

MANITOBA CLEAN ENVIRONMENT COMMISSION

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1 Thursday, March 7, 2013

2 Upon commencing at 9:00 a.m.

3 THE CHAIRMAN: Good morning. We'll  
4 reconvene.

5 This morning we have a number of  
6 Manitoba Hydro officials who will be responding to  
7 questions in respect of the possibility of  
8 rerouting Bipole III to Dorsey or other places in  
9 Southern Manitoba.

10 It's my understanding that there's no  
11 presentation by Manitoba Hydro on this, that's  
12 correct?

13 MR. TYMOFICHUK: That's correct.

14 THE CHAIRMAN: Okay. So we'll jump  
15 right into cross-examination.

16 Mr. Meronek?

17 MR. MERONEK: Thank you, Mr. Chairman.  
18 Good morning, gentlemen.

19 Hearing no response, I'll carry on.

20 MR. TYMOFICHUK: Good morning.

21 MR. MAZUR: Good morning.

22 MR. NEUFELD: Good morning.

23 MR. MERONEK: It's my intention today  
24 or this morning to go over the subject matter that  
25 you have articulated, Mr. Chairman, but I will be

1 keeping my powder dry, so to speak, with respect  
2 to those components that deal with rebuttal  
3 evidence for next Tuesday. There is sometimes  
4 not -- there's a Maginot line between the two, but  
5 I'll get as much done as I can today. But I just  
6 want to start off with some timing questions, and  
7 I leave it up to anybody on the panel to answer.

8 Just to put matters into perspective,  
9 the proposal that's presently before the  
10 Commission was approved by the Manitoba Hydro  
11 Board in September of 2007, roughly?

12 MR. TYMOFICHUK: Yes, that's correct.

13 MR. MERONEK: And I'm getting that  
14 from the EIS. And the environmental assessment  
15 proposal form, the acronym is EAPF, went to  
16 Manitoba Conservation roughly in December of 2009?

17 MR. TYMOFICHUK: I believe that's  
18 correct.

19 MR. MERONEK: And the scoping document  
20 was approved by Manitoba Conservation  
21 approximately June of 2010?

22 MR. TYMOFICHUK: That's correct.

23 MR. MERONEK: And by December 2010,  
24 there had been four rounds of consultation with  
25 respect to the preferred route, correct?

1 MR. TYMOFICHUK: That's correct -- no,  
2 I stand corrected, three rounds.

3 MR. MERONEK: The fourth round had  
4 been initiated in 2010, correct?

5 MR. TYMOFICHUK: Right. I believe we  
6 completed our work in the summer of 2011, which  
7 identified the preferred final route.

8 MR. MERONEK: Now, Manitoba Hydro  
9 filed with the Commission yesterday a report  
10 that's entitled "The Ultimate HVDC Development of  
11 Manitoba," and it's dated October 14, 2010.

12 You gentlemen are familiar with that  
13 report?

14 MR. TYMOFICHUK: Yes, we are.

15 MR. MERONEK: Do you have copies in  
16 front of you?

17 MR. MAZUR: Yes.

18 MR. TYMOFICHUK: Yes.

19 MR. MERONEK: And that report was  
20 prepared in part by Mr. Mazur, correct?

21 MR. MAZUR: That's right.

22 MR. MERONEK: And signed off by you,  
23 Mr. Neufeld?

24 MR. NEUFELD: That's correct.

25 MR. MERONEK: And distributed to



1 Mr. Tymofichuk?

2 MR. TYMOFICHUK: Correct.

3 MR. MERONEK: Did you sign off on it  
4 too?

5 MR. NEUFELD: No, the executives on  
6 the distribution list.

7 MR. MERONEK: All right. This report  
8 was prepared in October of 2010 and signed by you,  
9 Mr. Neufeld, on November 2, 2010, right in the  
10 middle of the consultation process for the final  
11 preferred route; is that correct?

12 MR. NEUFELD: Yeah, that's correct.

13 MR. MERONEK: And as I understand this  
14 report, it was to deal with issues of future  
15 transmission development, correct?

16 MR. NEUFELD: That's correct.

17 MR. MAZUR: Yes.

18 MR. MERONEK: And one of the big  
19 components of that report dealt with the issue of  
20 reliability, correct?

21 MR. MAZUR: I think it more so dealt  
22 with the issue of reliability relative to whether  
23 north to south transmission beyond Bipole III  
24 would be AC or DC.

25 MR. MERONEK: But it's fair to say

1 that reliability was a major factor that was  
2 considered in that report in terms of what options  
3 to promote and which options to disregard,  
4 correct?

5 MR. MAZUR: The report looked at the  
6 impact of reliability, essentially assuming that  
7 if the Bipole III line was not built, what would  
8 be some of the converter options?

9 MR. MERONEK: It's a simple question,  
10 Mr. Mazur. Reliability was a significant  
11 consideration in this report, was it not?

12 MR. MAZUR: Yes, it was, but in the  
13 context of the Bipole III line not being there.

14 MR. NEUFELD: And I would also add  
15 that the significant focus of the report had to do  
16 with technology and what technologies might be  
17 applicable.

18 MR. MERONEK: I understand that.  
19 We've all read the report.

20 Now, there are two key findings in the  
21 report. And if you go to page 2, at the top first  
22 of all, it says:

23 "There is a pressing need from a  
24 reliability perspective for the third  
25 Bipole."

1 Do you see that?

2 MR. MAZUR: Yes.

3 MR. MERONEK: And that forms the major  
4 assumption for Bipole III in this hearing,  
5 correct?

6 MR. MAZUR: This report essentially  
7 assumes that Bipole III has been approved. We had  
8 approval based on some 2006 planning reports that  
9 Bipole III was going to be built and included in  
10 the capital plan.

11 MR. MERONEK: Let me ask the question  
12 again, Mr. Mazur. Reliability was the cornerstone  
13 of promoting Bipole III in this particular  
14 application, the EIS?

15 MR. MAZUR: This report deals with  
16 what --

17 MR. MERONEK: I'm not asking about  
18 this report. My question relates to the EIS.  
19 Reliability was a cornerstone for promoting Bipole  
20 III, the final preferred route in the EIS; is that  
21 not correct?

22 MR. MAZUR: That is correct,  
23 reliability was -- and it was identified as two  
24 reliability issues. The reliability to deal with  
25 the common Bipole I and II corridor loss, and to

1 deal with the Dorsey converter loss.

2 MR. MERONEK: Yes. And on the basis  
3 of the conclusions drawn in the EIS, Manitoba  
4 Hydro is promoting Bipole III, in the final  
5 preferred route, or the alternative final  
6 preferred route, whichever you choose, correct?

7 MR. MAZUR: That is correct, with the  
8 line going on the final preferred route between  
9 Keewatinoow and Riel station in the south.

10 MR. MERONEK: Right.

11 Now, it goes on to say that:

12 "If building Bipole III is delayed for  
13 some reason, then at some point  
14 relocating Bipole II will have to be  
15 reconsidered to address the risk of a  
16 Dorsey Station outage, even  
17 considering the risks that moving the  
18 Bipole II inverter entails."

19 Do you see that?

20 MR. MAZUR: Yes, I see that.

21 MR. MERONEK: Do you still subscribe  
22 to that proposition?

23 MR. MAZUR: From what we know today,  
24 it wouldn't be the first choice.

25 MR. MERONEK: Do you have an updated

1 study which would indicate what your first choice  
2 would be?

3 MR. MAZUR: I think that, as we had  
4 issued an IR, that will largely depend on the  
5 future resource development plan.

6 MR. MERONEK: Have you done an updated  
7 study to this 2010 report which would show your  
8 change in thinking?

9 MR. MAZUR: As I said, we have done a  
10 lot of preliminary work, and if the preferred plan  
11 went ahead, then I think we would be moving to a  
12 reliability solution that might involve an  
13 export-import line, but nothing has been decided.

14 MR. MERONEK: So you do not have a  
15 report, an engineered stamped report to replace  
16 this report; is that correct?

17 MR. MAZUR: That's correct. But I'm  
18 not sure there is an intent to do it until we have  
19 some of the resource plans solidified.

20 MR. NEUFELD: I would also add that  
21 nothing's changed.

22 MR. MERONEK: If for some reason, and  
23 let me posit a reason, this Commission decides  
24 that Bipole III, as it's presently constituted,  
25 cannot go ahead because of impenetrable

1 environmental concerns, you would be looking at  
2 other options, correct?

3 MR. MAZUR: That's correct. And I  
4 think we had identified some options in the  
5 alternatives report that we studied, one being  
6 southern generation.

7 MR. MERONEK: All right. Southern  
8 generation was always on tap, wasn't it? I mean,  
9 southern generation was always a possibility at  
10 the time that this report was prepared?

11 MR. MAZUR: It was an alternative.

12 MR. MERONEK: Right. And it's not in  
13 this report?

14 MR. MAZUR: This report was just  
15 looking at the concept of whether, beyond Bipole  
16 III, we could put more DC into the system or we  
17 would have to go to AC. And there's a lot of  
18 technical documentation in the report describing  
19 the issues and the reasons why.

20 MR. NEUFELD: Might I also add that  
21 this is a transmission written report. This is  
22 about transportation of electrons. And if  
23 southern system generation was contemplated, that  
24 would be done in a different business unit.

25 MR. MERONEK: But under one corporate

1 umbrella, correct?

2 MR. NEUFELD: That's correct. But  
3 that's the reason why you wouldn't see generation  
4 in a report such as this ultimate DC, or ultimate  
5 DC development.

6 MR. MERONEK: Nor did you see in this  
7 report the use of gas turbines as an option,  
8 correct?

9 MR. NEUFELD: Correct, for the same  
10 reason.

11 MR. MERONEK: Right. But yet gas  
12 turbines and importation were reliability issues,  
13 as comparables, to compare against the Bipole III  
14 transmission line in the EIS, correct?

15 MR. MAZUR: That is correct. We did a  
16 joint study with the resource planning section of  
17 our company.

18 MR. MERONEK: And none of the options  
19 that we are about to talk about today in this  
20 report were placed in the EIS for comparative  
21 purposes, correct?

22 MR. MAZUR: That's correct because  
23 none of the options, other than the Bipole III  
24 option, as planned and put into the capital plan,  
25 addressed the corridor outage and the converter

1 station outage.

2 MR. NEUFELD: Might I add that when we  
3 talk about ultimate DC, we're talking far future  
4 DC. We're not talking about plans that are  
5 eminent on the near term horizon.

6 MR. MERONEK: Right. But your  
7 definition and my definition of far into the  
8 future probably are very different.

9 But having said that, the fact of the  
10 matter is this report was not identified as a  
11 technical report dealing with reliability in any  
12 of the supporting documentation in the EIS;  
13 correct?

14 MR. MAZUR: I believe that we had  
15 thought we had filed it, because it was one of the  
16 reports asked for. And I don't know what happened  
17 to it, but apparently it was not filed.

18 MR. MERONEK: Now the key findings in  
19 this report are found on page 2. And it says:

20 "Based on the currently available new  
21 HVDC technology, system response to  
22 faults and other technical and  
23 reliability factors, a high capacity  
24 high voltage AC transmission line  
25 should be considered for the next



1 major north/south transmission

2 addition beyond Bipole III."

3 Correct?

4 MR. MAZUR: That's right.

5 MR. MERONEK: And that still stands  
6 today?

7 MR. MAZUR: Yes.

8 MR. MERONEK: All right. And that  
9 high capacity high voltage AC transportation line  
10 would have to be a 500 kV AC line, would it not?

11 MR. MAZUR: At this point, it would  
12 really depend on what future generation it was  
13 going to be designed to provide outlet for.

14 MR. MERONEK: But you wouldn't put  
15 something less than a 500 kV AC line coming from  
16 the north to the south?

17 MR. MAZUR: Yeah, I think it would be  
18 500 kV. The question would be the capacity.

19 MR. MERONEK: Right.

20 MR. NEUFELD: And then the capacity  
21 would be established as a requirement for  
22 generation outlet.

23 MR. MERONEK: Right. And that 500  
24 kV AC transmission line would have to come down  
25 the west side, correct?

1 MR. MAZUR: I don't think I would  
2 presume where it would go at this point, but it  
3 wouldn't go on the same corridor as the Bipole III  
4 line.

5 MR. MERONEK: No, but it wouldn't go  
6 down the east side, correct?

7 MR. NEUFELD: Well, we haven't  
8 predetermined the corridor for this. This is the  
9 future, this is future conceptual.

10 MR. MERONEK: It wouldn't go down the  
11 east side, would it?

12 MR. NEUFELD: How would I know that?

13 MR. MERONEK: Okay. Because Bipole  
14 III wasn't allowed to go down the east side.

15 MR. MAZUR: That's correct, Bipole III  
16 wasn't, but we have no indication whether that  
17 east side will be available in the future or not.

18 MR. MERONEK: So if it went down the  
19 west side, it wouldn't go down the same corridor,  
20 would you accept that it would get pretty crowded  
21 in relationship to the Bipole III that's presently  
22 proposed?

