MANITOBA PUBLIC UTILITIES BOARD

Re: MANITOBA HYDRO

NEEDS FOR AND ALTERNATIVES TO

REVIEW OF MANITOBA HYDRO'S

PREFERRED DEVELOPMENT PLAN

Regis Gosselin - Chairperson

Marilyn Kapitany - Board Member

Larry Soldier - Board Member

Richard Bel - Board Member

Hugh Grant - Board Member

HELD AT:

Public Utilities Board

400, 330 Portage Avenue

Winnipeg, Manitoba

April 11, 2014

Pages 6478 to 6674

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25 Michael Weinstein)

1 TABLE OF CONTENTS

2 Page No.

19

20

21

22

23

24

25

LIST OF EXHIBITS

1 LIST OF UNDERTAKINGS

1 --- Upon commencing at 9:02 a.m.

2

3 THE CHAIRPERSON: Good morning. I

4 believe that we can commence this morning's

5 proceedings. It's a little bit past 9:00, so I

6 apologize for the three (3) minute delay.

7 So, without further ado, I will look to

8 Mr. Hombach to introduce today's proceedings.

9 MR. SVEN HOMBACH: Yes. Good morning,

10 Mr. Chairman, and good morning, members of the panel.

11 Today is reserved for the direct testimony and cross-

12 examination of Power Engineers, one of the independent

13 expert consultants appointed by the NFAT panel to look

14 at transmission issues.

15 I would like to advise the members of

16 the public in the room that are following the

17 proceeding that at the end of the day there is time set

18 aside for a brief CSI session that will be held in

19 camera where members of the public will have to be

20 excused.

21 Before we turn it over to Me. Monnin to

22 introduce and qualify the witnesses, Mr. Chairman, I

23 have been advised by My Friend, Ms. Ramage, that

24 Manitoba Hydro has two (2) matters that they'd like to

25 speak to first.

1 MS. PATTI RAMAGE: Thank you, Mr.
2 Hombach. Manitoba Hydro wishes to bring to the Board's
3 attention that, in this morning's online edition of the
4 Free Press, there appears an editorial by the Free
5 Press regarding the evidence of La Capra Associates,
6 along with a link to an article headed, "Where Hydro
7 Falls Short," with a byline indicating that that
8 article is written by La Capra Associates.
9 This is a serious concern for Manitoba
10 Hydro, and before we elaborate on -- on the concerns we
11 have, I think it would be fair -- I have spoken with
12 Mr. Monnin. Manitoba Hydro is requesting that Mr.
13 Monnin speak with La Capra and advise the panel whether
14 this piece was in fact prepared by La Capra, upon whose
15 instructions it was prepared, and whether they in fact
16 gave an interview or cooperated with the Free Press
17 because this is a matter that certainly would go to the
18 independence of La Capra.
19 And it is a concern, but in fairness to
20 both La Capra and Mr. Monnin, I think we should have
21 that information first, whether -- whether perhaps the
22 byline overstates what was done, or we need the facts
23 first. But -- but it is a serious concern to Manitoba
24 Hydro.
25 THE CHAIRPERSON: Can you comment, Me.

1 Monnin?

2 MR. CHRISTIAN MONNIN: Merci, M.

3 President. I can't, and to the extent that the first

4 time that it was brought to my attention was about five

5 (5) minutes ago. I've inquired. I sent an email to La

6 Capra to inquire, and once I have any further

7 information, I could provide that information to the

8 Board.

9 THE CHAIRPERSON: I have to confess, I

10 have not read the -- that article this morning.

11 Focussed on the Boston Bruins and the -- the Winnipeg

12 Jets. But I will definitely read it on the break.

13 MS. PATTI RAMAGE: And it was good to

14 see that we won that one last night.

15 The other concern Manitoba Hydro did

16 have, and we just want to bring it to the Board's

17 attention, is, as all parties are aware, there is a lot

18 of -- of new evidence and new materials being

19 introduced. And it -- it's a concern for -- we've

20 heard from the Intervenors, but it's also a concern to

21 Manitoba Hydro.

22 And in the normal course, materials --

23 for example, reports would be filed prior to the oral -

24 - the commencement of the oral hearing, and Manitoba

25 Hydro would be given an opportunity to provide a

1 written rebuttal and then address the evidence in its
2 evidence. Manitoba Hydro's direct and cross-
3 examinations have essentially finished. We do have a
4 day for undertakings, but that doesn't give us an
5 opportunity to speak to all that new evidence.
6 And we certainly had been planning on,
7 again, in the -- in the typical schedules, and -- and
8 in, really, any administrative proceeding, the -- the
9 party whose interests are at stake do rebuttal evidence
10 at the end. And the current schedule, we looked at it
11 to see how much time we'd been allotted, and it --
12 there is no rebuttal evidence day, and it is something
13 that we think is critical to this process to be able to
14 address that evidence.
15 So we will speak with the advisors and
16 see what can be worked out. We know time is at a
17 premium right now, and it appears we've lost that May
18 3rd day with the building being shut down, so we're all
19 going to have to put our collective heads together and
20 figure this out.
21 THE CHAIRPERSON: Agreed. So we'll
22 take that under advisement, and we will address that
23 matter in due course. So are we prepared to --
24 MR. KURT SIMONSEN: I think Mr. Hacault
25 has a --

