to be damming rivers. Damming rivers is not  
22 sustainable; there are only so many available.  
23 Once they run out, what are they going to do then?  
24 This has to be considered.

25 And as far as the use of power in

1    Labrador, we don't need Muskrat Falls. There are  
2    300 megawatts of recall power available now from  
3    Churchill Falls. Some of it is already being used.  
4    Well, it's all being used, I think. Some of it is  
5    being sold at a loss. It could conceivably be used  
6    elsewhere in Labrador should the need arise. I  
7    would say almost immediately in western Labrador in  
8    the iron-mining sector. They would probably be  
9    willing to pay cost price even. Nalcor would not  
10   have to sell it at a loss, which is totally counter  
11   to what they're talking about. Like, they say that  
12   even though it's 14.3 minimum delivered to  
13   Newfoundland upon completion of this project, the  
14   fact is that this is way more than people are  
15   paying now. They're willing to pay a bit more than  
16   what they have now, but I don't know if they really  
17   want to pay 14.3 or more distributed and put into  
18   their homes. But selling below cost straight to  
19   Nova Scotia, that's not good business case either  
20   as far as I can see. I mean, I'm not a business  
21   person, obviously, but it just doesn't make sense  
22   to me that they would spend 6.2 billion.

23                                    And I should bring up another  
24   branch of Nalcor is the oil and gas sector. They  
25   recently budgeted for some dealing, as I think Ms.

1 Benefiel mentioned. I think within a few months or  
2 less than a year with two-thirds of their work done  
3 their budget was pretty well shot. You know,  
4 that's 50 percent overrun, you might say. This is  
5 what happens.

6                               And they might be using the best  
7 case, but it doesn't always work out that way.  
8 They could end up spending so much money that the  
9 project -- it will be forever a debt on the public  
10 purse. And it's just too much to believe what they  
11 are saying because they make up these stories that  
12 really they don't have much basis in good fact  
13 because they define every little thing to knock  
14 about any alternatives and their parameter is set  
15 such that they have to have 3,000 megawatts.

16                              Well, they don't need 3,000  
17 megawatts if a lot of it is going to be sold at a  
18 loss; a lot of it is going to be spilled. You  
19 know, they talk about 40 percent lying around St.  
20 John's with no use until somebody buys it beyond  
21 Emera's projected use in Nova Scotia. It's a huge  
22 amount of power that's really not required and they  
23 don't seem to be addressing that in 2016, the  
24 contract between CFLCo and Hydro Quebec expires;  
25 there's an automatic renewal. But there is a

1 difference. The renewal also has a -- there's a  
2 completion date for the construction bonds. I  
3 mentioned this before and nobody seemed to even  
4 notice it. However, at that point I'm sure that  
5 CFLCo or the Newfoundland government or whoever  
6 could -- well, preceding that they could be --  
7 maybe they are now negotiating with the Government  
8 of Quebec or Hydro Quebec to make changes at that  
9 switchover point from the unchangeable Churchill  
10 Falls agreement with Hydro Quebec or the extension,  
11 which I don't think is cast in stone.

12                   It's possible -- as I mentioned  
13 previously, there could be taxes put on the export  
14 of power; taxes that Hydro Quebec -- or CFLCo,  
15 sorry, would have to charge the customer; one of  
16 which is Hydro Quebec, one is Twin Falls Power.  
17 But there's nothing to say that the Newfoundland  
18 government can't reimburse customers in Labrador  
19 and the Quebec government could reimburse customers  
20 of Hydro Quebec if they desire to do so.

21                   But they're getting power now at  
22 such a cheap rate that they can afford to pay a  
23 little bit more in taxation and that money could  
24 potentially be used to ink base the diversity of  
25 power generation on their island because they do

1    need some power, especially during peak periods.

2                               And one of those -- it's also  
3    mentioned in our energy plan, this conversion of  
4    Holyrood from what these people say they know the  
5    price is going to be in 10, 15 years. I don't --  
6    well, they might not say that -- maybe they don't  
7    say they know the price, but I think everybody  
8    admits that it's probably going to be more that it  
9    is now. The price of oil is volatile. It's up and  
10   down with geopolitical concerns. However, we know  
11   that the value of the oil will increase, but  
12   natural gas is practically unchangeable for the  
13   foreseeable future and to convert Holyrood, which  
14   is the cornerstone of their energy production right  
15   now, the single one anyway -- could, in my simple  
16   mind, be converted like a lot of other plants have  
17   been into gas burning. And that is available now  
18   and it is cheap and it will be available far into  
19   the future because there are huge reserves that,  
20   again, the oil and gas branch of Nalcor, if they  
21   get off their asses and do some actual work rather  
22   than drilling dry holes -- which they were told was  
23   dry anyway -- that they could probably get some  
24   natural gas ashore of their own. They don't have  
25   to pay anybody, but the transport and I guess the



1 drilling costs to get it to their island -- and  
2 it's not that far away on the southern shore  
3 apparently -- that they could substitute expensive,  
4 dirty oil for cheap and much cleaner, although not  
5 totally clean, natural gas. And they could  
6 probably do it for less than \$6.2 billion.