23 MR. NEUFELD: Well, from a  
24 transmission standpoint, you are correct. If  
25 we're talking about the central corridor or the

1 east corridor, it gets fairly congested when  
2 you've got big transmission lines like this coming  
3 down, relative to the spacing required for  
4 reliability.

5 MR. MERONEK: All right. Second key  
6 finding:

7 "As a long-term reliability goal,  
8 Splitting of the Dorsey Bipole I and  
9 II inverters into two separate  
10 converter station location shall be  
11 considered to reduce the amount of  
12 power loss due to catastrophic  
13 events."

14 Do you see that?

15 MR. MAZUR: Yes. And I would also add  
16 that, although this report didn't concentrate on  
17 the corridor, it would also be a long-term goal to  
18 split the Bipole I and II lines out of the same  
19 corridor, otherwise you gain nothing.

20 MR. MERONEK: Right. And that issue  
21 remains a problem, that you still got a Bipole I  
22 and II at the same Dorsey Station with the same  
23 risk?

24 MR. MAZUR: Absolutely, a very  
25 significant problem.

1                   MR. NEUFELD: I would add that once  
2 Bipole III is in place, it becomes less of a  
3 problem.

4                   MR. MERONEK: Mr. Neufeld, in this  
5 report is it not the case that, with that key  
6 finding, that it is still very much in the mindset  
7 of Manitoba Hydro to split Bipole I and II because  
8 you are not ameliorating the outage with respect  
9 to the Dorsey Station; is that not true?

10                  MR. NEUFELD: With Bipole III, that  
11 risk becomes significantly suppressed.

12                  MR. MERONEK: By a third, correct?

13                  MR. MAZUR: I think the statement is  
14 talking about a long-term goal, it's not talking  
15 about a definitive plan or when.

16                  MR. MERONEK: I know it's -- you say  
17 it's a long-term goal. But is it not the case  
18 that if you split Bipole I and II, and you have  
19 three inverter stations, your reliability is  
20 enhanced over what you are proposing?

21                  MR. MAZUR: In actual fact, it is not.  
22 The exposure to the Dorsey converter is reduced,  
23 but we still have significant exposure to the  
24 corridor loss.

25                  MR. MERONEK: I'm not talking

1 corridor, sir, I'm talking about the inverter  
2 stations.

3 MR. MAZUR: You cannot talk about one  
4 without the other.

5 MR. MERONEK: I am talking about one  
6 without the other, and I'm asking you to confine  
7 your answer to that. If you have Bipole I at one  
8 station, Bipole II at another, and Bipole III at a  
9 third, are you not reducing the impact of a loss  
10 of Dorsey Station more than you would be by what  
11 is being proposed here?

12 MR. MAZUR: Yes, you would, but you  
13 don't address the corridor loss.

14 MR. MERONEK: Well, we'll get to that,  
15 sir.

16 MR. MAZUR: I would also like to point  
17 out in that same report, in the executive summary  
18 at page 1, there is a statement that says:

19 "Bipole III is definitely the best  
20 next addition to the system  
21 considering the Bipole I and  
22 catastrophic outage exposure. Risks  
23 associated with moving Bipole II to  
24 another location and the need for  
25 further north/south transmission."

1 MR. MERONEK: I'm not going to leave  
2 any stone unturned, I assure you, Mr. Mazur, we'll  
3 come to that.

4 Over on page 3 in the conclusion of  
5 this report at least, in the item number 3, last  
6 sentence:

7 "If building the Bipole III  
8 transmission line is significantly  
9 delayed, then at some point relocating  
10 Bipole II from Dorsey will have to be  
11 considered."

12 Do you still subscribe to that proposition?

13 MR. MAZUR: Only in the context of the  
14 previous sentences.

15 "The best development sequence from a  
16 reliability perspective is to have the  
17 third Bipole in the separate  
18 corridor."

19 MR. MERONEK: If you can't do Bipole  
20 III, and just humour me for a moment, if you  
21 cannot, if you do not get the licence to build  
22 Bipole III as it's presently constituted, will you  
23 not have to look at a Bipole II relocation as an  
24 option?

25 MR. TYMOFICHUK: Mr. Chairman, if

1 Bipole III is not licensed, we will have to  
2 reconsider all options, including southern gas  
3 generation, and this will be in the mix. We  
4 cannot definitively say that this is the only  
5 option. It's not a preferred option by far.

6 MR. MERONEK: And I'm not suggesting  
7 that, sir, I'm just saying it is an option. It's  
8 in here, and it's something that you would have to  
9 look at, revisit?

10 MR. TYMOFICHUK: In the mix of all the  
11 others.

12 MR. MERONEK: Yes, sir.

13 Now, let's go to the options that have  
14 been discussed in this report. And we're starting  
15 at page 8. And as I see in this particular  
16 report, there are seven considerations, is that  
17 correct? Status quo and six options?

18 MR. MAZUR: That's correct.

19 MR. MERONEK: And I think we can all  
20 agree that the status quo of having Bipoles I and  
21 II inverters located at Dorsey cannot be  
22 sustained, correct?

23 MR. TYMOFICHUK: Correct.

24 MR. MAZUR: In the context of Bipole  
25 III wouldn't be built, I would say that's correct.

1 MR. MERONEK: That's what the status  
2 quo is, correct?

3 MR. MAZUR: That's correct.

4 MR. NEUFELD: Correct. It's highly  
5 risky.

6 MR. MERONEK: Yes, I think we all  
7 agree.

8 The first option is a Bipole II  
9 inverter relocated at Riel. And might I add,  
10 that's roughly what the Clean Environment  
11 Commission was asking about, a relocation to Riel,  
12 correct? We can call this more or less the CEC  
13 inquiry?

14 MR. NEUFELD: I don't believe so.  
15 Their proposal was to inject the Bipole III line  
16 into Dorsey and move Bipole II converters to Riel.

17 MR. MERONEK: All right. In part they  
18 were talking about it?

19 MR. NEUFELD: In part.

20 MR. MERONEK: Yes, I stand corrected.  
21 Now, according to this report, from a  
22 strict reliability point of view, it's an  
23 improvement over the status quo; is that correct?

24 MR. MAZUR: It addresses the Dorsey  
25 Station loss.



1 MR. MERONEK: Right. Reduces that  
2 component of risk by 50 percent, correct?

3 MR. MAZUR: Approximately.

4 MR. MERONEK: The second option is  
5 option two, the existing system plus Bipole III  
6 with a Riel inverter. And that more or less is  
7 the present proposal before this Commission,  
8 correct?

9 MR. MAZUR: That's correct.

10 MR. MERONEK: The third option over on  
11 the next page -- and just speaking to that, that  
12 particular option provides enhanced reliability  
13 and provides new transmission generation capacity.  
14 So that's an enhancement over what options were  
15 discussed above, correct?

16 MR. MAZUR: Yeah. Any north/south  
17 transmission line will provide for future, or  
18 potential future northern generation.

19 MR. NEUFELD: But in the context of  
20 the earlier options that we reviewed, the Bipole  
21 III alternative also covers for corridor loss,  
22 whereas option two does not.

23 MR. MERONEK: I'm just going by this  
24 report. I'm just trying to determine the issue of  
25 reliability in this context. And option two

1 appears to be better than option one, which

2 appears to be better than the status quo?

3 MR. NEUFELD: That's correct.

4 MR. MERONEK: Yes. And option three  
5 is similar to the Art Derry/Dennis Woodford  
6 proposal of having Bipole I at Dorsey, Bipole III  
7 at Riel, Bipole II at a new location. They have  
8 just reversed Bipole III being at another location  
9 and Bipole II being at Riel, but it's the same  
10 configuration, correct?

11 MR. MAZUR: That's correct.

12 MR. NEUFELD: That's a very expensive  
13 option.

14 MR. MERONEK: We'll get to that,  
15 Mr. Neufeld. I know you're anxious to get to the  
16 end of the story.

17 That option in terms of reliability in  
18 this report indicates that from a converter  
19 station perspective, it's a better reliability  
20 option than option two. Am I reading that  
21 correctly?

22 MR. MAZUR: Yeah, that's correct.

23 MR. MERONEK: And it goes on to say  
24 that the inverter station could be at or near  
25 LaVerendrye or along the future South Winnipeg

1 transmission corridor, correct?

2 MR. MAZUR: That's correct.

3 MR. MERONEK: So if you had a concern  
4 about the station being at LaVerendrye, there's  
5 nothing to prevent it being located further south  
6 and east along the transmission corridor, correct?

7 MR. MAZUR: Yes. This was conceptual  
8 so we didn't look in detail at any particular  
9 site.

10 MR. MERONEK: Sure. Everything is  
11 conceptual in the sense that there hasn't been a  
12 full study in relation to any of these options,  
13 correct?

14 MR. MAZUR: Well, this study looked at  
15 it from a conceptual point of view.

16 MR. MERONEK: Right.

17 MR. MAZUR: And we ruled it out as  
18 being less of a preferred option compared to  
19 option two, and so we didn't pursue detailed  
20 studies.

21 MR. MERONEK: I know, and everybody  
22 can read the report, and I'll concede that, sir,  
23 but I'm just trying to walk through this. From a  
24 reliability perspective, as it relates to Dorsey,  
25 and I failed physics and I failed chemistry, so I

1 never got into engineering, but it seems  
2 mathematically intuitive that if you have three  
3 inverters as opposed to two, your reliability  
4 against the risk of an outage at one with two  
5 Bipoles is a lot better?

6 MR. MAZUR: That is correct, ignoring  
7 the issue of the lines.

8 MR. MERONEK: Yes. And option four is  
9 Bipoles I and II at Dorsey, Bipole III at Riel and  
10 a fourth Bipole at a third inverter, correct?

11 MR. MAZUR: That's correct, and it's  
12 one of the options that was really the focus of  
13 what should the future north/south transmission be  
14 for future generation that would require  
15 additional transmission beyond Bipole III?

16 MR. MERONEK: Right. And that hasn't  
17 been discarded?

18 MR. MAZUR: It remains a future  
19 option.

20 MR. MERONEK: Okay.

21 MR. MAZUR: At this point we don't  
22 know whether there's future northern generation or  
23 not, that hasn't been approved.

24 MR. MERONEK: Option five is option  
25 four, but with four inverters at separate

1 locations providing the greatest DC related  
2 reliability improvements, correct?

3 MR. MAZUR: That's correct.

4 MR. MERONEK: And option six would be  
5 relocating Bipole II inverter at Riel, but further  
6 northern development on the AC line. Would that  
7 present the best option from a reliability point  
8 of view? I'm just trying to do it -- whether you  
9 can do it in sequence here?

10 MR. MAZUR: I think as you go through  
11 the report, option six provides some benefits in  
12 terms of southern inertia but it -- and it  
13 provides some benefits in terms of fault  
14 reduction.

15 MR. MERONEK: Okay. So would it be  
16 fair to say that in terms of reliability, going  
17 from status quo to option six would be going from  
18 worst to best, in terms of converter stations?

19 MR. MAZUR: I don't think that's  
20 necessarily true. It really depends a lot on what  
21 the future generation development will be.

22 MR. MERONEK: Can you tell me why none  
23 of these options were put in the EIS report for  
24 the purposes of comparison, to give the parties  
25 and the Commission an idea of what options were

1 out there.

2 MR. MAZUR: I think the purposes of  
3 this report was to screen out the options and get  
4 down to options of future north/south  
5 transmission, which is back-up for the existing  
6 Bipole I and II, new southern generation, or  
7 import.

8 MR. MERONEK: Could I --

9 MR. MAZUR: And those were filed and  
10 put into the EIS.

11 MR. MERONEK: Could I propose another  
12 reason, and that would be that these are much more  
13 attractive than the options that were put into the  
14 EIS in relation to, as a comparison to Bipole III?

15 MR. MAZUR: I would disagree with  
16 that, because they do not address the corridor,  
17 except for option six, which is addressed in the  
18 EIS as the AC line being much more expensive. I  
19 think that's the \$4.188 billion line that  
20 Mr. Derry took note of.

21 MR. MERONEK: Now, over on page 10  
22 under technical issues, there is a reference to  
23 reliability gains -- I'm in the first paragraph on  
24 page 10, last sentence:

25 "Reliability gains accrue from the

1 placement of new stations around the  
2 hub and in completing transmission  
3 rings at various voltage levels around  
4 the city. Such advancements are  
5 consistent with worldwide practice."

6 Do you see that?

7 MR. MAZUR: Yes.

8 MR. MERONEK: And so worldwide  
9 practice would support having new stations around  
10 the transmission rings around the city?

11 MR. MAZUR: I believe the worldwide  
12 practice is the reference to the fact that  
13 Manitoba Hydro to date has not established a  
14 maximum station size, you know, which if we had,  
15 we wouldn't have a 4000-megawatt Dorsey station.

16 MR. MERONEK: Now, the next several  
17 pages deal with technical issues, correct?

18 MR. MAZUR: That's correct.

19 MR. MERONEK: And they're too  
20 complicated for my plebeian mind to understand,  
21 but obviously there are technical difficulties  
22 associated with whatever you do, correct? Would  
23 that be fair?