1 THE CHAIRPERSON: Oh, Me. Hacault, s'il
2 vous plait.
3 MR. ANTOINE HACAULT: Talking about new
4 information. At one point in time, it would be useful
5 to know whether Manitoba Hydro believes it can still
6 meet its undertaking dates with respect to the
7 financial analysis as set out in I forget which
8 undertaking. I had asked that question yesterday of
9 counsel for Hydro, and Hyd -- they weren't too sure.
10 So just if we're going to be trying to
11 keep on track and -- and use April 21 and April 22,
12 keeping in mind that my previous advice that -- that we
13 believe that we need about one (1) week to absorb the
14 material to be able to prepare. It -- it would be
15 useful to know whether or not we think we can meet that
16 deadline of at least one (1) week prior to the April 21
17 dates.
18 THE CHAIRPERSON: Can you comment, Ms.
19 Ramage, please?
20 MS. PATTI RAMAGE: Well, I -- we did
21 speak with Mr. Hacault yesterday, and he is correct.
22 Counsel is having a heck of a time keeping track of all
23 this information. However, following that, at the end
24 of the day, Mr. Wojczynski and others had a meeting to
25 try to sit down and figure out exactly what's on our

1 plate.

2 And so I think it might be best, while I

3 sat in, Mr. Wojczynski understands exactly -- or has a

4 far better understanding, certainly, of -- of what's

5 outstanding in the work in progress. So if -- with

6 your indulgence, I would suggest Mr. Wojczynski speak -

7 - can advise the Board.

8 THE CHAIRPERSON: Thank you. Scanning

9 the room to see if anybo -- anybody else has a -- has a

10 hand up. Mr. Wojczynski, I'm sorry. I thought -- I

11 didn't realize you were there. Good morning.

12 MR. ED WOJCZYNSKI: I don't pretend to

13 know everything that's outstanding, but I think of the

14 issues that Our Friend from MIPUG is speaking about.

15 First of all, the extensive financial analysis with the

16 updated capital costs are going to be available at one

17 o'clock today. There will be the -- the pro formas,

18 plus an -- an overview explanation, a brief overview

19 explanation. That will be provided at 1:00, and there

20 will be diskettes with the PDFs of the pro formas, plus

21 the Excel downloads of the data.

22 There are also the Chair's undertaking

23 about the economics of the high capital cost scenario.

24 The sensitivity of that will be filed today as well,

25 and there will be a few other filings along that line

as well that we're -- we're going to -- scrambling to get them all done today.

THE CHAIRPERSON: That answers your questions, Me. Hacault? Okay. I think that -- Mr. Hombach, please?

MR. SVEN HOMBACH: I'm advised that Mr. Weinstein is going to qualify the witnesses.

THE CHAIRPERSON: Good morning, Mr. Weinstein.

MR. MICHAEL WEINSTEIN: Good morning, Mr. Chair, members of the panel. Before I go ahead and begin with the qualification of these three (3) expert witnesses, I thought maybe I could just see to a bit of housekeeping with respect to some exhibits for Power Engineers. The first item is a revised version of the non-CSI Power Engineers report. This was just circulated yesterday, actually, by PUB counsel. We'd like it to be entered at PE-3-1. So it will essentially come as a sub-exhibit to the first version of the public report -- report that's -- that's on file.

And I note, just for the panel's information, that this report says, "April 2014 redacted," at the top of it.