7                               So to me these people are in two  
8 modes. One; they have to build a dam. They're  
9 fixated on a dam; nothing else will do. You know,  
10 if they could harness lightning, they wouldn't do  
11 it because it's not a dam. You can't put Danny  
12 Williams on a dam.

13                              The other thing is the costs that  
14 they project, you know, they're minimums and I  
15 don't know if people realize that their bills and  
16 their provincial debt would increase by a large  
17 amount.

18                             So I don't know, they don't have a  
19 good case as far as I'm concerned. The fact that  
20 other rivers in Labrador are scheduled to go, like  
21 I said, how sustainable is it to destroy all the  
22 major rivers? Then what do you do? Then you have  
23 to put up a windmill.

24                             If they weren't fixated with  
25 producing power for export which currently they

1     could only export at a loss, you think they would  
2     learn from the Churchill Falls fiasco, wouldn't  
3     you? Well, obviously, they haven't.

4                     But anyway, this dam for \$6.2  
5     billion and associated transmission line, it really  
6     is not a money maker in the foreseeable future.  
7     It's a huge debt and there are alternatives that  
8     they just dismiss out of hand. They don't give  
9     serious recognition of these things like other  
10    people do.

11                    I have a question. I don't expect  
12    an answer, of course. Are there any negotiations  
13    now between the Newfoundland government of CFLCo  
14    and the Quebec government or Hydro Quebec regarding  
15    what is going to happen in five years' time; the  
16    end of August 2016?

17                    MR. G. BENNETT: So in respect to  
18    the renewal of the Churchill Falls power contract;  
19    that contract renewal was executed when Hydro  
20    Quebec signed the original power contract so they  
21    had already exercised their option to renew at that  
22    time. So the renewal -- the last 25 years of that  
23    contract is already baked into the existing  
24    agreement so there's no further negotiation on that  
25    front.

1 MR. DAVIS: Well, that's not what  
2 I asked, but ---

3 MR. G. BENNETT: Well, no, but I'm  
4 just trying to put some context around it.

5 I mean, there's nothing -- I guess  
6 where I'm going is that there's nothing to  
7 negotiate. They've already exercised a renewal and  
8 it's part of ---

9 MR. DAVIS: Well, that's not  
10 necessarily true, there's nothing to negotiate.  
11 You can always negotiate. It doesn't mean that the  
12 other party will have to along with you.

13 CHAIRPERSON GRIFFITHS: Let Mr.  
14 Bennett finish, then you make your final comment on  
15 this, and I will need to go to the next question.

16 Mr. Bennett.

17 MR. G. BENNETT: Thank you, Madam  
18 Co-Chair.

19 The point I was trying to get to  
20 was that the negotiation of that renewal was  
21 already undertaken between CFLco at the time back  
22 when the original power contract was signed.

23 So I guess what I was trying to  
24 say was that there is nothing to negotiate in  
25 respect of the renewal.

1                               MR. DAVIS: I believe it was  
2 Brinko, wasn't it?

3                               MR. G. BENNETT: Well, Brinko was  
4 the shareholder of CFLco, yes, but CFLco was still  
5 the entity that executed that contract with Hydro  
6 Quebec. But they were owned by Brinko, you're  
7 correct on that point.

8                               In fact, now Nalcor has what  
9 Brinko's interest was at the time.

10                              MR. DAVIS: Well, it's certainly a  
11 lot more than Brinko's interest.

12                              However, there's a strong parallel  
13 here to the fact that CFLco and Hydro Quebec  
14 contract is -- they look good for a few years and  
15 then it just -- reality struck, and I think we're  
16 seeing the same thing here.

17                              But as far as the negotiation  
18 goes, as I said, there is a possibility, a strong  
19 possibility that Newfoundland or CFLco could hit  
20 Hydro Quebec with a bill for taxation of export  
21 power, and I'm sure Hydro Quebec would probably  
22 respond, and that would entail negotiations.