24 MR. MAZUR: There are technical  
25 challenges with all options.

1 MR. MERONEK: Exactly. And they would  
2 have to be addressed in a serious, meaningful and  
3 detailed way, correct?

4 MR. MAZUR: That's correct.

5 MR. MERONEK: And it's clear that from  
6 Hydro's perspective, there are more complicated  
7 issues associated with relocation, rather than  
8 Bipole III in and of itself?

9 MR. MAZUR: Absolutely.

10 MR. MERONEK: But they are not  
11 impenetrable?

12 MR. MAZUR: I think all issues are  
13 mitigable, but you have to consider the risk  
14 associated with a heavily utilized existing  
15 system.

16 MR. MERONEK: And in order to do that,  
17 you'd have to do a pretty comprehensive study to  
18 weigh those risks against the costs and against  
19 the benefits, fair?

20 MR. MAZUR: We have looked at the  
21 risks, we hired consultants to advise us.

22 MR. MERONEK: But you haven't done  
23 that with respect to this particular report and  
24 these options that are listed in that report,  
25 correct?



1 MR. NEUFELD: Well, that's true, we  
2 haven't. And the reason is that these, everything  
3 that's in this report doesn't describe  
4 alternatives to Bipole III, these are future  
5 plans.

6 MR. MERONEK: Well, Bipole III is in  
7 here and it's not a future plan, it's what you're  
8 proposing.

9 MR. NEUFELD: Well, it's as a  
10 reference.

11 MR. MERONEK: Starting at page 33, you  
12 get into the ultimate conclusions now in terms of  
13 the options, the effectiveness of the options in  
14 addressing reliability, and that's the heading.  
15 The status quo is right off the table, it's not  
16 even addressed there, correct?

17 MR. MAZUR: Can you repeat that, sir?

18 MR. MERONEK: Yes. In terms of  
19 ultimate conclusions and reliability, there's not  
20 even a reference to status quo, it's been  
21 discarded?

22 MR. MAZUR: That's correct.

23 MR. MERONEK: So you start with option  
24 one, and it talks about relocation of Bipole II at  
25 Riel. It's the earliest in-service date option,

1 correct?

2 MR. MAZUR: I'm not sure how you make  
3 that conclusion?

4 MR. MERONEK: Well, I'm just reading  
5 from your report. It says:

6 "Also this option is expected to have  
7 the earliest in-service date since it  
8 does not require new north/south  
9 transmission to be implemented."

10 MR. MAZUR: Yes, I see that.

11 MR. MERONEK: Yeah. So the impediment  
12 with respect to Bipole II being relocated to Riel  
13 as it relates to this particular option in this  
14 particular report has to do with additional  
15 transmission, correct?

16 MR. MAZUR: The other impediment is it  
17 doesn't address the loss of the Bipole I and II  
18 corridors. And that wasn't the focus of this  
19 report.

20 MR. MERONEK: Well, I'm just getting  
21 you to confirm, the loss of the corridors, you  
22 won't find that in this narrative, in this option,  
23 correct?

24 MR. MAZUR: The corridor is not  
25 discussed in this option.

1 MR. MERONEK: Okay.

2 MR. MAZUR: In this report, sorry.

3 MR. MERONEK: Right.

4 Now, with respect to option two,  
5 that's with the existing system, plus Bipole III  
6 with the Riel inverter -- I call that the Manitoba  
7 Hydro option -- there's an enhanced reliability  
8 and increased generation transmission possibility,  
9 correct?

10 MR. MAZUR: That is correct. And as  
11 the EIS points out, it does address the corridor  
12 loss.

13 MR. MERONEK: Again, just to confirm,  
14 there's no reference in option two to the issue of  
15 the corridor?

16 MR. MAZUR: There's also no reference  
17 to the lines required as far as relocating the  
18 Bipole to Riel, et cetera.

19 MR. MERONEK: So the answer --

20 MR. MAZUR: The focus was on the  
21 technical issues associated with the location of  
22 converters.

23 MR. MERONEK: So the answer to my  
24 question is no, there's no reference to risk of  
25 outage for the Bipole I and II lines in this

1 report?

2 MR. MAZUR: There is no reference to  
3 corridors. The purpose of the report was to  
4 select technology after Bipole III, select  
5 technology for possible future north/south  
6 transmission.

7 MR. MERONEK: And then if you go over  
8 to page 34, in reference to the option that  
9 Manitoba Hydro is proposing, the last sentence  
10 under option two says:

11 "This option would improve the LOLE  
12 for many years but other steps would  
13 need to be taken in the future as  
14 system load becomes overly dependent  
15 on the Dorsey station."

16 That's the future requirements for potential  
17 additions to the system, correct?

18 MR. MAZUR: That would be correct.

19 MR. MERONEK: And if it was AC  
20 transmission down the west side, that has not been  
21 factored in as a cost, correct?

22 MR. MAZUR: This report doesn't really  
23 deal with any costs.

24 MR. MERONEK: Well, it hasn't been  
25 factored in anywhere, correct?

1 MR. MAZUR: That's correct.

2 MR. MERONEK: And if it was imported  
3 from the United States, there would be a cost  
4 component to that, if that was the resolution that  
5 Manitoba Hydro thought was appropriate, correct?

6 MR. MAZUR: That's correct. And  
7 Manitoba Hydro filed a report, an alternative to  
8 Bipole III that looked at gas and import.

9 MR. MERONEK: Right. And that's more  
10 expensive than Bipole III?

11 MR. MAZUR: That is correct.

12 MR. MERONEK: Right. So that option,  
13 certainly in this study -- not in this study, but  
14 in this hearing, is just not appropriate?

15 MR. MAZUR: That was our conclusion.

16 MR. MERONEK: Yes.

17 Now, over on page 34 under option  
18 three, the conclusion is that it's an enhanced  
19 reliability and should be looked at -- and I'm  
20 paraphrasing -- at a future date, but there are  
21 technical difficulties in terms of communication  
22 and other components or aspects that dramatically  
23 or significantly change the system, correct?

24 MR. MAZUR: Excuse me, what page are  
25 you referring to?

1 MR. MERONEK: On page 35.

2 MR. MAZUR: That's correct.

3 MR. MERONEK: Now, over on page 36,  
4 there's even -- there's more narrative on this  
5 subject which goes into the issue of what is  
6 preferred. And you are dealing on page 36, or the  
7 report is dealing, as I understand it, with the  
8 problem of refurbishment, and that's under 5.4,  
9 splitting the Bipole I and II inverters.

10 Do you see that?

11 MR. MAZUR: Yes. I don't know what  
12 the, what you're -- where you are referring to  
13 refurbishment?

14 MR. MERONEK: Yeah, in the first  
15 paragraph it says:

16 "As can be expected after these many  
17 years, Bipoles I and II are starting  
18 to be renewed."

19 I call that refurbishment.

20 MR. MAZUR: Yes, thank you for the  
21 clarification.

22 MR. MERONEK: And the report  
23 identifies that there are problems that are  
24 surfacing with respect to Bipole II, and certainly  
25 the record in this hearing indicates that as well.

1 But I'm interested in the next paragraph. It  
2 says:

3 "It would be tempting then, knowing  
4 the present overconcentration of  
5 facilities at the Dorsey Station..."

6 And by that you mean Bipoles I and II there,  
7 correct?

8 MR. MAZUR: Yes.

9 MR. MERONEK: "...and the  
10 deteriorating state of Bipole II, to  
11 give weighting options which would  
12 re-establish the Bipole II inverter at  
13 a different location."

14 Options one, which is relocating Bipole II at  
15 Riel, option three, which is more or less the  
16 Coalition option, option five and six all include  
17 this possibility.

18 Do you see that?

19 MR. MAZUR: Yeah, I see that.

20 MR. MERONEK: And one of the issues  
21 here that the report emphasizes is that there  
22 might be a temptation to, if there was a  
23 catastrophic loss at Dorsey, to try to rebuild it?

24 MR. MAZUR: I think that would be one  
25 of the issues.

1 MR. MERONEK: Yeah. And it's a  
2 warning here that if there was that temptation,  
3 there would be substantial reconstruction costs  
4 and bottle generation, and a significant financial  
5 impediment equivalent to a multi-year severe  
6 drought, correct?

7 MR. MAZUR: Sorry, given the  
8 catastrophic loss at Dorsey?

9 MR. MERONEK: Right?

10 MR. MAZUR: That would be true.

11 MR. MERONEK: Right. So given those  
12 warnings, the report goes on over to the next page  
13 and states in the last sentence of the first  
14 paragraph:

15 "Planning preparation for an ultimate  
16 split would seem prudent as it is not  
17 likely that the high power levels  
18 through Dorsey would be acceptable for  
19 reliability in the foreseeable  
20 future."

21 Do you see that?

22 MR. MAZUR: Yes.

23 MR. MERONEK: Okay. So whether it's  
24 tomorrow or five years down the road, or 10 years  
25 down the road, that's something that Manitoba



1 Hydro is going to have to look at seriously in  
2 terms of overall design, correct?

3 MR. MAZUR: I think we would look at  
4 that seriously. It has been looked at seriously,  
5 and the decision right now is it is still much  
6 more economical to refurbish Bipole II than to  
7 rebuild it.

8 MR. MERONEK: And aside from present  
9 value issues, and aside from inflation and other  
10 construction costs, that money will have to be  
11 spent anyways if Manitoba Hydro comes to the  
12 conclusion that that's an appropriate thing to do  
13 in the future, correct?

14 MR. MAZUR: It would. It's just  
15 unknown at what future. Because just relocation  
16 only solves half the problem. And the issue is at  
17 what point would it be feasible to separate the  
18 corridor, the lines on the corridor?

19 MR. MERONEK: Right.

20 MR. MAZUR: None of these decisions  
21 can be made independent. This report looked at  
22 one aspect.

23 MR. MERONEK: I understand that.

24 And then if you go to the final  
25 conclusions over on page 38, you have the status

1 quo. And again, that's been discarded. And you  
2 have option one. And again, the caveat here that  
3 Bipole III, as proposed by Manitoba Hydro, is the  
4 preferred way to go, but if it's not doable, then  
5 this option has to be looked at seriously and fast  
6 forwarded, as it were. Is that a fair summary?

7 MR. MAZUR: That's a fair summary,  
8 given the caveat that Bipole III is not a go.

9 MR. MERONEK: That is the underlying  
10 assumption, of course.

11 And under option two, it's giving the  
12 green light to the Manitoba Hydro proposal, which  
13 in fact had already been chosen by Manitoba Hydro  
14 before this report, correct?

15 MR. MAZUR: Yes. As I said, we were  
16 doing several different evaluations in parallel.  
17 Yeah. Bipole III overall addresses all the  
18 issues.

19 MR. MERONEK: Right. And option  
20 three -- and I'm paraphrasing -- over on page 39,  
21 while attractive from a reliability perspective,  
22 has considerable technical change, complexity, and  
23 combined with a high cost, this option is not  
24 favoured as the next step. But I am interested in  
25 the following sentence:

1 "It can be considered a desirable  
2 ultimate outcome and should be  
3 technically protected to the extent  
4 possible."

5 Does that mean that in any planning, you plan with  
6 a potential prospect of having Bipole II  
7 relocated?

8 MR. MAZUR: That means that at the  
9 time when we have to make the next decision on  
10 reliability, yeah, it would be one of the options.  
11 But option two is beneficial because it provides  
12 us the capacity and spare, so we have the  
13 operating flexibility to be able to accommodate  
14 doing other system enhancements.

15 MR. MERONEK: Right. But it seems to  
16 imply here that this option certainly not be  
17 discarded, and certainly not be put in a drawer  
18 anywhere. In the back of the corporate mind, or  
19 the engineering mind, this is very much something  
20 that ultimately may well be considered.

21 MR. MAZUR: That's right. It would  
22 really be related as well to when we might  
23 consider corridor separation, which would likely  
24 be near the end of life of the transmission lines.

25 MR. MERONEK: Now, just on that score,

1 certainly this report, and as a matter of fact the  
2 EIS study says that from a reliability  
3 perspective, building of Bipole III at 3.28 or  
4 3.92 billion, or whatever it is, only addresses  
5 the reliability factor out to 2025, correct?

6 MR. MAZUR: Bipole III addresses the  
7 reliability effect until 2025, considering loss of  
8 the corridor -- and I need to point this out very  
9 clearly -- plus loss of the converter. Option  
10 three would basically be no different than status  
11 quo with respect to loss of the corridor.

12 MR. MERONEK: So in terms of  
13 reliability, something would have to be done after  
14 2025, correct?

15 MR. MAZUR: That is correct.

16 MR. MERONEK: And I think you're  
17 saying to the Commission that you don't know what  
18 that would be at this point?

19 MR. MAZUR: What we're saying to the  
20 Commission is that the choices will a lot depend  
21 on decisions on the future development. If  
22 there's no northern generation development, we're  
23 certainly not going to be building future  
24 north/south lines. At that point in time, our  
25 deficit for loss of Bipole I and II is zero. If

1 we follow the generation, or the load growth of  
2 some 80 megawatts a year, one option is to put an  
3 80-megawatt southern generator in every year --  
4 I'm speaking from the point of view, and would  
5 address the reliability.