1 --- EXHIBIT NO. PE-3-1: Revised non-CSI Power
2 Engineers report
3
4 MR. MICHAEL WEINSTEIN: The next item
5 that we'd like to enter is the scope of work for Power
6 Engineers dated September 20th, 2013. If that could be
7 entered, please, as PE-4.
8
9 --- EXHIBIT NO. PE-4: Scope of work
10
11 MR. MICHAEL WEINSTEIN: And the final
12 exhibit to enter right now, Mr. Chair, is the slide
13 deck which will be used during the non-CSI portion of
14 Power Engineers's direct evidence which has been -- a
15 copy's been provided to all members of the panel, and
16 it would please be entered as PE-5.
17
18 --- EXHIBIT NO. PE-5: Slide deck
19
20 MR. CHRISTIAN MONNIN: Mr. Chair, I --
21 I apologize for interrupting. But on the issue that
22 was raised peremptorily with respect to the Winnipeg
23 Free Press, I would like to get on the record now.
24 I've heard back from Mr. Peaco of La Capra, and he's
25 confirmed that he's had -- they've had no interaction

at all with the Free Press. And the byline that is put onto the online article is -- has -- has nothing to do with them and it must be the Free Press who put it that way, so.

THE CHAIRPERSON: Does it appear to be an extract from the transcript or...?

MR. CHRISTIAN MONNIN: It's a very high level summary of -- of -- I'll let you read on the -- the iPad of Chair (sic) member Grant, but it's a very high level -- sorry, chair member Soldier. It's a very high level synopsis of the key findings, I think, of the La Capra report.

MR. KURT SIMONSEN: Mr. Chair, we can flash it up on the screen if you desire.

THE CHAIRPERSON: Yes, do that.

MR. CHRISTIAN MONNIN: You'll note, Mr. Chair, that it is -- it does say, "By La Capra Associates." And it says, "Posted at 5 a.m." Mr. Peaco said -- has confirmed that La Capra's had no interaction with the press.

(BRIEF PAUSE)

THE CHAIRPERSON: It appears to me to be a direct quote from a presentation, doesn't it --

1 MR. CHRISTIAN MONNIN: Yes.
2 THE CHAIRPERSON: -- from the report?
3 Okay. With that, I think we can continue the
4 proceedings. And we will have an off-ramp discussion
5 about what's going on. Thank you.
6 Mr. Weinstein, please?
7 MR. MICHAEL WEINSTEIN: Thank you, Mr.
8 Chair. Power Engineers today has three (3) expert
9 witnesses present to present the direct evidence. And
10 what we'd like to do is give each of them an
11 opportunity to be qualified. And then once all of them
12 have presented their qualifications, we'll turn it over
13 to counsel for the other parties present to -- to ask
14 questions.
15 Present today are Mr. Glenn Davidson,
16 Mr. Paul Arnold, and Mr. Brian Furumasu. And I'd like
17 to begin with Mr. Glenn Davidson, who's seated directly
18 to my left. Yes. Thank you.
19
20 IEC POWER ENGINEERS PANEL:
21 PAUL ARNOLD, Sworn (Qual)
22 GLENN DAVIDSON, Sworn (Qual)
23 BRIAN FURUMASU, Sworn (Qual)
24
25 QUALIFICATION OF WITNESSES:

1 MR. MICHAEL WEINSTEIN: My thanks to
2 Ms. Court Reporter for reminding me to swear the
3 witnesses in. And if could now begin with Mr.
4 Davidson?
5 You're here today on behalf of Power
6 Engineers, Mr. Davidson, which has been retained by the
7 Manitoba Public Utilities Board in order to assist the
8 PUB to conduct a Needs For and Alternatives To Review
9 of Manitoba Hydro's proposed Preferred Development
10 Plan, correct?
11 MR. GLENN DAVIDSON: Yes.
12 MR. MICHAEL WEINSTEIN: Power Engineers
13 has prepared a report which was dated January 24th,
14 2014 -- it has now been resubmitted as a new exhibit
15 dated April 2014 -- in accordance with the terms of
16 reference and Power Engineers's scope of work dated
17 September 20th, 2013, to critically review certain
18 aspects of Manitoba Hydro's Preferred Development Plan
19 and filings, correct?
20 MR. GLENN DAVIDSON: That's correct.
21 MR. MICHAEL WEINSTEIN: And was this
22 report prepared by you and under your supervision and
23 control?
24 MR. GLENN DAVIDSON: Well, the report
25 was prepared under the joint supervision and control of

1 myself, Paul Arnold and Brian Furumasu, who are here
2 with me.
3 MR. MICHAEL WEINSTEIN: In addition to
4 the work that you and Power Engineers generally perform
5 pursuant to the scope of work, can you please describe
6 for the Board the primary areas of focus in your work
7 for the PUB?
8 MR. GLENN DAVIDSON: My scope of
9 responsibility covered the first six (6) items of the
10 terms of reference which basically had to do with a
11 review and analysis of Manitoba Hydro's construction
12 cost estimates, O&M cost estimates, management
13 reserves, and indirect costs of the overhead power
14 transmission system.
15 MR. MICHAEL WEINSTEIN: And, Mr.
16 Davidson, your CV has been filed with the panel as part
17 of Hill Co. Exhibit Number 8, and it's found at Tab 4A
18 of that Exhibit.
19 Can you describe your qualifications and
20 experience both generally and also specifically as they
21 -- they relate to the work undertaken here?
22 MR. GLENN DAVIDSON: Yes. I have a
23 bachelor's and master's degree in electrical
24 engineering from Newark College of Engineering, which
25 is now a -- a part of New Jersey Institute of