23                              Maybe they haven't started yet.  
24 Are they going to? I mean, they have negotiated  
25 other items on this contract. One is the unfair --

1    what was it Danny Williams said some time ago -- in  
2    a civil court in Quebec you cannot saddle somebody  
3    with a contract if the negotiations are conducted  
4    in an unfair manner or whatever.  You know, I don't  
5    know if it's still in front of the Quebec courts  
6    but it was certainly in the headlines around here  
7    for a while.

8                                So to say that there's no  
9    negotiation, that it's cast in stone is just not  
10   true.  Hydro Quebec -- politically we've been told  
11   that all Quebecers are demons, but I've not yet  
12   seen one with horns or -- all my dealings with the  
13   people of Quebec have been as good as any other  
14   people anywhere.  So there's a falsehood being  
15   spread here or propagated that you can't deal with  
16   Quebeckers, which is not true, you know, they are  
17   reasonable people.

18                           The only reason they're being cast  
19   in this light is because they have an ironbound  
20   contract that they do not have to give up any money  
21   to Newfoundland Hydro, or Nalco, or CFLco, I guess,  
22   whichever entity you choose.

23                           But the fact is that they are open  
24   to negotiation.  They have before been negotiating;  
25   it's gone to court even.  But there things that can

1 be done. And again, this goes back to the fact,  
2 these people are fixated on a dam and nothing else  
3 will do.

4 So as far as saying well, you  
5 know, we're in a position here where we have  
6 ammunition, you can tax these people, they don't  
7 even want to consider it, it just doesn't make  
8 sense.

9 Anyway, I'll leave it at that.  
10 Thank you.

11 CHAIRPERSON GRIFFITHS: Okay,  
12 well, thank you very much, Mr. Davis.

13 So we have a final question or  
14 statement from Ms. Wheeler, and then I think, bear  
15 with us, the panel have one or two more questions  
16 for Nalcor and then that will wrap up the session.

17 Ms. Wheeler.

18 MS. WHEELER: Sorry, I've got  
19 three questions actually.

20 Mr. Bennett, you brought up about  
21 the coast wanting the convenience of electric heat,  
22 in your presentation earlier. I was somewhat  
23 surprised last week to hear Premier Dunderdale  
24 mention transmission to the north and south coast.

25 Is this close to reality and has

1 any of that been put into your forecasts?

2 MR. G. BENNETT: You're right, she  
3 did bring it up. She said that, you know, we  
4 wanted to re-evaluate that business case. And  
5 certainly, as I understand the situation -- I've  
6 been sort of out of head office for a little while  
7 now, but the situation with respect to the Voisey's  
8 Bay mine is an interesting question there and how  
9 it affects the business case. So that's something  
10 that we'll unfold hopefully over the coming months.

11 In respect to the demand of those  
12 communities in our forecast, it would be a very  
13 relatively small amount in the forecast and it  
14 would sort of almost get lost in the rounding in  
15 terms of the availability of production from the  
16 project.

17 But certainly if it did happen,  
18 and we certainly would like to see it happen, yeah,  
19 we'll be able to accommodate that. And it would  
20 simply mean that some of our short-term exports  
21 would not be sold into those markets and we would  
22 just simply use it energy domestically.

23 So whether that was for those  
24 developments or some other activity that took place  
25 in Labrador, we would just stop selling in the

1 short term and use it energy here in the region.

2 MS. WHEELER: Last week the Quebec  
3 regulators, energy regulators, upheld their earlier  
4 decision to deny transmission access through  
5 Quebec.

6 How does that impact your  
7 transmission to markets now? Like, are you looking  
8 -- is this going to be -- is this route to Emera,  
9 is that going to be the only method now or is --  
10 what's going to happen there?

11 MR. G. BENNETT: That's a good  
12 question. We don't see it that way. I mean,  
13 certainly Hydro Quebec draws energy, has an  
14 obligation to deliver open access. They do have a  
15 tariff. We do use their service in other aspects  
16 of our business. They have an obligation to  
17 deliver the service.

18 We're going to look at the  
19 decision that came back from the Régie de l'énergie  
20 in respect of our application for revision and  
21 we'll look at the appropriate steps to be taken  
22 there.

23 We have other applications for  
24 transmission service in their queue. We fully  
25 expect that we will get service from HQT if in fact



1 we need it.

2 MS. WHEELER: Okay.

3 MR. G. BENNETT: So that door is  
4 there. They have an obligation to provide the  
5 service, and we expect to get that.