6 MR. MERONEK: Right.

7 MR. MAZUR: If there is northern  
8 generation, there might be import options, because  
9 any northern generation will likely be related to  
10 some power sales and an export line. So the  
11 options are varied. And for us to come out and  
12 identify a specific option today wouldn't be  
13 appropriate.

14 MR. MERONEK: So in terms of  
15 reliability, forget about new sales or  
16 development, strictly from a reliability  
17 perspective, and the anticipated domestic load  
18 growth, the EIS clearly states that there will be  
19 an issue with respect to liability come 2025?

20 MR. MAZUR: That's correct.

21 MR. MERONEK: And so are you going to  
22 wait till 2025 or --

23 MR. MAZUR: No, we'll be knowing that  
24 once the generation resource plan is approved.

25 MR. MERONEK: And the intention,

1 whether it comes to pass or not, is to have new  
2 generation, correct?

3 MR. MAZUR: New generation is required  
4 to continue to serve Manitoba load, yes.

5 MR. MERONEK: Right.

6 MR. MAZUR: And somewhere around 2021,  
7 it varies from year to year.

8 MR. MERONEK: And the anticipation is  
9 that there will be -- the hope and expectation of  
10 Manitoba Hydro is that there will be new  
11 north/south transmission, correct? Whether that  
12 comes to pass or not, who knows?

13 MR. MAZUR: All I can say is that the  
14 preferred plan put forward by Manitoba Hydro  
15 assumes northern generation.

16 MR. MERONEK: Now, I want to move  
17 briefly into the answers to -- that Manitoba Hydro  
18 gave to the letter from the Commission dated  
19 December 3. Have you got those in front of you?

20 MR. MAZUR: Yes.

21 MR. MERONEK: Can you take credit for  
22 this response, Mr. Mazur, or should --

23 MR. MAZUR: My team prepared it, yes.

24 MR. MERONEK: So, I should be speaking  
25 to you about this?

1 MR. MAZUR: Yes, or if there's other  
2 issues, my panel members will help out.

3 MR. MERONEK: Sure.

4 Now, as I understand this report,  
5 clearly picking up Bipole II equipment and moving  
6 it to Riel is a non-starter, correct?

7 MR. MAZUR: Picking up Bipole II  
8 equipment and moving it is a non-starter, yes.

9 MR. MERONEK: I think we all agree  
10 with that.

11 What I understand here in the rest of  
12 the report is that there's another scenario, and  
13 that is relocating Bipole II to Riel as a new  
14 converter station. And that's scheme three.

15 MR. MAZUR: Yes, that was one of the  
16 questions we were responding to.

17 MR. MERONEK: Right. And again, as I  
18 understand it, it's technically feasible, with a  
19 lot of complexities, technical difficulties that  
20 you have identified in this response, correct?

21 MR. MAZUR: Yes.

22 MR. MERONEK: It's technically  
23 feasible. And the cost of that you have  
24 estimated, with all of the pluses and minuses, to  
25 be roughly \$836 million?

1 MR. MAZUR: That would be --

2 MR. MERONEK: Incremental costs,  
3 sorry?

4 MR. MAZUR: That would be the net  
5 cost, assuming that we didn't build, for example,  
6 a south paralleling line. And it was providing  
7 credit for the expenditures expected on Bipole II  
8 in the capital plan.

9 MR. MERONEK: Right. So this scenario  
10 would increase the cost by approximately  
11 \$836 million, if I read it correctly?

12 MR. MAZUR: By how much? Sorry, I  
13 didn't hear.

14 MR. MERONEK: \$836 million, page 12?

15 MR. MAZUR: I believe that's correct.  
16 Yes. Yes, that's correct.

17 MR. MERONEK: Now one of the --

18 MR. MAZUR: Yes. And just to point  
19 out that the 836 wouldn't address or provide  
20 equivalent reliability with respect to paralleling  
21 of Bipole I and II.

22 MR. MERONEK: Now, one of the  
23 constraints that has been identified in these  
24 answers is over on page 14. And that deals with  
25 the need for an environmental impact assessment



1 for approximately 250 kilometres of line?

2 MR. MAZUR: That's correct.

3 MR. MERONEK: Now, the 250 kilometres  
4 is made up of the following, and I think it's  
5 probably easier to look at figure 4 to the  
6 answers, page 16. Have you got that, sir?

7 The 250 kilometres, and I think the  
8 point here is that you'd have to build 250  
9 kilometres of line to ameliorate the 230  
10 kilometres that are proposed, correct?

11 MR. MAZUR: For this scheme, the way  
12 we envision it, that is correct.

13 MR. MERONEK: Right, okay. So the  
14 first component will be 80 kilometres straight  
15 across to Dorsey, correct?

16 MR. MAZUR: Yeah. And that was the  
17 proposed routing by the Commission.

18 MR. MERONEK: And the hundred  
19 kilometres, has that been identified precisely to  
20 be a hundred?

21 MR. MAZUR: No. It's an estimate  
22 based on the fact that we wanted to maintain at  
23 least 50 kilometres separation from Dorsey.

24 MR. MERONEK: Right, so it's probably  
25 more than a hundred, isn't it?

1                   MR. MAZUR: I can't tell you at this  
2 point until we go out there and look at some  
3 details of the routing.

4                   MR. MERONEK: Right. And so is there  
5 any reason why that juncture along existing Bipole  
6 I and II can't be closer, closer to Dorsey?

7                   MR. MAZUR: Well, we would be hoping  
8 to maintain separation. The whole premise of the  
9 reliability initiative is to provide redundant  
10 separated facilities. And all our risk analysis  
11 indicate that that is the best way to address our  
12 existing problem.

13                   MR. MERONEK: But you don't have any  
14 separation of Bipole I and II at Dorsey right now?

15                   MR. MAZUR: No, but we're making a  
16 change and we're not going to be, you know, doing,  
17 repeating the same, I'll call it mistakes, with no  
18 disrespect to past decisions, that were made some  
19 40 or 50 years ago.

20                   MR. MERONEK: Okay. Now, with respect  
21 to the 70 kilometres, you have indicated here that  
22 that isn't -- there's another way to skin the cat  
23 so to speak, and it's to put a switching gate in  
24 along Bipole II where the hundred kilometres  
25 starts, and you'd save yourself approximately

1 \$55 million?

2 MR. MAZUR: That is correct, on the  
3 caveat that now we wouldn't be able to parallel  
4 for that portion of line, because there's no way  
5 to cover it if it's lost.

6 MR. MERONEK: Unless you kept it open,  
7 unless you kept that line -- you are anticipating  
8 that you wouldn't keep that line from the  
9 switching gate to Dorsey, correct?

10 MR. MAZUR: Well, if the hundred  
11 kilometre line is lost, you have no way to get to  
12 Dorsey.

13 MR. MERONEK: And so in terms of that  
14 outage, we're talking hours perhaps, or days, not  
15 months, correct?

16 MR. MAZUR: We're not talking hours.  
17 I think we have repeatedly said, you know, that we  
18 would need six to eight weeks and it could be  
19 more, depending on the location and nature of the  
20 damage.

21 MR. MERONEK: You haven't done any  
22 studies to pin that down, correct?

23 MR. MAZUR: We have responded to  
24 several IRs on that, and that is our best  
25 estimate. So I wouldn't agree that we haven't --

1 we did the studies.

2 MR. MERONEK: If you did the  
3 switching, then you wouldn't need the 70  
4 kilometres, correct, underneath?

5 MR. MAZUR: If we accepted the  
6 reduction in the reliability of the parallel  
7 scheme, that's correct.

8 MR. MERONEK: Correct me if I'm wrong,  
9 but that 70 kilometres, that that connection from  
10 Riel to Dorsey is anticipated in the future in any  
11 event, correct?

12 MR. MAZUR: No, it is not. It would  
13 be a paralleling line, it would have to be  
14 reserved for DC operation.

15 MR. MERONEK: In your EIS, you put in  
16 a figure, 1-2, that has an existing undeveloped  
17 right-of-way from Riel to LaVerendrye, and then an  
18 existing developed right-of-way up to Dorsey.  
19 That would imply to me that there's some  
20 contemplation that there's going to be a ring  
21 around the city?

22 MR. MAZUR: There is an existing  
23 right-of-way. Actually, we don't even own all of  
24 the right-of-way at this point, but there is an  
25 existing designated right-of-way between Dorsey

1 and LaVerendrye, and LaVerendrye all the way  
2 around the city to St. Vital, Riel.

3 MR. MERONEK: Right. So if that gets  
4 built, you'd have to pay for that in any event,  
5 correct?

6 MR. MAZUR: I don't follow your  
7 question. Can you repeat?

8 MR. MERONEK: Well, you're saying  
9 there's no contemplation of connecting Riel to  
10 Dorsey. And I'm just saying it looks like there's  
11 something in the plans to that effect.

12 MR. MAZUR: No, there's nothing in the  
13 plans. It's just prudent to be able to secure  
14 these right-of-ways. I think just from the fact  
15 that we've been here in these hearings, it's a  
16 difficult task these days to obtain right-of-way.

17 MR. NEUFELD: I might add that, if I  
18 understood the question correctly, perhaps you can  
19 confirm. Is the question that was asked whether  
20 the intention was to have a DC paralleling line  
21 following that south route corridor extending from  
22 Riel to Dorsey?

23 MR. MERONEK: No, I'm looking at  
24 figure 4, trying to understand what that 70  
25 kilometres is. And it looks to me like it's a

1 line that's ringing the city?

2 MR. MAZUR: Figure 4 depicts the  
3 transmission that would require to implement this  
4 scheme --

5 MR. MERONEK: Right.

6 MR. MAZUR: -- and obtain the same  
7 reliability for paralleling, which includes the  
8 hundred kilometre line, reroute the Bipole II and  
9 the line from Riel to Dorsey, which would be the  
10 DC line that would be required to connect Riel in  
11 Bipole II to Dorsey Bipole I in the event that we  
12 wanted to parallel.

13 MR. NEUFELD: That south loop corridor  
14 is intended for future lines which we have on our  
15 plans, which include St. Vital to LaVerendrye, St.  
16 Vital to Lettelier. Perhaps if the new export  
17 line might be 500, it would follow through that  
18 route. If there was a western grid, such as what  
19 had been contemplated, it would probably reside on  
20 that corridor. So that's the type of  
21 transmission. We haven't got in our plans a  
22 paralleling line to go on there.

23 MR. MERONEK: And the export line that  
24 you are talking about, or that you would  
25 visualize, is a 500 K line that goes from the

1 States up to Dorsey?

2 MR. MAZUR: That is one concept that  
3 is being looked at.

4 MR. MERONEK: And that would go right  
5 through prime agricultural land, correct?

6 MR. NEUFELD: Not necessarily. It  
7 might not be 500 kV either.

8 MR. MERONEK: Well, you go from the  
9 States straight up to Winnipeg, where would you be  
10 missing prime agricultural land?

11 MR. NEUFELD: Well, we haven't mapped  
12 that out, but there's other routes.

13 MR. MERONEK: It's certainly not the  
14 route that Manitoba Hydro talked about in their  
15 CIGRE August 12 paper.

16 MR. TYMOFICHUK: Mr. Chairman, that  
17 CIGRE paper is a very conceptual forward looking  
18 paper. The U.S. export line is still under study  
19 as to voltage. It's still under study as to a  
20 number of corridors. And yes, immediately out of  
21 Dorsey, it would have to trespass or traverse  
22 agricultural land. But as we head southeast, we  
23 may not be in agricultural. We don't know yet  
24 today where that final routing is going to be.  
25 We're months and months away from that.

1 THE CHAIRMAN: I'm not sure of the  
2 relevance of that question in these hearings.

3 MR. MERONEK: If I could have a  
4 minute?

5 THE CHAIRMAN: Certainly.

6 MR. MERONEK: Mr. Chairman, just to  
7 follow up your last observation, it is relevant  
8 from a cumulative effects perspective.

9 THE CHAIRMAN: Okay. Carry on.

10 MR. MERONEK: But I was finished.

11 THE CHAIRMAN: I'll permit it for now  
12 and we'll see where you go.

13 MR. MERONEK: Well, that's the end of  
14 that.

15 THE CHAIRMAN: Okay.

16 MR. MERONEK: I just want to clarify  
17 one thing with respect to the ring. There's a  
18 contemplation of a 500 kV AC line ringing the  
19 city, as a possibility?

20 MR. MAZUR: Conceptually, any ringing  
21 of the city that we have looked at to date, other  
22 than this paralleling line, is a new export line,  
23 and there's a couple options at least that had  
24 been looked at. One is shown in that CIGRE paper  
25 where a line would come out of Dorsey, terminate



1 at Riel, and then from Riel go on to U.S.

2 A second option is that the line would  
3 come out of Dorsey and go directly to U.S. And in  
4 that case, there wouldn't be a ringing line so to  
5 speak.