1 Technology. I started my career almost exactly fifty
2 (50) years ago at Jersey Central Power and Light
3 Company. My fiftieth anniversary is in June of this
4 year, never dreamed it would happen.
5 I -- I worked at Jersey Central Power
6 and Light Company for seventeen (17) years, entirely in
7 their transmission engineering department. When I left
8 Jersey Central Power and Light Company, I was the
9 manager of transmission engineering for them. I came
10 out to Denver and I worked for CH2M HILL for -- for a
11 period of time, and then I worked for Stone & Webster
12 Engineering Corporation, and finally, for the last
13 approximately fifteen (15) years, I've worked for Power
14 Engineers.
15 My total consulting career has been
16 about thirty-three (33) years. CH2M HILL, Stone &
17 Webster, and Power Engineers are all large
18 international consulting companies. I'm a senior life
19 member of the IEEE, Institute of Electrical and
20 Electronics Engineers. I am a professional engineer in
21 several states in the -- in the US.
22 Applicable experience to this
23 assignment, at -- at Jersey Central Power and Light
24 Company, I -- I was responsible for preparing the
25 annual construction budget for transmission lines

1 throughout the -- throughout the system, and then as
2 projects that were in the budget were approved and we
3 were starting to work on them, we did detailed
4 construction cost estimates of them so that we could
5 get a project authorized and have -- have a -- a budget
6 and a schedule for it.
7 In the consulting world, I've been
8 responsible for preparing engineers' estimates to --
9 for clients as they are putting budgets together for --
10 for their annual construction projects, providing
11 engineers' estimates that were used in evaluating bids
12 from -- from contractors, and -- and doing, prior to
13 design, general estimates of -- of what the
14 construction costs would be so that management could
15 decide whether to approve the project or not.
16 The clients that I have performed this -
17 - these tasks for have included large and small
18 public/private utilities, including investor-owned
19 utilities, municipal utilities, federal government
20 power marketing agencies, cooperatives, generation and
21 transmission associations, and I've done this work both
22 in the US and internationally.
23 Thank you Mr -- thank you, Mr. Davidson.
24 If I could now turn to Mr. Paul Arnold, who is seated
25 to Mr. Davidson's left, Mr. Arnold, you are also here

1 on behalf of Power Engineers, which was retained by the
2 PUB to assist the PUB to conduct the Needs For and
3 Alternatives To review of Manitoba Hydro's proposed
4 Preferred Development Plan, correct?
5 MR. PAUL ARNOLD: That's correct.
6 MR. MICHAEL WEINSTEIN: And Power
7 Engineers prepared a report dated January 24th, 2014,
8 recently submitted in a revised format dated April
9 2014, redacted in accordance with the terms of
10 reference and Power Engineers's scope of work dated
11 September 20th, 2013, to critically review certain
12 aspects of Manitoba Hydro's Preferred Development Plan
13 and filings, correct?
14 MR. PAUL ARNOLD: Yes.
15 MR. MICHAEL WEINSTEIN: And we heard
16 from Mr. Davidson a moment ago that the report was
17 prepared jointly under the supervision and control of
18 Mr. Davidson, Mr. Furumasu, and yourself.
19 Is that correct?
20 MR. PAUL ARNOLD: That's correct. We
21 jointly prepared this report among -- among the three
22 (3) of us. Thank you.
23 MR. MICHAEL WEINSTEIN: In addition to
24 the work that you and Power Engineers generally
25 performed pursuant to the scope of work in preparing

1 the report, can you please describe for the Board the
2 primary areas of focus in your -- in your work in
3 preparing the report?
4 MR. PAUL ARNOLD: Certainly. My work
5 was targeted towards scope items 7, 10, 11, and 12,
6 with 7 being a -- a discussion of the technical
7 aspects, and the reliability and reasonableness of the
8 existing and proposed AC and DC transmission systems.
9 Scope item 10 was basically an
10 assessment of MISO transmission constraints which would
11 require construction and/or financial participation of
12 US transmission facilities.
13 And scope item 11 covered the technical
14 aspects of the North-South AC transmission system. And
15 then lastly, an assessment and review of technical
16 reasons for construction to facilitate sales into MISO,
17 or -- or otherwise known as exports into MISO.
18 MR. MICHAEL WEINSTEIN: Mr. Arnold,
19 your CV has been filed with the panel as part of
20 Exhibit Hill Co. Number 8, found at Tab 4C.
21 Can you describe your qualifications and
22 experience, both generally and also specifically, as
23 they relate to the work you've undertaken pursuant to
24 this scope of work?
25 MR. PAUL ARNOLD: Certainly. I have a