6 MS. WHEELER: So now -- this is a  
7 really broad question now. If this does go through  
8 -- if everything proceeds to regulatory approval  
9 and a decision is being made now by Nalcor and the  
10 Province as to whether you're going to actually  
11 move forward with this project, how -- economics  
12 aside -- like, we all know the business case, but  
13 economics aside, is there any other factors that  
14 you're going to be considering if this -- like to  
15 sanction this project, are any of these  
16 considerations that are coming through on this  
17 panel going to be considered?

18 MR. G. BENNETT: Well certainly  
19 the outcome of the environmental assessment process  
20 recommendations that are made by the panel,  
21 conditions that are applied by the appropriate  
22 regulators at the federal and provincial level, I  
23 mean, those are -- those have to be considered in  
24 our planning and they'll be an important part of  
25 our planning moving forward, no question about

1     that.

2                             And the other issues around us  
3     that unfold, you mentioned the potential for some  
4     other demands, those will all have to be factored  
5     into our thinking. I mean, it's an important --  
6     those are definitely important considerations. And  
7     certainly any obligations for continued monitoring  
8     and adaptive management are fundamentally part of  
9     our planning.

10                            The other thing I can add there is  
11     that our consultation efforts will continue. As we  
12     move to a different phase of the project we will  
13     continue to be in the community, we will be  
14     continuing to with community groups, with  
15     individuals, with stakeholders, with Aboriginal  
16     groups and continuing our planning.

17                            So if we look at sort of the  
18     consultation continuum that is ongoing through this  
19     process, into our further detailed planning, into  
20     construction and into operation.

21                            So on the multiple work plans and  
22     work phases that we have for the project, be it  
23     environmental or Aboriginal consultation, our  
24     engineering, procurement, construction activities,  
25     those are all important reasons for us to continue

1 to work with the community, and also our commercial  
2 work with other developers as they advance their  
3 plans in the region.

4 So, yeah, I think we'll be here  
5 for a long time.

6 CHAIRPERSON GRIFFITHS: Thank you  
7 very much, Ms. Wheeler.

8 Now, we're going to -- I'm sorry,  
9 I know it's one o'clock and you've been sitting a  
10 long time, but we do need to just finish off by  
11 allowing the panel to ask a few more questions to  
12 wrap up.

13 CHAIRPERSON CLARKE: There's two  
14 areas of questions that maybe you could help me  
15 better understand. That would be my question; can  
16 you better help me understand those two areas.

17 One is that I understand that the  
18 utility and the way you're looking at this is that  
19 in terms of satisfying the island you need to have  
20 the least-cost alternative. And I have difficulty  
21 understanding in any least-cost alternative that  
22 doesn't include the really cheap power from  
23 Churchill Falls after 2041 being factored into the  
24 system, like it's two or three mills or something  
25 like that.

1                   So maybe you could -- can you help  
2 me better understand that one?

3                   And the second one is related to  
4 one of the questions that was asked earlier, and  
5 this has to do with the access through Quebec,  
6 because, as I understand it, the Gull Island  
7 project on a per unit basis is hands down a cheaper  
8 generating source than the Muskrat Falls one.

9                   And if you were sure about having  
10 the export through -- export access through Quebec  
11 for Gull Island, then obviously Gull Island would  
12 be a much cheaper alternative for the province than  
13 Muskrat Falls.

14                   So it has to be related to the  
15 timing and the confidence that one has with respect  
16 to the access through the west.

17                   That's my understanding, so if you  
18 -- again, if you can help me better understand that  
19 dilemma, that would help, too.

20                   MR. G. BENNETT: All right.  
21 Thanks for those.

22                   I'll try to put some context  
23 around the 2041 situation.

24                   I guess if we look at the energy  
25 that's being sold from Churchill Falls today and if

1 we look at sort of the total portfolio, it's under  
2 contract right now. In 2041, we could pull it  
3 back. We could continue to sell it to Hydro  
4 Quebec. There could be a different price.

5                   But I guess where I'm going with  
6 that is that the 30 terawatt hours that are  
7 currently exported from Churchill Falls are  
8 committed to a market. And whether, you know, you  
9 switch -- you know, you switch production from  
10 Churchill Falls to domestic and you export Muskrat  
11 Falls, because you'd still look at the demand in  
12 the marketplace and say yes, at that point in time,  
13 given the importance of that Churchill Falls  
14 facility as an export opportunity, yeah, you might  
15 in the context of redistributing benefits -- you  
16 may say, okay, well, I'll take some Churchill Falls  
17 power back and use that domestically.

18                   But then you've created an  
19 opportunity to sell Muskrat or Gull Island into the  
20 other market. So I think maybe it's not a question  
21 of reducing the size of the pie, but just putting  
22 different pieces in different places.