6 MR. MERONEK: Okay. But that is an  
7 option?

8 MR. MAZUR: It definitely is an  
9 option.

10 MR. MERONEK: Thank you panel, thank  
11 you Mr. Chairman.

12 THE CHAIRMAN: Thank you, Mr. Meronek.  
13 Mr. Williams?

14 MR. WILLIAMS: Good morning members of  
15 the panel and members of the Hydro panel.

16 MR. MAZUR: Good morning.

17 MR. WILLIAMS: I'll be focusing for a  
18 few minutes on the October 14th, 2010, ultimate  
19 HVDC report.

20 Mr. Tymofichuk, just a housekeeping  
21 question for you. I see on the front page of this  
22 report that you are on the distribution list, but  
23 one doesn't see Mr. Brennan or the other  
24 vice-presidents of Manitoba Hydro on this  
25 distribution list.

1 MR. TYMOFICHUK: That is normal for  
2 these types of reports of Hydro.

3 MR. WILLIAMS: And that's just my  
4 question, sir. You are kind of where the buck  
5 stops in terms of where this report went, it  
6 didn't go higher up into the executive management  
7 committee level?

8 MR. TYMOFICHUK: We did present this  
9 to our full executive, including the president.

10 MR. WILLIAMS: Now, Mr. Mazur, I'm not  
11 going to concede that I had challenges with  
12 chemistry like Mr. Meronek did, but I'm not an  
13 engineer. So just in terms of the significance of  
14 the engineer's stamp that I see on the front page  
15 of this document, am I correct in suggesting to  
16 you, sir, that when we see that engineer stamp, it  
17 signifies that the engineer takes full  
18 responsibility for the conclusions of this report,  
19 and that it signifies that the conclusions are  
20 bound by a strict code of ethics and adhere to the  
21 proper standards of engineering?

22 MR. MAZUR: I think I would agree,  
23 yes.

24 MR. WILLIAMS: And Mr. Mazur, in terms  
25 of the issue canvassed in this report of

1 relocating Bipole II to Riel, I would be accurate  
2 in suggesting to you that under the engineering  
3 seal, you have described it as a worthy goal,  
4 correct?

5 MR. MAZUR: I think that's true. We  
6 covered that with Mr. Meronek, I believe.

7 MR. WILLIAMS: And indeed, sir, you  
8 described that option of relocating Bipole III to  
9 Riel as attractive, correct?

10 MR. MAZUR: Pardon, I didn't hear the  
11 last word?

12 MR. WILLIAMS: The last word was  
13 "correct" but I think you were probably --

14 MR. MAZUR: The second last word.  
15 Thank you.

16 MR. WILLIAMS: You described the  
17 option, sir, of relocating Bipole II to Riel as  
18 attractive, correct?

19 MR. MAZUR: In terms of addressing the  
20 converter loss, that's correct.

21 MR. WILLIAMS: And sir, just to start,  
22 if I can direct your attention to page 37 of your  
23 report, and I want to just ask you to look at a  
24 paragraph that I don't think you discussed with  
25 Mr. Meronek, which is the paragraph that appears

1 just -- the second full paragraph just above  
2 section 6. I'll give you just a second to look at  
3 that paragraph, okay, Mr. Mazur.

4 MR. MAZUR: Yes, I see it.

5 MR. WILLIAMS: And indeed, sir, this  
6 is the paragraph in which you describe the  
7 relocation of the Bipole II inverter as  
8 attractive, agreed?

9 MR. MAZUR: That's right.

10 MR. WILLIAMS: And, sir, despite the  
11 attractive nature of that option, you recommend  
12 that it not be given priority over Bipole III,  
13 correct?

14 MR. MAZUR: That's right.

15 MR. WILLIAMS: Am I correct in  
16 suggesting to you, sir, the second full paragraph,  
17 or sentence of this paragraph, that the first two  
18 things you cite are that current load growth and  
19 committed sales would dictate that the corporation  
20 must grapple with new transmission. Those are the  
21 first two things you cite; agreed, sir?

22 MR. MAZUR: Yeah, that's right.

23 MR. WILLIAMS: Now, in terms of  
24 current load growth, sir, I take it you would be  
25 relying upon the 2009 or 2010 load forecast;

1     agreed?

2                   MR. MAZUR: I believe at that time  
3     that would probably be correct.

4                   MR. WILLIAMS: There wouldn't be any  
5     report more current than the 2010 load forecast in  
6     October of 2010, sir?

7                   MR. MAZUR: I don't believe, but  
8     subject to check.

9                   MR. WILLIAMS: And in terms of  
10    committed sales, sir, what committed sales at that  
11    point in time were you referring to?

12                  MR. MAZUR: At the present moment,  
13    Manitoba Hydro has some 1200 megawatts of  
14    long-term sales, plus additional shorter term  
15    seasonal and yearly sales to a level of about  
16    1800 megawatts.

17                  MR. WILLIAMS: Now, sir, I guess the  
18    reason I ask that, sir, is because in 2010, of  
19    course, with Wisconsin Power as well as Minnesota  
20    Power, those weren't committed sales, those were  
21    simply term sheets, agreed?

22                  MR. MAZUR: I believe so, but I'm not  
23    totally familiar with the history of that.

24                  MR. WILLIAMS: And indeed the  
25    Wisconsin power term sheet was for a significantly

1 higher quantity of power than the actual sales  
2 agreement signed some one year later, agreed?

3 MR. MAZUR: If I recall from the  
4 public information, I believe it was 500 megawatts  
5 for the Wisconsin sale, plus I think the Minnesota  
6 power sale was in the 250-megawatt range.

7 MR. WILLIAMS: And of course, now it's  
8 only 100 megawatts for Wisconsin, correct?

9 MR. MAZUR: I cannot confirm that  
10 information. I am on the transmission side, not  
11 in sales. We are not allowed to talk to the  
12 marketers -- standards of conduct.

13 MR. WILLIAMS: I want to spend a  
14 couple moments, gentlemen, talking about, and I'll  
15 direct your attention to page 29, but I want to  
16 talk for a couple of moments in terms of the  
17 timing of Bipole III and the corporation's plans.  
18 And Mr. Mazur, I am correct in suggesting to you  
19 that way back at the time of Limestone, back in  
20 the late '80s, early '90s, the idea of a Bipole  
21 III, or a stage of Bipole III was on the drawing  
22 board way back then; correct, sir?

23 MR. MAZUR: Bipole III was on the  
24 drawing boards several times associated with an  
25 Ontario sale. I believe it was scheduled for some

1 time in the early 2000, '98 to 2000.

2 MR. WILLIAMS: So it's been on the  
3 plans for quite some time with Manitoba Hydro,  
4 sir?

5 MR. MAZUR: It's been in the plans and  
6 out of the plans based on proposed power export  
7 sales. And it's, up to this point, never  
8 proceeded based on generation. Which is why, in  
9 2001, we established a plan to build a line  
10 initially on the east side and put that into our  
11 capital plan, which was to be followed by  
12 converters. Although we never got there because  
13 of external agencies with regard to moving us to  
14 the west.

15 MR. WILLIAMS: Fair enough, sir.

16 Back at the time of Limestone, and  
17 certainly you discussed Limestone and Bipole III  
18 in this report, at that point in time you were not  
19 planning to bring Bipole III into Dorsey, correct?  
20 You were planning to bring it into a different  
21 converter station in the south?

22 MR. MAZUR: Planning of Bipole III and  
23 the termination has been going on for a long, long  
24 time, and Riel was established as the optimum  
25 site.

1 MR. WILLIAMS: And Riel was  
2 established as the optimum site quite some time  
3 ago, sir; agreed?

4 MR. MAZUR: That is correct.

5 MR. TYMOFICHUK: May I add to be  
6 clear, the Ontario Hydro sale in the late '80s was  
7 tied to Conawapa and a line south. I'm hearing  
8 Limestone, and perhaps that needs to be clarified.

9 MR. WILLIAMS: Well, Mr. Tymofichuk  
10 and Mr. Mazur, you'll agree with me that in your  
11 report on page 29, you note that Bipole III, or a  
12 stage of Bipole III, as a step for significantly  
13 improved reliability would have had a  
14 significantly negative effect on Limestone's  
15 economics, correct?

16 MR. TYMOFICHUK: Sorry, could you  
17 orient us on the paragraph?

18 MR. WILLIAMS: Yes. If you go to just  
19 above section 5.1, the second last paragraph, and  
20 the last three or four lines of that paragraph.

21 MR. MAZUR: Yes, okay, I see it. And  
22 sir, your question, sir, if you can clarify again,  
23 please?

24 MR. WILLIAMS: So first of all, sir,  
25 the point you make in the paragraph in question is



1 that the Bipole III option, or an incremental or  
2 stage of Bipole III option would have made the --  
3 had a significantly negative effect on Limestone's  
4 economics, correct?

5 MR. MAZUR: Yes.

6 MR. WILLIAMS: So notwithstanding the  
7 fact, sir, of the recognition of its availability  
8 for improved reliability, it was not on the agenda  
9 for Limestone, given the potential impact on the  
10 economics of Limestone, correct?

11 MR. MAZUR: Limestone went ahead  
12 without Bipole III.

13 MR. WILLIAMS: And the point you make  
14 in this paragraph, sir, is that twinning Limestone  
15 and Bipole III, notwithstanding its improved  
16 reliability effects, would have had a detrimental  
17 effect on the economics; agreed?

18 MR. MAZUR: Yes. I think the last  
19 sentence summarizes the intent, that any  
20 reliability impacts would have been incremental  
21 and worked against the catastrophic susceptibility  
22 which is more fully understood today. So at that  
23 point in time, based on what we understood and  
24 knew, that was a conclusion.

25 MR. WILLIAMS: Okay. And on page 33,

1 if I can direct your attention to a paragraph that  
2 you have already discussed with Mr. Meronek,  
3 Mr. Mazur, I'm focusing your attention on option  
4 one?

5 MR. MAZUR: Yes.

6 MR. WILLIAMS: Mr. Mazur, am I correct  
7 in interpreting this paragraph as one of the  
8 points being, that if one was looking for a quick  
9 fix in terms of the risk of a catastrophic option  
10 at Dorsey, the quickest fix would have been a  
11 relocation of the Bipole II inverter to Riel,  
12 certainly as compared to the challenges associated  
13 with bringing down new north/south transmission;  
14 agreed?

15 MR. MAZUR: That's the conclusion when  
16 you consider the converters alone. Manitoba Hydro  
17 had conducted three different reliability risk  
18 reports, which we filed as the Teshmont reports  
19 2006 -- or 2001, 2006 and 2012. And one cannot  
20 just make that decision on the converter without  
21 considering the corridor. And our final decision,  
22 in our opinion, is that we have to address both  
23 the corridor and the converter loss. We have got  
24 a single corridor that carries 70 percent of the  
25 power, and we need to diversify. And Bipole III

1 allows us to reduce that dependency on a single  
2 corridor to about 50 percent.

3 MR. WILLIAMS: And I thank you for  
4 that, Mr. Mazur. But let's just make sure I have  
5 a yes to my question first of all, and then you  
6 can go back to your notes.

7 The question was, sir, if one was  
8 looking for the quickest fix to the risk of a  
9 catastrophic outage at Dorsey, the insight offered  
10 from this report is that that quickest fix would  
11 have been offered by relocating the Bipole II  
12 inverter to Riel, agreed?

13 MR. MAZUR: That's right.

14 MR. NEUFELD: But that doesn't solve  
15 the problem.

16 MR. WILLIAMS: We are going to get to  
17 that.

18 So the decision made by Manitoba Hydro  
19 was to accept the risk of a fix that was not as  
20 quick, and to choose one that it felt was more  
21 holistic. Agreed?

22 MR. MAZUR: Decision made by Manitoba  
23 Hydro was to choose a solution that addressed both  
24 the corridor loss and the Dorsey loss.

25 MR. WILLIAMS: And fair enough, sir.

1 But in doing so, you had to live with the risk of  
2 a catastrophic failure at Dorsey for a few more  
3 years. Agreed?

4 MR. MAZUR: I believe so, yes.

5 MR. WILLIAMS: And Mr. Mazur, you made  
6 this point at the start of your evidence and I  
7 wasn't sure if I heard you correctly. But in  
8 terms of this actual report, your evidence was  
9 that you had thought Manitoba Hydro had filed it  
10 as part of its disclosure in this hearing, but  
11 that it was not due to an oversight.

12 Did I hear you correctly, sir?

13 MR. MAZUR: From my recollection, we  
14 had received a list of several references cited in  
15 the EIS, and I believe that was one of them. And  
16 so we forwarded it for filing. I can't tell you  
17 why it wasn't filed.

18 MR. WILLIAMS: I thank you for that,  
19 sir. And Mr. Chair, no further questions.

20 THE CHAIRMAN: Thank you,  
21 Mr. Williams.

22 Just to add a little bit on your very  
23 last question and Mr. Mazur's response, I found it  
24 interesting in his response to my letter,  
25 Mr. Bedford -- the question I had posed or

1 referred to was Mr. Neufeld, in November, saying  
2 that some time past, there had been a study of  
3 some of these options. In his response to me,  
4 Mr. Bedford referred to a 2004 study but never  
5 referenced the 2010 one. So perhaps they didn't  
6 want us to know about it. Makes one wonder.