1 Bachelor of Science degree, electrical engineering
2 degree, from the University of Portland. I received
3 that in 1971. I'm also a registered professional
4 engineer in the state of Oregon.
5 I have roughly thirty-four (34) years'
6 experience with the Bonneville Power Administration,
7 including many different areas, both technical and
8 managerial assignments, including design, planning,
9 operations, control and protection systems.
10 And just -- just a word about BPA to
11 kind of give you a scope. BPA operates 75 percent of
12 the Northwest transmission system. It includes about
13 fifteen thousand (15,000) circuit miles of
14 transmission, roughly twenty-two thousand (22,000)
15 interconnects, roughly 22,000 megawatts of federal
16 hydro generation.
17 I believe there's also a nuclear plant
18 in operation at Bonneville, about 1,000 megawatts.
19 That system interconnects with British Columbia and
20 also with California and with the states of Idaho and
21 Montana. One (1) of the primary things I can point out
22 is that Bonneville operated, and still operates today,
23 a 4,800 megawatt AC transmission intertie with
24 California, about a 3,100 megawatt DC line with the
25 State of California.

1 And a lot of my work was focussed on the
2 reliable operation of those interconnections,
3 determining safe operating limits for those facilities,
4 particularly with regard to system outages that might
5 occur. And -- and again, my focus there was primarily
6 on the operations of those -- of those facilities as
7 opposed to the planning of those facilities. But I did
8 have a lot of interaction with planning over
9 discussions about what exactly is the safe operating
10 limit for -- for different conditions.
11 So I also spent a -- a great deal of
12 time in my Bonneville career working with the Western
13 Electricity Coordinating Council, short -- WECC for
14 short. They are the Western Interconnection regional
15 reliability organization and they basically -- that --
16 that RRO is now basically under -- under NERC under
17 contract to monitor and enforce compliance with
18 reliability standards. That took -- took basically a
19 lot of my time throughout my -- my career with BPA.
20 So I retired from Bonneville in 2005.
21 And then in 2006 I went into independent consulting for
22 a while, did some relia -- excuse me -- reliability
23 compliance audits for WECC as an independent
24 consultant.
25 Then in 2008 I took a job with

1 ColumbiaGrid. I was vice president of the planning
2 group. My -- my basic task there was to do a start-up
3 and grow our planning department, which basically
4 provided two (2) -- two (2) types of services for an
5 eight (8) member utility group in ColumbiaGrid. And
6 that, number 1, was to do an annual system reliability
7 assessment of the Northwest power system which pri --
8 included Bonneville and -- and maybe eight (8) or ten
9 (10) other utilities. The other task was to develop a
10 biannual transmission expansion plan to define for the
11 region what transmission was necessary over the next
12 ten (10) years.
13 So in 2011, I went to work for Power
14 Engineers as a senior consultant. My clientele usually
15 included transmission-utility-type organizations. One
16 in particular was interested in expanding their
17 investment and ownership and operation of transmission
18 facilities beyond their -- their current jurisdiction.
19 And one of the projects involved developing a
20 conceptual transmission plan, basically a 500 kV
21 overlay for the State of Colorado, who was -- had a --
22 an energy program run by the Energy Department to look
23 at the -- the shut down over time of coal-fired
24 generation and integra -- integration of large amounts
25 of wind generation.

1 Another example of work that I think is
2 -- pertains to what we're doing here today is I -- I
3 worked for a client who was interested in becoming a --
4 certified as a transmission operator. In -- in NERC,
5 if you -- if you want to designate yourself as a
6 transmission operator or balancing authority area, you
7 have to go through a certain certification process.
8 And so my role was to help them do a gap analysis on
9 what they were prepared to do as an operator and what
10 the NERC standards required them to do.
11 The other part of my -- my job there was
12 to write operating procedures which would explain how
13 to operate the facility and how to -- and -- and the
14 operation of out-of-step relaying, which was designed
15 to deter -- be able -- be able to determine whether or
16 not there was an unstable condition and -- or a stable
17 condition; detected contingencies within British
18 Columbia, and Alberta, and Montana; and then triggered
19 appropriate actions, usually meaning tripping the tie-
20 line between Alberta and Montana.
21 I think -- I think that that concludes
22 my report. Thanks.
23 MR. MICHAEL WEINSTEIN: Thank you, Mr.
24 Arnold.
25 Mr. Furumasu, along with Mr. Arnold and