23                   The value proposition from the  
24 total portfolio would still be the same.

25                   CHAIRPERSON CLARKE: Yes. But

1 that was exactly my point, that in terms of having  
2 the least cost for the Newfoundland consumer, which  
3 was the ---

4 MR. G. BENNETT: Right.

5 CHAIRPERSON CLARKE: --- outcome  
6 we've been talking about, it would seem to be a lot  
7 better to sell relatively expensive Muskrat Falls  
8 power somewhere else and have relatively cheaper  
9 power from Gull Island.

10 MR. G. BENNETT: Okay. But ---

11 CHAIRPERSON CLARKE: From  
12 Churchill Falls.

13 MR. G. BENNETT: From Churchill.  
14 That might happen, but the market values in both  
15 places probably end up with the same margin.

16 The other point, I guess, is that  
17 Muskrat Falls would be close to being -- you know,  
18 its financing would be close to being paid off at  
19 that point in time as well. So we look at a 30-  
20 year financing period, you're getting to the point  
21 where Muskrat Falls is almost paid down as well.

22 So it -- you know, again, we get  
23 back to that distribution of benefits. Does the  
24 province want to say well, you know, we like that  
25 return on equity and we're going to continue that

1 to provide a conservation signal or do you say,  
2 okay, well, you know, we're going to take it right  
3 back down to, you know, the fully-recovered cost.

4 So I think where I'm going is that  
5 the benefits are still there. It's just a question  
6 of how they're distributed between ratepayers and  
7 taxpayers.

8 And I guess the -- you know, sort  
9 of the question on Muskrat versus Gull, yeah, I  
10 mean, I think it's fair to say that if the  
11 transmission access for -- you know, through Hydro  
12 Quebec were there right now and you could see that  
13 path today, we'd say, yes, you know, probably Gull  
14 has attractive unit costs and we may want to go in  
15 that direction.

16 But it's a trade-off between, you  
17 know, the continuing to plan and having certainty.  
18 And Muskrat -- you know, Muskrat is a good project.  
19 There's no question about that.

20 Its costs, its unit costs, are not  
21 far off Gull Island. I'd characterize Gull as a  
22 great project from a cost perspective.

23 But you know, on the other hand,  
24 Muskrat Falls is a shorter construction period,  
25 requires a smaller capital expenditure at this

1 point in time compared to Gull, and there's a  
2 school of thought that says it's okay to, you know,  
3 take the smaller piece and then take the larger  
4 project a little bit later.

5 But it is a bit of a trade-off  
6 between having, you know, certainty and being in a  
7 position where we actually have the -- all the  
8 requisite conditions for Muskrat comparing to  
9 continue to advance our planning activity, you  
10 know, in light of the bigger Gull Island one.

11 If you defer -- you know, as you  
12 continue to defer the project, though, you may find  
13 that the economic advantage that Gull has begins to  
14 get diminished because you're -- you know, you're  
15 still continuing to spend on fuel for Holyrood and  
16 you're -- you'll be later, you know, replacing that  
17 cost on the other side.

18 CHAIRPERSON CLARKE: Okay, thank  
19 you.

20 MEMBER JONG: I've got one last  
21 question, and this is -- really, it's for me to  
22 help me figure out something that I suspect is very  
23 straightforward, so -- and it's not really tied to  
24 what we've been talking about today, but it's been  
25 bothering me all the length of this.



1                               It's the change in the  
2   transmission lines from the original plan to the  
3   new plan. They're bigger and there are of more  
4   them, and I don't understand why.

5                               MR. HUMPHRIES: Okay. When we  
6   look at the transmission configuration between --  
7   with the 3,000 megawatt development, which would be  
8   Muskrat and Gull, there's no question we need a 735  
9   transmission link to get that amount of power to  
10  move it west.

11                              As we look at the smaller 824  
12  megawatt Muskrat, we still need a connection  
13  between Churchill Falls and Muskrat Falls, but the  
14  amount of power that we will be moving will be  
15  less.

16                              So we do not require the 735, but  
17  we do require two circuits to cover off the event  
18  when we lose one circuit. We have to maintain a  
19  link between Churchill Falls and Muskrat for system  
20  stability reasons to ensure that we don't have a  
21  contingency shutdown on the system.

22                              So when we look at the economics  
23  of two 345-kV lines as opposed to two 735-kV lines,  
24  it's cheaper to pre-build the -- at 345 and upgrade  
25  to 735 in the future if needed or add additional

1 345 kV circuits.