7                   Anyhow, we'll take a break right now  
8 and we'll come back in 15 minutes. There will be  
9 some more questioning.

10                   (Hearing recessed at 10:30 a.m. and  
11 reconvened at 10:45 a.m.)

12                   THE CHAIRMAN: We'll reconvene. It  
13 appears that we may not be here all that much  
14 longer today. We were just informed that York  
15 Factory First Nation, who was to make a  
16 presentation this afternoon, has withdrawn. And  
17 there's no other business that we can really  
18 address today. So once we are finished the  
19 questioning on this matter, I think that may be it  
20 for the day, so...

21                   Panel members have a few questions.  
22 I'm going to start off and ask, is Bipole III, or  
23 will Bipole III, if and when completed, will it  
24 have sufficient capacity to transmit all of the  
25 power from Conawapa, if and when it is completed?

1 MR. TYMOFICHUK: Mr. Chairman, if  
2 Bipole III is in service and if Keeyask and  
3 Conawapa are in service, we will need to add at  
4 the final stages of Conawapa incremental AC  
5 transmission, not a complete north/south link, but  
6 add to our existing system, mostly in Western  
7 Manitoba, Northern Manitoba.

8 THE CHAIRMAN: In this ultimate report  
9 you refer to, I think it mentions the need for a  
10 fourth or a fifth Bipole. And the other thing, I  
11 hadn't heard or read Gillam Island referred to for  
12 many years until I saw it in this report. Is it  
13 still in Hydro's long-term plans?

14 MR. TYMOFICHUK: It's a known resource  
15 from that point of view, but there's no definitive  
16 market for it, whether it's domestic or  
17 non-domestic.

18 THE CHAIRMAN: But it is a long-term  
19 possibility still?

20 MR. TYMOFICHUK: Right, correct.

21 THE CHAIRMAN: And if I am not  
22 mistaken, that would be -- or maybe I should ask  
23 it as a question rather than stating it. Would  
24 that be the last significant generating station on  
25 the Nelson River?

1 MR. TYMOFICHUK: That is correct.

2 THE CHAIRMAN: And so if it were to  
3 go, Gillam Island, then you would definitely need  
4 another Bipole or a high capacity AC line? You'd  
5 need more major transmission line from the north?

6 MR. TYMOFICHUK: Yes, we would need a  
7 new link. Studies to date indicate that our  
8 system is not capable of accepting more than three  
9 Bipoles, for technical reasons. So if I were to  
10 look into the crystal ball, it probably would be  
11 an AC line.

12 THE CHAIRMAN: Or I think it is  
13 referenced in this ultimate report as well that  
14 there is the possibility of a DC line going  
15 directly to another jurisdiction?

16 MR. TYMOFICHUK: You are correct,  
17 Mr. Chairman.

18 THE CHAIRMAN: For example, if an  
19 Ontario major sale were to come to pass again, you  
20 might run it straight across to Ontario or  
21 something?

22 MR. TYMOFICHUK: You are correct,  
23 Mr. Chairman, it would be an express line.

24 THE CHAIRMAN: And Keeyask power will  
25 be handled by the existing Bipoles I and II, or I

1 or II?

2 MR. TYMOFICHUK: No. Our capacity in  
3 the two Bipole system is maxed out with the  
4 existing generation, so as soon as new northern  
5 generation comes on, we need more transmission to  
6 bring it down.

7 THE CHAIRMAN: So you will need Bipole  
8 III for Keeyask -- not specifically for Keeyask,  
9 but you'll need additional capacity?

10 MR. TYMOFICHUK: That's correct, yeah.  
11 Just for the record, today we only have three  
12 megawatts of spare on the DC system.

13 THE CHAIRMAN: Three?

14 MR. TYMOFICHUK: 300 megawatts.

15 THE CHAIRMAN: Oh, 300.

16 MR. TYMOFICHUK: That's all that's  
17 left.

18 THE CHAIRMAN: Now, we have had a fair  
19 bit of discussion this morning and a couple of  
20 days ago about the perhaps inevitable splitting of  
21 Bipoles I and II from Dorsey. Two days ago we  
22 heard about the window of opportunity that  
23 sometime in the very near future, Bipole II, or I  
24 guess the converters, or inverters for Bipole II  
25 at Dorsey will need to be completely refurbished.



1 Mr. Mazur referred to that earlier today. When do  
2 you think that will happen?

3 MR. TYMOFICHUK: For planning  
4 purposes, we have identified a point in time. But  
5 that's today. If we keep the equipment  
6 maintained, that could change. And we need Bipole  
7 III to give us that insurance that as we look at  
8 replacing inverters on Bipole II, we have that  
9 back-up.

10 THE CHAIRMAN: But I guess where I  
11 want to go with this is the window of opportunity.

12 MR. MAZUR: I'll explain that a bit  
13 more. What is in the capital plan is to replace  
14 the converter valves and the control system going  
15 from -- and we have identified that cost as  
16 \$234 million, I believe. There's some numbers of  
17 272 million in some of this documentation. So the  
18 window, there's ongoing expenditures. I think  
19 even as Mr. Woodford pointed out in his  
20 presentation, we have had lots of problems with  
21 both the Bipole I and II transformers, for  
22 example, and there's been purchases to replace  
23 those transformers. But we also keep a stock of  
24 spares. And I'm not sure I would call it a window  
25 of opportunity, because it's an economic decision

1 of whether you want to spend a certain amount, or  
2 spend the 1.2 billion to relocate.

3 THE CHAIRMAN: But I think the window  
4 of opportunity would, you know, if you go ahead in  
5 five or 10 years, whenever, and do refurbish the  
6 Bipole II stations, and you have spent this  
7 quarter of a billion dollars, then you're going to  
8 be reluctant to do that splitting until that  
9 equipment has sort of served its purpose, which we  
10 were told the other day could be as much as 40  
11 years. Is that a correct assumption?

12 MR. MAZUR: That's correct, yeah. But  
13 you also have to keep in mind that without  
14 addressing the line, we still have a gigantic  
15 problem. So it becomes a question of what is the  
16 right thing to do first, which is why we put  
17 Bipole III forward.

18 THE CHAIRMAN: And so the differential  
19 cost between refurbishing Bipole II now and  
20 building new is the difference between  
21 1.16 billion and 240, or whatever it is, million?

22 MR. MAZUR: Yes.

23 THE CHAIRMAN: Thank you. Now, I'm  
24 still not quite clear, Mr. Meronek explored this a  
25 fair bit. The additional, the 70K DC line that

1 would run from Dorsey to Riel, why would that be  
2 needed?

3 MR. MAZUR: Pardon me?

4 THE CHAIRMAN: The 70K DC line from  
5 Dorsey to Riel, assuming that you were to do the  
6 Bipole I and II split that we inquired about in  
7 our December 3rd letter, why would that 70K line  
8 be needed?

9 MR. MAZUR: In the document that we  
10 supplied, we identified two approaches. One  
11 approach would be to put that line in, and that  
12 provides a connection between Dorsey and Riel  
13 converters. And if you don't do that, and you  
14 lose the overhead line from the tap off to Riel,  
15 you can't parallel. So there's some additional  
16 risk.

17 Alternatively, you can put a switching  
18 station in and not build that line, and accept  
19 that risk. Loss of that portion of line from  
20 Bipole II tap to Riel, you wouldn't parallel it.  
21 So it's not -- the line gives you more equivalent  
22 reliability that we have today than if you didn't  
23 build it.

24 THE CHAIRMAN: Somewhere in, I think  
25 it was one of the options in the ultimate report,

1 it talked about in the future when you come to  
2 split Bipoles I and II from Dorsey, running Bipole  
3 II to LaVerendrye or somewhere near LaVerendrye,  
4 would that line just sort of then be extended  
5 directly, sort of skip over Dorsey and go to this  
6 LaVerendrye or near LaVerendrye site?

7 MR. MAZUR: I would imagine we would  
8 have to take that Bipole line and, yes,  
9 generically speaking, it's not the right term,  
10 skip over Dorsey and get to LaVerendrye, or quite  
11 likely something further south along that  
12 corridor.

13 THE CHAIRMAN: I understand that skip  
14 over is not exactly an engineering term, but it's  
15 one that I understand.

16 I think that all the significant  
17 questions that I had have been addressed. So  
18 Ms. MacKay, you had a question?

19 MS. MacKAY: Actually I have I think  
20 just one question, which I'm sure will be a  
21 repetition for you of much of what you have said,  
22 but could you just go through for me one more  
23 time? All of your choices have Bipole I or  
24 Bipoles I and II at Dorsey, and Bipole III going  
25 into Riel. You do not ever use the option that,

1 for example, the Coalition suggested of taking  
2 Bipole III into, for example, LaVerendrye. Why  
3 does it seem so important to you to bring Bipole  
4 III all the way around the city and into Riel  
5 instead of something on the other side?

6 MR. MAZUR: Well, the best place to  
7 inject the Bipole III power is into Riel. And if  
8 you inject it into LaVerendrye, now you have to  
9 build additional transmission to get the power to  
10 Riel. And so, in essence, it's more expensive,  
11 and it's more efficient to just run the DC line  
12 into Riel.

13 MS. MacKAY: Okay. To follow that up  
14 then, can you explain to me why you have to get  
15 the power to Riel?

16 MR. MAZUR: Well, I think way back in  
17 November sometime, Mr. Neufeld did a little bit of  
18 an explanation. But all that the major power  
19 coming into the network, or at least 70 percent of  
20 it is at Dorsey. So all the power is flowing  
21 really from Dorsey towards loads, and a lot of the  
22 load is on the east side of Winnipeg. So we've  
23 got all the underlying transmission that's loading  
24 up. And unless we get an injection point on that  
25 side, we're really going to be just building

1 additional transmission from the west toward --  
2 northwest toward the east. And on, you know, well  
3 into the future. So the best option is to inject  
4 some DC power into that southeast corner.

5 THE CHAIRMAN: Mr. Gibbons?

6 MR. GIBBONS: Yes, actually I want to  
7 follow up on a couple of things, one in regards to  
8 Mr. Sargeant's question. Yesterday, one of the  
9 Coalition witnesses, I think it might have been  
10 Mr. Derry, actually cited a year by which he  
11 thought the work regarding Bipole II's  
12 refurbishment would need to be done. I think he  
13 used the year 2019. Is that a close approximation  
14 of -- in fact, he used that in the context of the  
15 window of opportunity -- is that a close  
16 approximation of the life of the equipment as you  
17 see it?

18 MR. MAZUR: I don't believe it's an  
19 approximation of the life of the equipment. We  
20 would undertake to do something after Bipole III  
21 is in service so we have the spare capacity to do  
22 it. Otherwise, there's additional outage costs  
23 and lost opportunity of power sales.

24 MR. GIBBONS: Let me pose a  
25 hypothetical then, if I may? If Bipole III were

1 to go ahead, would the splitting off of Bipole II  
2 need to be done by 2019, or is there a longer or  
3 shorter time frame that you have in mind?

4 MR. MAZUR: Well, the next decision  
5 point is 2025, where we would, of course somewhere  
6 a few years prior to that, make some decision on  
7 an evaluation of options as to how we would  
8 address additional reliability.

9 MR. GIBBONS: 2025, okay, thank you.

10 The Coalition's proposal differs from  
11 option three largely in two ways, it seems to me.  
12 One is they foresee Bipole II being split off and  
13 going to Riel and Bipole III going into  
14 LaVerendrye. And the other has to do with the  
15 timing. They would prefer to see Bipole II split  
16 first. We have heard from Manitoba Hydro, I think  
17 it might have been Mr. Bedford who made reference  
18 to this, that Hydro would be reluctant, highly  
19 reluctant to split off Bipole II if Bipole III  
20 weren't in place, in order to cover off I suppose  
21 the potential for outages and so on.

22 If Bipole III were in place, let me  
23 assume the following scenario, if we assume that  
24 Bipole III went forward, then it opens up a better  
25 opportunity for splitting off Bipole II. And for

1 the moment I'm only going to focus on splitting it  
2 from Dorsey, separate from the broader corridor  
3 issue. In the context of option three, there  
4 really isn't much difference in whether or not one  
5 then takes Bipole III into LaVerendrye and Bipole  
6 II into Riel, as opposed to the original idea  
7 which was the reverse. And in some respects it  
8 seems to me, from the longer term perspective of  
9 the corridor issue, bringing Bipole II, if you are  
10 moving it not only from Dorsey but widening the  
11 corridor for reliability reasons, wouldn't it make  
12 more sense to bring Bipole II into Riel rather  
13 than into LaVerendrye, thereby opening up the  
14 possibility that Laverendrye becomes the terminus,  
15 or somewhere near Laverendrye, somewhere southwest  
16 in other words, becomes the more logical terminus  
17 for Bipole III. And in that scenario, there is  
18 the benefit I suppose of, A, shorter lines, B,  
19 less prime agricultural land being disrupted. But  
20 certainly as you look at the map, if one is  
21 worried about the corridor eventually, bringing  
22 Bipole III to Riel means then you don't have to  
23 cross over or skip over Bipole I to get to  
24 LaVerendrye. So it strikes me that at least from  
25 that perspective, there's a certain logic to the



1 Coalition's perspective, if we put aside the  
2 timing issue. And even if we assume the point  
3 about timing that Bipole III needs to be done  
4 first, wouldn't the location at least that the  
5 Coalition talks about make more sense?