1 Mr. Davidson, you are also here on behalf of Power
2 Engineers, which was retained by the PUB in order to
3 assist the PUB to conduct a Needs For and Alternatives
4 To review of Manitoba Hydro's proposed Preferred
5 Development Plan, correct?
6 MR. BRIAN FURUMASU: That is correct.
7 Yes, that is correct.
8 MR. MICHAEL WEINSTEIN: And Power
9 Engineers prepared a report dated January 24th, 2014,
10 now filed in a revised version as Exhibit 3-1 ,dated
11 April 2014, redacted in accordance with the terms of
12 reference and Power Engineers's scope of work dated
13 September 20th, 2013, to critically review certain
14 aspects of Manitoba Hydro's Preferred Development Plan
15 and filings, correct?
16 MR. BRIAN FURUMASU: Yes, that is
17 correct.
18 MR. MICHAEL WEINSTEIN: And these other
19 two (2) gentlemen have said that that report was
20 prepared under the joint supervision and control of Mr.
21 Arnold, Mr. Davidson, and yourself.
22 If that correct?
23 MR. BRIAN FURUMASU: Yes, it is.
24 MR. MICHAEL WEINSTEIN: In addition to
25 the work generally performed by Power Engineers

1 pursuant to the scope of work, can you please describe
2 for the Board the primary areas of focus and your work
3 in preparing the report?
4 MR. BRIAN FURUMASU: Sure. Yes, I can.
5 I worked on scope items 89 and scope item 8. The
6 purpose of that was to determine the average energy
7 flow and the Manitoba Hydro losses on its transmission
8 system when you add Keeyask and Conawapa generation on
9 the -- on the Nelson River for the purpose of serving
10 domestic load in Southern Manitoba.
11 And specific areas that we were to
12 investigate was to look at how these losses are
13 affected during seasonal peak and off-peak load times,
14 and to also investigate how the losses are affected
15 with the current Bipole and Bipoles I and II in the
16 system, and to also look at what happens with the
17 addition of Bipole III. So you'd have Bipoles I, II,
18 and III in the system.
19 I also worked on scope item 9. And the
20 primary focus on -- on this question was to answer:
21 What were the transmission losses on the Manitoba Hydro
22 system for exports into the MISO system, again looking
23 at peak and off-peak seasonal loadings and under the
24 conditions where you have Bipoles I and II in -- in
25 service, as you have today in the existing system, and

1 plus losses of the AC transmission to the border?
2 And the other condition to look at was
3 when you add Bipole III. So you have three (3) Bipoles
4 on the AC system in addition to -- including the AC
5 losses -- AC transmission line losses to the border.
6 MR. MICHAEL WEINSTEIN: Mr. Furumasu,
7 your CV has been filed with the panel as part of Hill
8 Co. Exhibit number 8, which is found at Tab 4B of that
9 exhibit.
10 Can you describe your qualifications and
11 experience, both generally and also specifically, as
12 they relate to the work you've undertaken here?
13 MR. BRIAN FURUMASU: Yes, I can. I'm
14 an electrical engineer by training. I have a bachelor
15 of science and a master's degree from Washington State
16 University. And those were earned in 1975 and 1976,
17 respectively. I also have an executive MBA, a degree
18 from the University of Oregon, and that was earned in
19 1993. I'm also a register -- registered professional
20 engineer in the State of Oregon.
21 I spent my first career with the
22 Bonneville Power Administration, which is a US
23 Government transmission utility and power marketing
24 agency. Paul described more fully the -- the role of
25 that federal agency.

1 My primary background is I'm a high
2 voltage equipment engineer. But during that career, I
3 -- I was able to do a lot of different things. I would
4 say the first half of my career was focussed on high
5 voltage equipment. During those years, as an agency,
6 we also did a lot of utility R&D. We worked a lot with
7 electrical equipment manufacturers to develop high
8 voltage equipment. And we were able to do things with
9 helping to test that equipment that they were not able
10 to do themselves.
11 Bonneville actually did a lot of testing
12 with equipment on the high voltage system itself. And
13 a lot of times, those are conditions you can't
14 replicate in a laboratory.
15 I also did some work and had experience
16 with running power flow studies, power flow in
17 transients, stability programs which would be your
18 system planning studies. I worked with both AC and DC
19 equipment, and that included during -- my career
20 Bonneville had two (2) major upgrades to the HVDC
21 converter stations; one (1) was a voltage upgrade and
22 one (1) was adding a parallel converter. And I worked
23 on both of those projects. Being in the system
24 planning, we also worked very close -- I also worked
25 very closely with the transmission and the substation