2 MEMBER JONG: I guess I had --  
3 originally it was -- there was one 231 for Muskrat  
4 to Gull Island and one 735 one from Gull Island to  
5 Churchill Falls.

6 MR. HUMPHRIES: Yeah, well, that  
7 was when -- yes, to move Muskrat Falls up to Gull  
8 Island. At that stage, the converter station and  
9 all coming to the island would be at Gull Island as  
10 opposed to Muskrat Falls. And for that short  
11 distance, you could move that amount of power over  
12 230 kV lines.

13 But when we look at the connection  
14 all the way back to Churchill Falls, 230 kV is not  
15 an option.

16 MEMBER JONG: All right.

17 Thank you.

18 CHAIRPERSON GRIFFITHS: Okay.

19 I've just got a couple of I think very quick  
20 questions, and I think Mr. Clarke has a question on  
21 a totally different issue, but a quick one.

22 So my two questions are -- my  
23 first one is about tidal. Mr. Bennett, you've  
24 dismissed it rather out of hand, I thought.

25 Do you want to qualify that at all

1 in terms of when you think -- whether you think at  
2 some point you could have some interest in tidal?

3 Is it because you think that tidal  
4 -- you believe tidal is not ready right now that  
5 you're dismissing it, or -- if you could just give  
6 me a little bit more sense -- know a little bit  
7 about what's going on in Nova Scotia and other  
8 places with regard to demonstration.

9 Clearly there have been some  
10 problems, but also some successes.

11 MR. G. BENNETT: And I would agree  
12 that, you know, that there are -- you know, we're  
13 seeing both sides of it.

14 I guess the challenge is when we  
15 look at hydro projects in general that are well  
16 established as technology and I think, you know,  
17 fundamentally, we look to the basic physics of the  
18 hydro facilities, you know, we're interested in a  
19 couple of things.

20 We're interested in flow and we're  
21 interested in head of water available. And that's  
22 a direct function to the power that's produced.

23 So in that light, you know, we're  
24 sitting here with two excellent hydro projects.  
25 And I think that in the longer term, these other --

1 and I know that there's been, you know, a  
2 considerable amount of frustration expressed  
3 through this proceeding in terms of our view of  
4 other alternatives.

5                   And when we look at it from an  
6 engineering perspective from the standards of  
7 reliability that are expected in the business, the  
8 economic pressures, the price expectations that all  
9 of our customers have and all of our markets have,  
10 you know, we look at, I guess, a couple of things.

11                   First of all, when we make  
12 technology decisions even in respect of this  
13 project, we are -- we take a very conservative view  
14 to proven and reliable technologies, and that's an  
15 important part of our thinking.

16                   And I think that, you know, if I  
17 turn to Mr. Henderson and Mr. Humphries, they would  
18 say that those are important reasons why we keep  
19 the lights on. Generally speaking, we take a very  
20 conservative view to -- you know, to all aspects of  
21 the business.

22                   And you know, for example, our  
23 loss of load hours in the generation expansion plan  
24 is a very conservative number. It's somewhat less  
25 than three hours a year, which, on its face,

1 doesn't sound like very much, but it's sort of  
2 representative of our view of the business.

3                   You know, wind is frustrating  
4 because it doesn't blow at the exact right times.

5                   So it will be important for us to  
6 see a track record. And I would agree that if you  
7 look at the Strait of Belle Isle, I mean the  
8 currents in the Strait of Belle Isle are fairly  
9 significant. There's a good current there. But is  
10 it at the point where it can displace either of  
11 these projects for small hydro, I think that  
12 remains to be seen.

13                   Certainly look at all of those  
14 renewables; they are in the energy plant. They are  
15 there as opportunities. The province would  
16 certainly say if those are good resources to  
17 develop and they compete on an economic footing  
18 with wind or small hydro, whatever else is  
19 available because we have interconnection and  
20 greater storage in the system. I look at those as  
21 definitely opportunities.

22                   But I guess we take a conservative  
23 view today when we look at and we're trying to say  
24 okay, how do they compare to the project that we're  
25 advancing here and how do they stack up against

1 Lower Churchill, and in that light, we're not there  
2 yet, and I think that was probably the message that  
3 we're trying to deliver.

4 We're certainly not ruling them  
5 out as opportunities. They're covered in the  
6 energy plan. If you look at that energy warehouse  
7 graphic that we've used in a couple of  
8 presentations, they're on there and they will be  
9 looked at, but just sort of in the economic  
10 hierarchy and the feasibility hierarchy, technical  
11 and operational, hydro, large-scale hydro with  
12 access to storage is front and centre and then the  
13 others, the others fit into the portfolio.