6 MR. MAZUR: Well, as you mentioned,  
7 timing is a big issue, number one. And secondly,  
8 it's still more expensive, in that you've got to  
9 extend a lot of transmission that wouldn't need to  
10 be built if you went and put Bipole III into Riel.

11 MR. GIBBONS: But from a reliability  
12 perspective, two going to Riel and three going to  
13 LaVerendrye or thereabouts makes more sense than  
14 the reverse, does it not? Speaking now only about  
15 reliability, in that you get better line  
16 separation by moving two farther east and bringing  
17 down to Riel and so forth, rather than having it  
18 cross over Bipole I on its way to LaVerendrye?

19 MR. MAZUR: Well, I guess the  
20 crossover is only something you need to deal with  
21 if and when the decision is to relocate Bipole II.

22 MR. GIBBONS: But that's part of the  
23 scenario that I'm painting here, and it's part of  
24 the scenario that the Coalition is talking about.

25 I'm sorry, unlike some of the speakers

1 today, I was president of my high school physics  
2 club, so I perhaps have one percent more knowledge  
3 about physics than they do, maybe a half a  
4 percent. That is not saying much, I admit. It  
5 strikes me, though, that if you are concerned  
6 about the closeness of lines, having a line skip  
7 over another line, it's about as close as you can  
8 get. So having more physical separation strikes  
9 me as more reasonable.

10 MR. MAZUR: I don't think that there  
11 is much of a difference in that case, however,  
12 because both Bipole I and II converge at Dorsey.

13 MR. GIBBONS: But we are talking about  
14 them in the context of splitting them?

15 MR. MAZUR: Yes.

16 MR. GIBBONS: So if you are splitting  
17 them, wouldn't it, in the context of splitting  
18 them, make more sense of having them farther apart  
19 rather than having them crossing over?

20 MR. MAZUR: I guess it depends how you  
21 did it, but you're still starting from Dorsey  
22 where the two lines are converged. So I'm not  
23 sure, there may be a reliability advantage.

24 MR. GIBBONS: Well, as I understand  
25 the 2010 report and some of the comments that have

1    been made today, ultimately you would like further  
2    separation between Bipole I and Bipole II in order  
3    to address the corridor loss problem. In that  
4    context, if one looks at the map, the more likely  
5    scenario in terms of separation is to move Bipole  
6    II farther east, isn't it, as opposed to putting  
7    it to the west side? So putting it in closer  
8    proximity to the Riel station?

9                   MR. MAZUR: Well, in terms of the  
10   corridor separation, yes.

11                   MR. GIBBONS: Okay. That's  
12   essentially where I was going with that.

13                   Last question, and only because I'm  
14   trying to visualize how the planning process is  
15   moving forward. If this separation in the  
16   corridor does occur -- and I'll be retired from  
17   the Clean Environment Commission before this  
18   happens I imagine -- but are you envisioning then  
19   a line -- where would the line separation begin?  
20   Presumably it's going to begin far before you get  
21   to Dorsey, so presumably it's what, Teulon,  
22   Riverton? I mean, where would you see a split-off  
23   occurring? At the very top of the Interlake?

24                   MR. MAZUR: You are referring to the  
25   tapping of the Bipole II and moving it to Riel?

1 MR. GIBBONS: Yes.

2 MR. MAZUR: I believe something like  
3 St. Andrews comes to mind.

4 MR. GIBBONS: That close to the city,  
5 okay, St. Andrews then.

6 MR. MAZUR: I think it was within 50  
7 kilometres or so of Dorsey, to the north.

8 MR. GIBBONS: Okay. Thank you.

9 MR. TYMOFICHUK: Mr. Chairman, if you  
10 visualize St. Ambroise on Lake Manitoba, that's  
11 about the western point, and take a line straight  
12 east and it probably comes out somewhere at  
13 St. Andrews.

14 THE CHAIRMAN: There is a map attached  
15 to Mr. Bedford's response to my letter that shows  
16 it.

17 Mr. Kaplan?

18 MR. KAPLAN: Contrary to my colleagues  
19 today who either failed physics or were at the  
20 head of their class in physics, I can't even  
21 recall taking physics. It doesn't help anybody  
22 that much.

23 Yesterday I started off with a  
24 question, but I was asked to hold it by  
25 Mr. Bedford, waiting for the engineers to arrive.

1 I'm going to assume you are the engineers, that  
2 you have arrived, and that I can ask my question  
3 that I don't think is that difficult, just for  
4 clarification purposes, if I could.

5 From the Coalition presentation, and  
6 I'd refer you to a page number of Mr. Woodford's  
7 presentation, but there are no page numbers, so  
8 you're going to have to rely on me to quote two  
9 quotations from his presentation. And this deals  
10 simply with analog versus digital. And I will  
11 have three minor questions attached to the overall  
12 question. I quote for you for consideration:

13 "Today BP I, Bipole I and Bipole II  
14 are analogue (30 year old technology)  
15 which eventually must be replaced."

16 A second quote from the same page without a number  
17 states:

18 "Tomorrow Bipole I, Bipole II and  
19 Bipole III controls will be digital,  
20 state of the art."

21 My questions, if you could, relate to what the  
22 present plan of Hydro is for the digital  
23 conversion. And I think, Mr. Mazur, you spoke  
24 about control system shortly before this question,  
25 with a changeover cost of 234 million to

1 272 million. I take it control changeover is what  
2 we're talking about?

3 MR. MAZUR: The valve groups and the  
4 controls, and those controls certainly will be  
5 digital when that gets changed over. Bipole III  
6 certainly will be digital. All our protection and  
7 control systems, other than the DC, right now is a  
8 mix of old relays and old control systems. But  
9 everything we buy today that's for new equipment  
10 or replacement of equipment is digital.

11 MR. KAPLAN: And if I can ask you the  
12 time to change over, what is involved in that?  
13 Are we talking a day, a week, a month, a year?

14 MR. MAZUR: We have an estimate of  
15 about six weeks per valve group.

16 MR. KAPLAN: I'm sorry, six weeks  
17 per --

18 MR. MAZUR: Per valve group. So on  
19 Bipole II, there's four valve groups on each  
20 converter station.

21 MR. KAPLAN: And when you said  
22 234 million to 272 million, more specifically what  
23 is that related to? All of the changeovers?

24 MR. MAZUR: That includes the valve  
25 group changeovers, which is the bigger component,

1 and the controls. And that 230 is at Dorsey for  
2 the Bipole II, just to be clear.

3 MR. KAPLAN: All right. If you could  
4 just briefly highlight to me the benefits of the  
5 digital versus the analogue.

6 MR. MAZUR: Well, there's certainly  
7 advantages. Like all the digital controls are  
8 programmable. So in terms of ease of settings and  
9 flexibility of making operating changes, you know,  
10 things like that, they are certainly much more  
11 flexible, I mean, as compared to analogue controls  
12 which still require revisions to printed circuit  
13 boards and things that are -- the art is lost  
14 these days as to how to modify, and ease of  
15 modification, et cetera.

16 MR. KAPLAN: In the unfortunate  
17 incident of a power outage, does digital help  
18 Hydro to do something to get the system back up a  
19 lot easier, I assume, than analogue?

20 MR. TYMOFICHUK: Yes, Mr. Chairman, it  
21 is, because we can interrogate in front of a  
22 computer, from a remote distance, data to see what  
23 has gone wrong. We can reset. In the old system  
24 we pretty much have to have people in the station  
25 to look at what may have burnt out, what cards are

1 failed, and then install new cards, that sort of  
2 thing.

3 MR. KAPLAN: Thank you.

4 THE CHAIRMAN: Thank you. Before we  
5 close off this panel, I invite any of the other  
6 participants or members of the public who might  
7 have questions of these gentlemen specific to this  
8 issue? Anybody?

9 Mr. Bedford?

10 MR. BEDFORD: If we are about to  
11 close, I do have a comment I would like to make.

12 THE CHAIRMAN: Go ahead, sir.

13 MR. BEDFORD: With respect,  
14 Mr. Sargeant, to your speculation just before we  
15 broke --

16 THE CHAIRMAN: I was being facetious.

17 MR. BEDFORD: -- as to why my client's  
18 report on ultimate HVDC development in Manitoba  
19 was not filed before this week, I'll admit that I  
20 have, since I heard your speculation been sitting  
21 here, speculating upon my own future. And I had  
22 been helped by our staff who have reminded me that  
23 in July, Mr. Meronek's client sought production of  
24 that report through IRs, and also asked a number  
25 of IRs on this general subject of alternatives to



1 Bipole II. And I have a letter sent by the Clean  
2 Environment Commission dated July 27, 2012, which  
3 tells us all that the particular questions,  
4 including the ones that sought production of this  
5 report were "Outside the mandate or scope of the  
6 hearing as provided in the terms of reference."

7 And we will now quickly remember that  
8 Mr. Meronek challenged that decision through a  
9 motion filed in August, and that particular motion  
10 was dealt with in part through clarification from  
11 the Minister of Conservation of this Commission's  
12 mandate.

13 So I have grown happier in my  
14 contemplations, because I know that should some  
15 day I stand trial, having been accused of  
16 suppressing a document that the Clean Environment  
17 Commission wanted, that in that trial I'll stand  
18 in the docket in the happy company of some  
19 Commissioners from the Clean Environment  
20 Commission. And I'll predict that should such  
21 trial ever unfold, that we will all be quickly  
22 acquitted. Because the ultimate reason why this  
23 report was not filed at an earlier date was  
24 because the Minister of Conservation did say that  
25 he was not inclined and did not want this

1 Commission to explore need for an alternative for  
2 the Bipole III project.

3           And I think we can also all be  
4 forgiven, given the thousands of pages of paper  
5 that's been filed at this hearing, given all of  
6 the dozens and dozens of exhibits. Human beings  
7 do have difficulty recalling a particular document  
8 and a reference to that document that was made in  
9 an IR over half a year ago. And I think we can  
10 also all be understanding and forgiving that,  
11 notwithstanding the Minister's clarification of  
12 your mandate, curiosity gets the better of most of  
13 us at times, and these subjects are to a degree  
14 relevant, we certainly appreciate that they are  
15 vitally important to Mr. Meronek's client. And so  
16 I don't regret that you have ultimately had my  
17 engineering colleagues back here today, and that  
18 we have heard from some of their predecessors at  
19 Manitoba Hydro on Tuesday. But I hope that with  
20 respect to your speculation as to why this report  
21 didn't surface until this week, that we at least  
22 appreciate that there's a more complicated  
23 explanation as to why it didn't surface.

24           THE CHAIRMAN: I thank you for that  
25 clarification, Mr. Bedford. I'd just like to say

1 that if your future with Manitoba Hydro is not  
2 secure, I would encourage you to go into writing  
3 because -- I do not say this facetiously -- your  
4 way with words is one of the pleasures of sitting  
5 through some of these long days.

6           Mr. Meronek and I have actually had a  
7 little bit of a discussion off the record on this  
8 matter. In his motion in January and in a letter  
9 to the Commission earlier, he referred to me as  
10 having truncated his line of questioning some  
11 number of months back. And I had to admit that I  
12 was partly at fault in that, and so was he. I had  
13 jumped to the conclusion -- the Coalition came  
14 into this process initially seeking to consider  
15 the east/west argument, which we all know is not  
16 on the table. I asked, in the transcript from  
17 whenever that was that I truncated Mr. Meronek's  
18 questioning, I asked him if he was going to go  
19 into a full tilt NFAT, and he said yes. I jumped  
20 to the conclusion that he was going to bring up  
21 the east side. He didn't debate that point with  
22 me. If he had pointed out that he wanted to look  
23 at alternatives within the study area, I would  
24 have allowed it.

25           That was how we interpreted the

1 Minister's response as well, that a broad NFAT,  
2 particularly for issues outside of the study area  
3 were not on, but alternatives within the study  
4 area are on, and that is why we are here today.  
5 That's why we welcomed, if I can use that word,  
6 but perhaps I should say that is why we allowed  
7 Mr. Meronek's motion in January, because we felt  
8 that alternatives within the study area were  
9 certainly within our scope.

10 But thank you for that clarification,  
11 and I'll take back my comments about wondering why  
12 this report wasn't filed earlier.

13 It was a very interesting report,  
14 although I must admit that the middle parts of it  
15 that were strictly on engineering stuff, I had  
16 difficulty with and skimmed over the sort of the  
17 front and back, and when it got into the planning  
18 stuff was quite interesting. So thank you for  
19 filing that yesterday.

20 So we have another free afternoon. We  
21 will resume on Monday morning in this same space.  
22 Monday morning, we anticipate that Wuskwi Sipihk  
23 will make a presentation. We also will have a  
24 short presentation from the Manitoba Lodges and  
25 Outfitters Association. The afternoon will be

1 devoted to the Manitoba Metis Federation, who will  
2 make a presentation on the rerouting matters, and  
3 then make their final argument, as that is the  
4 only day that Mr. Madden is available.