1 groups.
2 On the -- most of the latter half of the
3 career, I was in management. I was -- I worked in
4 transmission operations. I was also working in the
5 power merchant function for some period of time.
6 During towards the end of my career, I set up the NERC
7 compliant function that Bonneville has today.
8 I also had some special projects. One
9 (1) was to set up the reliability coordinator. We were
10 setting up -- we set up the first reliability coord --
11 coordinators in the West. At the time, it was called a
12 security coordinator, and at the time BPA hosted that.
13 That is now an independent function outside of BPA. I
14 was also on BPA's executive team; I served as BPA CIO
15 for four (4) years.
16 After BPA, I joined Power Engineers.
17 And I've been with Power for about four and a half (4
18 1/2) years now. And my primary focus there is high
19 voltage DC and flexible AC transmission systems. That
20 also includes -- I'm in a group that does system
21 studies, so I lead of transmission studies that will
22 invest -- basically system planning and qualification
23 of transmission lines for ratings, using -- in our
24 case, it would be the WECC rating process, path rating
25 process.

1 Today I do a -- a lot of support with
2 electrical studies also beyond power flow and transit
3 stability that support our transmission and substation
4 groups. These could be protective relay-type studies,
5 design parameters when we design transmission lines,
6 optimize a conductor, look at the electric field, and
7 those kind of electrical parameters of a -- of a
8 transmission line.
9 And I also do a little bit of NERC
10 compliance as that work comes up. And today Power
11 Engineers is the owners' engineer for the Bonneville
12 Power Administration. They are replacing their
13 northern -- the Celilo converter station with a 3,800
14 megawatt HVDC converter and -- at a voltage of 560 kV.
15 The experience that I believe brought to
16 bear and assisted in the work we did with addressing
17 the questions on eight (8) and nine (9) state -- scope
18 of work statements 8 and 9 was a broad understanding of
19 both AC and DC transmission systems, how they work
20 together, and my background and some of the current
21 study work we're doing in system planning studies and
22 using powerful in transient stability studies. Thank
23 you.
24 MR. MICHAEL WEINSTEIN: Thank you, Mr.
25 Furumasu. With that, Mr. Chair, I would ask that Mr.

1 Davidson, Mr. Arnold, and Mr. Furumasu be accepted by
2 the Board as experts for the purposes of giving
3 evidence on the work performed by Power Engineers
4 according to its scope of work under the NFAT.
5 Mr. Chair, I would just -- before the
6 microphone is turned over to other counsel, like to
7 advise the Board that we were advised by Mr. Orle,
8 who's not present today, that his client has no
9 objections to the qualifications of these three (3)
10 witnesses as experts.
11 THE CHAIRPERSON: Thank you, Mr.
12 Weinstein. I have a couple of questions that I'd like
13 to ask the -- the representatives of Power Engineers.
14 Specifically, I'm looking for you to comment on your
15 experience -- you know, you've talked about system
16 planning and so on.
17 But I -- I'd like to know your
18 experience with respect to the planning side and
19 delivering a cons -- delivering a transmission line at
20 the -- at the end of a construction process; you know,
21 your understanding of that process and your experience
22 in encountering issues related to construction.
23 And -- and in addition to that, I wonder
24 if you could comment on your experience in dealing with
25 transmission lines in remote locations and what to you,

1 south of the border, would call extreme cold. But for
2 us it's just regular cold.
3 But could you talk about any experience?
4 MR. GLENN DAVIDSON: The -- the first
5 question having to do with the -- the estimating and
6 design and following a line through construction.
7 I have been -- I've been doing that for
8 -- for most of my career, most intensively at Jersey
9 Central Power and Light Company, where New Jersey is a
10 small state. It is the most densely populated state in
11 the US, and has -- has a lot of very wealthy people who
12 have a lot of very good attorneys who -- who can do an
13 awful lot to impede the -- both the permitting of a --
14 of a transmission line and the -- the acquisition of
15 right-of-way of a transmission line and the
16 construction of a transmission line.
17 I jokingly referred to my career as
18 spending half of my time with the attorneys, half of my
19 time with the accountants, and half of my time de --
20 designing transmission lines. But it -- it -- frankly,
21 there -- there was a -- a lot of interaction between
22 the utility and the legal community and the public, in
23 -- in both sou -- siting and constructing transmission
24 lines. And we spent a lot of our time on the fly
25 during construction resolving issues that -- that have

1 arisen.