14 So hopefully that can put some  
15 context around that.

16 CHAIRPERSON GRIFFITHS: Thanks.

17 My second question is line loss.  
18 Mr. Hull, I think you talked about line loss when  
19 you were talking about the cost of repairs and you  
20 said five percent loss -- line loss that would have  
21 to be factored into the cost.

22 Can you tell me, give me -- just  
23 tell me a little bit about how line loss is  
24 proportional to length of line? Is there a nice  
25 handy little thing that you can ---

1                   MR. G. BENNETT: I might start and  
2 then we'll get Mr. Humphries on this one. But  
3 certainly it is proportional to the distance. It  
4 is also a function of the conductor size that we  
5 use on the transmission line.

6                   Generally speaking DC transmission  
7 is more efficient than AC transmission, but you  
8 incur some incremental losses in the converters  
9 when you go from AC to DC and from DC back to AC.

10                  So the long and the short of it is  
11 that it's an aspect of the transmission system. It  
12 is optimized. You look at the cost of energy, you  
13 look at the value of that energy and you compare it  
14 to the capital cost of increasing the capacity of  
15 the system.

16                  That's one of the reasons why for  
17 longer distance generally you increase the voltage.  
18 It's one important way to reduce the current and  
19 therefore reduce the losses.

20                  It's -- five percent is probably  
21 not an unusual number. If we look at the Hydro  
22 Quebec system, for example, that's the kind of  
23 number that they see in Hydro Quebec trans-energy  
24 system. So from generator to the delivery point in  
25 their system, they would see about five percent

1 losses.

2                               So it's something that we'll  
3 engineer and if we look at the various aspects of  
4 the system, we can -- by moving around transmission  
5 lines and where we make interconnections, we can  
6 have a big impact on that.

7                               That's one of the reasons that the  
8 DC link that we're talking about for the island  
9 will go right to Soldiers Pond. So it's more  
10 efficient to move that block of power to the Avalon  
11 Peninsula using DC transmission then to go further  
12 back and then transmit with AC.

13                              Paul, if I can turn to you; you  
14 may have some more comments on this.

15                              CHAIRPERSON GRIFFITHS: Well, let  
16 me just ask the following -- it's just the question  
17 you may want to -- so I understand that there's  
18 various things that you can do to change that, but  
19 in a very rough sense if you lose five percent  
20 because you take the power from Muskrat Falls to  
21 Soldiers Pond, but if you were going from Gull  
22 Island double the distance, could you avoid it  
23 being 10 percent?

24                              MR. HUMPHRIES: Well, there's a  
25 lot of factors there I guess and the relationship



1 is not linear, that's the key. On a given  
2 transmission line at a given voltage, if you double  
3 the load, the losses are going to go up by a factor  
4 of four.

5                               So what you would look at, we  
6 would do an optimization based on the load on that  
7 line and the anticipated load over its life and you  
8 can do things to reduce it. You can put a larger  
9 conductor in so that there's less current and lower  
10 losses. You can increase the operating voltage.  
11 And you would do an optimization to come up with an  
12 optimum for the cost you're putting in to get the  
13 minimum losses till, you know, that you get a break  
14 even.

15                              It doesn't make any sense to put  
16 in more money to save the power that's going to  
17 cost -- it costs more than market value to do that,  
18 so we do that type of optimization.

19                              So in theory you can bring the  
20 losses down probably in the two percent range. In  
21 reality once they get much beyond 10 percent you're  
22 going to have other operating problems. So you  
23 generally optimize somewhere in between the two and  
24 10 percent range and five is not a bad stop to fall  
25 out of.

1                               CHAIRPERSON GRIFFITHS: Thank you.

2                               Mr. Clarke?

3                               CHAIRPERSON CLARKE: Thank you.

4                               You'll probably be happy to know  
5 that my question is about caribou, and Mr. Tripper  
6 I don't think is here, but anyway you can think  
7 about it and maybe you could do something by four  
8 o'clock today, and if it's not new information you  
9 can do it tomorrow.

10                              But the question had to do with if  
11 there's like a simple map, say, of Labrador and  
12 Quebec, if you could show on it the normal ranges  
13 of the sedentary herds, like the Lac Joseph Herd  
14 and the Red Wine Mountain Herd and the George River  
15 Herd, on that map.

16                              And at the same time also indicate  
17 where the George River Herd crosses the Churchill  
18 River Valley, and then to the extent that you know  
19 it, how far south of the Churchill River does the  
20 George River Herd go. You may not have completely  
21 accurate information but just some indication of  
22 that. That's the information I want.