5 Tuesday morning at this time, we have  
6 what we are referring to as leftovers, questions  
7 from the panel for hydro officials. We will  
8 endeavour to let Manitoba Hydro know, probably by  
9 tomorrow, what if any experts we would like to see  
10 so that we can ask questions of them.

11 Following that we'll get into Manitoba  
12 Hydro's rebuttal. And then Wednesday and  
13 Thursday, the various parties will make their  
14 final arguments, and we will adjourn some time on  
15 Thursday afternoon.

16 Madam secretary, do you have documents  
17 to file?

18 MS. C. JOHNSON: Yes, I do. The  
19 document that was subject to questioning today is  
20 MH 118 from Manitoba Hydro. And I have a couple  
21 leftovers from yesterday, from Pine Creek, PCFN  
22 number 3 is the map of the RM of Mountain; PCFN  
23 number 4 is the property ownership map for the  
24 Duck Bay area. And I also have Mr. Meronek's  
25 letter of March 4th, which will be BPC 17, it was

1 corrections to the expert reports.

2 (EXHIBIT MH 118: Ultimate HVDC  
3 Development of Manitoba)

4 (EXHIBIT PCFN 3: Map of the RM of  
5 Mountain)

6 (EXHIBIT PCFN 4: Property ownership  
7 map for Duck Bay area)

8 (EXHIBIT BPC 17: Mr. Meronek's letter  
9 of March 4th)

10 THE CHAIRMAN: Mr. Williams?

11 MR. WILLIAMS: Yes.

12 THE CHAIRMAN: More questioning?

13 MR. WILLIAMS: Only of you, Mr. Chair.

14 In terms of York Factory, I think I heard this  
15 morning words to the effect that they had  
16 withdrawn, and so I guess I have two questions.  
17 One is, I take it now we're not expecting a  
18 presentation from York Factory? And secondly,  
19 that if memory serves me right, there was some  
20 supporting material filed by York Factory, and I'm  
21 presuming that that would still remain on the  
22 record of the hearing, but I'm just seeking  
23 clarification from the panel?

24 THE CHAIRMAN: That's a good question.

25 They have already provided --

1 MS. C. JOHNSON: Not officially.

2 THE CHAIRMAN: Not officially, so Mr.  
3 William's question is, is that to stay on the  
4 record or not?

5 MS. C. JOHNSON: I have asked them  
6 whether they want to record that as a written  
7 submission.

8 THE CHAIRMAN: And?

9 MS. C. JOHNSON: I'm waiting for their  
10 reply.

11 THE CHAIRMAN: Okay. For now it's in  
12 abeyance. We'll let you know on Monday morning  
13 whether or not they wish to submit that as on the  
14 record.

15 MR. WILLIAMS: Okay, because certainly  
16 I think our client had intended to rely on some of  
17 that information for their closing submissions.  
18 So that would be helpful to have that clarified,  
19 sir.

20 THE CHAIRMAN: Okay. Thank you  
21 Mr. Williams. Mr. Tymofichuk?

22 MR. TYMOFICHUK: Yes. With your  
23 indulgence and the indulgence of everybody in the  
24 room, I'd like to share something here that speaks  
25 to the passion that you have felt from some of us

1 during the hearings, and the cure that we all have  
2 for planning to keep the lights on in the  
3 Province, and even more so when the lights do go  
4 out.

5 THE CHAIRMAN: Were you here earlier  
6 in the week when the lights went out here?

7 MR. TYMOFICHUK: Yes, I was. I really  
8 don't know what the cause of it was. So bear with  
9 me. This is by an anonymous author. It's called  
10 the Man on the Pole.

11 "The black blowing night and the driving snow,  
12 makes it feel much colder than ten below.  
13 The wind rasps the snow like sharp cutting sand,  
14 strokes bare frozen trees with harsh icy hand.  
15 Stiff branches creak with the weight of the wind,  
16 which has sung its chill dirge for hours on end.  
17 No pin-point of light pricks the gloom of the  
18 street,  
19 the dark is forever, frozen, complete.  
20 By the curb stands a truck, its tail to the storm,  
21 around it gray drifts have started to form.  
22 Dimly discerned are the lines of its back,  
23 the tools on its side, the high ladder rack.  
24 Like a pack-horse it stands, hock deep in the  
25 snow,



1 as patiently waiting, with head hanging low.  
2 Alone in the wind and the swirling dark,  
3 dim flashers repeating their faint red spark.  
4 Above, on a pole, in the wintry night sky,  
5 a snow-blurred figure works on high.  
6 Clings to his perch with sharp pointed steel,  
7 arches his back to the safety trap feel.  
8 Desperately he twists the stiff, stubborn wires,  
9 his mind running home to warm glowing fires.  
10 He pulls with numbed hands, his face a chill mask,  
11 with fast-ebbing strength, completes his lone  
12 task.  
13 Now LIGHT sprays from windows all down the street,  
14 a radio blares loudly, then becomes more discreet.  
15 Somewhere a dog barks his plea at the door,  
16 light and LIFE have come back to the street once  
17 more.  
18 The man on the pole draws a long, tired sigh,  
19 then picks his way slowly down out of the sky.  
20 The cold hours of labour have taken their toll,  
21 he leans for a moment against the hard pole.  
22 To the truck he ploddingly makes his way,  
23 stows his tool in the back and drives away.  
24 Not a soul in those houses, now bright and warm,  
25 knows that he's been there, out of the storm.

1 Silently working to bring them light,  
2 as silently fading into the night.  
3 When work-a-day heroes are inscribed on the roll,  
4 we too often forget The Man on the Pole."

5 Thank you, Mr. Chairman.

6 THE CHAIRMAN: Thank you,  
7 Mr. Tymofichuk.

8 I recall last fall when there was the  
9 ice storm and the power outage in Southeastern  
10 Manitoba, and watching the news, and I greatly  
11 admired those men on the pole. And I was glad  
12 that it was somebody else and not me, that I have  
13 a different job. So thank you for that.

14 Mr. Mills?

15 MR. MILLS: Just a few points.

16 In our cross of Hydro, I believe we  
17 received one undertaking and one commitment that I  
18 will, and if we could encourage Hydro to get those  
19 to us sometime before our closing, we would  
20 appreciate it.

21 For your information, Mr. Chairman,  
22 our closing is available, and if you want to use  
23 that time to move your schedule up, we can offer  
24 that after Monday morning.

25 And we just wanted to, John and I were

1 concerned to hear Mr. Bedford's reference to his  
2 potential future employment. In the spirit of  
3 sharing that we have strived to achieve, we wanted  
4 to let him know that we can confirm that, yes, in  
5 fact, Ikea is hiring.

6 So that would be all, Mr. Chairman,  
7 thank you.

8 THE CHAIRMAN: I think you made that  
9 reference to me as well yesterday, so I'm not  
10 quite sure what you're getting at.

11 MR. MILLS: We'll have cards on Monday  
12 for your file.

13 THE CHAIRMAN: Okay. No more final  
14 comments? Well, then thank you all. We'll stand  
15 adjourned now until Monday morning at 9:00 a.m.

16 (Adjourned at 11:30 a.m.)

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Cecelia Reid and Debra Kot, duly appointed  
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hereby certify the foregoing pages are a true and  
correct transcript of my Stenotype notes as taken  
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the best of our skill and ability.

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Cecelia Reid  
Official Examiner, Q.B.

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Debra Kot  
Official Examiner Q.B.

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<p>1-2 6427:16  <b>1.16</b> 6449:21  <b>1.2</b> 6449:2  <b>10</b> 6405:21,24              6415:24 6449:5  <b>10:30</b> 6444:10  <b>10:45</b> 6444:11  <b>100</b> 6437:8  <b>11:30</b> 6474:16  <b>118</b> 6379:2 6468:20              6469:2  <b>12</b> 6423:14 6430:15  <b>1200</b> 6436:13  <b>14</b> 6383:11 6423:24  <b>14th</b> 6432:18  <b>15</b> 6444:8  <b>16</b> 6424:6  <b>17</b> 6379:8 6468:25              6469:8  <b>1800</b> 6436:16</p>	<p><b>29</b> 6437:15 6439:11</p> <hr/> <p style="text-align: center;"><b>3</b></p> <hr/> <p><b>3</b> 6379:4 6397:4,5              6421:19 6468:22              6469:4  <b>3rd</b> 6450:7  <b>3.28</b> 6419:3  <b>3.92</b> 6419:4  <b>30</b> 6376:16 6460:14  <b>300</b> 6447:14,15  <b>33</b> 6408:11 6440:25  <b>34</b> 6411:8 6412:17  <b>35</b> 6413:1  <b>36</b> 6413:3,6  <b>37</b> 6434:22  <b>38</b> 6416:25  <b>39</b> 6417:20</p>	<p>6420:3  <b>836</b> 6423:19</p> <hr/> <p style="text-align: center;"><b>9</b></p> <hr/> <p><b>9:00</b> 6381:2 6474:15  <b>90s</b> 6437:20  <b>98</b> 6438:1</p>		
<hr/> <p style="text-align: center;"><b>2</b></p> <hr/> <p><b>2</b> 6384:9 6385:21              6391:19  <b>2000</b> 6438:1,1  <b>2001</b> 6438:9              6441:19  <b>2004</b> 6444:4  <b>2006</b> 6386:8              6441:19,19  <b>2007</b> 6382:11  <b>2009</b> 6382:16              6435:25  <b>2010</b> 6382:21,23              6383:4,11 6384:8              6384:9 6388:7              6432:18 6435:25              6436:5,6,18              6444:5 6457:25  <b>2011</b> 6383:6  <b>2012</b> 6441:19              6464:2  <b>2013</b> 6376:19              6381:1  <b>2019</b> 6453:13              6454:2  <b>2021</b> 6421:6  <b>2025</b> 6419:5,7,14              6420:19,22              6454:5,9  <b>230</b> 6424:9 6462:1  <b>234</b> 6460:25              6461:22  <b>240</b> 6449:21  <b>250</b> 6424:1,3,7,8  <b>250-megawatt</b>              6437:6  <b>27</b> 6464:2  <b>272</b> 6448:17 6461:1              6461:22</p>	<hr/> <p style="text-align: center;"><b>4</b></p> <hr/> <p><b>4</b> 6379:6 6424:5              6428:24 6429:2              6468:23 6469:6  <b>4th</b> 6379:8 6468:25              6469:9  <b>40</b> 6425:19 6449:10  <b>4000-megawatt</b>              6406:15</p>			
<p><b>2007</b> 6382:11  <b>2009</b> 6382:16              6435:25  <b>2010</b> 6382:21,23              6383:4,11 6384:8              6384:9 6388:7              6432:18 6435:25              6436:5,6,18              6444:5 6457:25  <b>2011</b> 6383:6  <b>2012</b> 6441:19              6464:2  <b>2013</b> 6376:19              6381:1  <b>2019</b> 6453:13              6454:2  <b>2021</b> 6421:6  <b>2025</b> 6419:5,7,14              6420:19,22              6454:5,9  <b>230</b> 6424:9 6462:1  <b>234</b> 6460:25              6461:22  <b>240</b> 6449:21  <b>250</b> 6424:1,3,7,8  <b>250-megawatt</b>              6437:6  <b>27</b> 6464:2  <b>272</b> 6448:17 6461:1              6461:22</p>	<hr/> <p style="text-align: center;"><b>5</b></p> <hr/> <p><b>5.1</b> 6439:19  <b>5.4</b> 6413:8  <b>50</b> 6400:2 6424:23              6425:19 6442:2              6459:6  <b>500</b> 6392:10,15,18              6392:23 6429:17              6429:25 6430:7              6431:18 6437:4</p>			
<p><b>2011</b> 6383:6  <b>2012</b> 6441:19              6464:2  <b>2013</b> 6376:19              6381:1  <b>2019</b> 6453:13              6454:2  <b>2021</b> 6421:6  <b>2025</b> 6419:5,7,14              6420:19,22              6454:5,9  <b>230</b> 6424:9 6462:1  <b>234</b> 6460:25              6461:22  <b>240</b> 6449:21  <b>250</b> 6424:1,3,7,8  <b>250-megawatt</b>              6437:6  <b>27</b> 6464:2  <b>272</b> 6448:17 6461:1              6461:22</p>	<hr/> <p style="text-align: center;"><b>6</b></p> <hr/> <p><b>6</b> 6435:2  <b>6381</b> 6380:3  <b>6432</b> 6380:3  <b>6445</b> 6380:4  <b>6469</b> 6379:2,4,6,8</p>			
	<hr/> <p style="text-align: center;"><b>7</b></p> <hr/> <p><b>7</b> 6376:19 6381:1  <b>70</b> 6425:21 6427:3,9              6428:24 6441:24              6452:19  <b>70K</b> 6449:25 6450:4              6450:7</p>			
	<hr/> <p style="text-align: center;"><b>8</b></p> <hr/> <p><b>8</b> 6398:15  <b>80</b> 6420:2 6424:14  <b>80s</b> 6437:20 6439:6  <b>80-megawatt</b></p>			

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