23                              MR. G. BENNETT: We'll take a run  
24 at that one, thanks.

25                              CHAIRPERSON GRIFFITHS: Okay,

1 well, whew.

2 Mr. Bennett, do you want to say a  
3 couple of words? Probably you've said lots of  
4 words but you might have a couple left, if you want  
5 to say something to reflect on this rather -- this  
6 session, by all means.

7 --- CLOSING REMARKS FROM NALCOR BY MR. GILBERT

8 BENNETT:

9 MR. G. BENNETT: That's great,  
10 thanks.

11 Actually I think when I reflect  
12 back on the sort of dialogue we've had here this  
13 morning, I think we've covered most of the points  
14 that I wanted to cover off.

15 I mean, just really briefly,  
16 certainly when we look at alternatives to the  
17 project, there are system and operational  
18 constraints that are important to us, and I know  
19 that from a technical perspective when I look to my  
20 right here, the team from system planning, system  
21 operations, these are issues that we wrestle with  
22 day in and day out within the entire company. It's  
23 an obligation and a responsibility we take very  
24 seriously.

25 So certainly, you know, I'll

1 circle back, we're not cavalier on this point.

2 These are very important issues in terms of the  
3 delivery of reliable energy to our customers.

4 And insofar as the alternatives  
5 are concerned, I can certainly appreciate the  
6 input, the ideas, they are valuable and important  
7 and they will come in due time, but unfortunately  
8 we're in a situation where we have some specific,  
9 technical and operational challenges, and I hope  
10 we've been able to demonstrate in the dialogue and  
11 in the material that we filed.

12 Those are real issues. I mean,  
13 those are engineering problems that when you run up  
14 against the physical constraints in the system,  
15 those are ones that we take very seriously.

16 But certainly we are committed to  
17 other alternatives. We are not fixated on this  
18 project. We're fixated on the best project that we  
19 can come up with and we do see it as being this  
20 one. It's an important piece of our planning.

21 I think we covered that ground  
22 this morning so I don't want to spend too much more  
23 time on that because I don't want to turn this into  
24 a closing submission, but I think those are  
25 important points.

1                   I think Mr. McCarthy, when he went  
2 through the fish assemblage material this morning,  
3 I hope that was helpful to the panel in terms of  
4 putting together and integrating a number of  
5 different issues that we've talked about over the  
6 course of the hearing, and to continue to value the  
7 input from everybody here.

8                   I think that's about all I wanted  
9 to cover, so thank you for that.

10                  CHAIRPERSON GRIFFITHS: Okay, well  
11 thank you very much, Mr. Bennett.

12                  Yes, Mr. Raphals?

13                  MR. RAPHALS: It's almost the hour  
14 this hearing was supposed to end. Would it be  
15 possible to extend the deadline this afternoon to  
16 five o'clock to compensate for that time?

17                  CHAIRPERSON GRIFFITHS: The four  
18 o'clock was a kind of practical time with respect  
19 to the registry, to get things onto the registry in  
20 order that people might have a chance to see them  
21 before tomorrow.

22                  Is there anyone I can consult with  
23 to see if that is possible? Just a minute please.

24                  (SHORT PAUSE)

25                  CHAIRPERSON GRIFFITHS: I'm sorry,

1 Mr. Raphals. I'm sorry about that. We did go on,  
2 as you say, but I think practically that we picked  
3 four o'clock as about the latest time we could go  
4 because it's got to get on the registry and it's  
5 got to then give people a chance to review it. So  
6 I'm sorry, I think we're going to stick with four  
7 o'clock.

8                               Anyway, so I just want to -- I  
9 thank Nalcor for making the presentations and for  
10 preparing those two documents. I imagine you're  
11 feeling extremely relieved that that's -- you only  
12 have one more presentation to prepare, so no more  
13 pesky requests from the panel to deal with, so  
14 anyway, but thank you for your information, you  
15 questions.

16                              I want to thank everybody who's  
17 present today for this session and who participated  
18 by asking questions and making statements.

19                              So this finishes this extra  
20 session and we meet again tomorrow morning at 9  
21 o'clock and it's the first of two days of closing  
22 remarks. So I look forward to seeing you then.

23                              Thank you.

24 --- Upon adjourning at 1:20 p.m./

25                              L'audience est ajournée à 13h20

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**C E R T I F I C A T I O N**

3

4 I, Sean Prouse, a certified court reporter in the  
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6 pages to be an accurate transcription of my  
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8 and I so swear.

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13 notes/enregistrements au meilleur de mes capacités,  
14 et je le jure.

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19 Sean Prouse, CVR

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