2 I've -- I've had somewhat less

3 involvement in that in the consulting part of the

4 business, because our clients are typically the ones

5 who are doing that act -- activity. And our -- our

6 review and my review of that has to do more with taking

7 a look at what impact is on -- on the design and

8 whether or not we can accomplish -- accommodate some of

9 the -- the issues that arise and -- and do that.

10 Regarding cold weather, and -- and I'd

11 just like to note that it's 70 degrees in Denver today.

12 It -- it -- but in regard to cold weather I've -- I've

13 been in -- involved in a trans -- 70 mile long

14 transmission line project in -- in Alaska along the

15 Turnagain Arm and down the Kenai Peninsula, and -- and

16 another project from the Bradley Lake hydroelectric

17 generating plant across the Kenai Peninsula. The --

18 the Bradley Lake transmission line was on 7 or 8 feet

19 of -- of, peat which required extremely specialized

20 equipment to operate. It required the -- it was remote

21 enough that it required the construction workers to be

22 housed in a man-camp and -- and transported to the site

23 by helicopter.

24 There -- there were serious issues with

25 frost jacking of foundations, and we developed a -- a

1 design that allowed for some frost heave of -- of
2 transmi -- of foundations and being able to adjust
3 structures on those heaved foundations; extreme ice
4 conditions in a portion of the line, 5 1/2 inches of --
5 of ice on a portion of the line. And we developed
6 methods to en -- to allow the accommodation of that
7 line and the unbalanced forces by huge amounts of ice
8 dropping off on one (1) side of the -- one (1) span of
9 the line and full ice on the other side of the line
10 without causing our line to cascade fail.
11 So in -- in my experience I have -- I
12 have worked on projects in remote areas and in cold
13 areas. Colder than Winnipeg.
14 MR. BRIAN FURUMASU: May I add to that
15 just a little bit? On the -- from a systems study
16 standpoint, on these long linear projects similar to
17 what you have here in Manitoba Hydro, many times the
18 systems are actually pretty -- almost independent of
19 one another. They may -- may -- some systems have an
20 AC system tie, but many do not. So a lot of what --
21 what we're doing is actually two (2) separate studies
22 on each end that look at the needs of each end when you
23 -- when you integrate a new DC line onto each of these
24 systems.
25 So we've -- we've done that with a

1 number of projects in the United States; TransWest
2 Express. We're also working with the Clean Line, who
3 has four (4) HVDC projects, three (3) of which are
4 active today. We're also working with other -- one (1)
5 other, the Zephyr project. In many of these cases,
6 they have very similar attributes to the project that -
7 - that Manitoba is undertaking today.
8 THE CHAIRPERSON: Thank you. I'd like
9 to call on Intervenors now. Ms. Menzies, do you have
10 an comments, questions?
11 MS. MEGHAN MENZIES: CAC (Manitoba) has
12 no questions for these witnesses, and we do not object
13 to them being qualified as experts.
14 THE CHAIRPERSON: Thank you, Ms.
15 Menzies. Me. Hacault, s'il vous plait?
16 MR. ANTOINE HACAULT: Merci, M.
17 President. I'll start by saying we have no objection
18 to the qualifications, but I just have a couple
19 questions of perhaps clarification on the breadth of
20 experience.
21 Mr. Davidson, in your CV you mentioned
22 that you did an overhead and underground line study for
23 the State of Wisconsin.
24 Are you at liberty to disclose for whom
25 you performed that assignment?

1 MR. GLENN DAVIDSON: Excuse me.
2 Madison Gas and Electric Company.
3 MR. ANTOINE HACAULT: Secondly, sir,
4 prior to accepting this engagement, did you have any
5 involvement in the Great Northern Transmission Line
6 project?
7 MR. GLENN DAVIDSON: I have not, no.
8 MR. ANTOINE HACAULT: Okay. Thank you.
9 Mr. Furumasu --
10 MR. BRIAN FURUMASU: Yes.
11 MR. ANTOINE HACAULT: Hopefully I
12 hadn't massacred that too badly.
13 MR. BRIAN FURUMASU: No, that's fine.
14 MR. ANTOINE HACAULT: In your CV at
15 page 3, you indicate that you had some experience with
16 respect to Great River Energy, the Dickinson HVDC
17 ground electric -- electrode study in Minnesota. I
18 just, I guess, want to know the -- the same of you.
19 Were you involved in the Great Northern
20 Transmission Line project in any way prior to this
21 engagement?
22 MR. BRIAN FURUMASU: No, I wasn't. My
23 -- my work was strictly on the ground electrode, so we
24 had no other work with actually the DC project itself
25 or -- or with the Great Northern Transmission.

1 MR. ANTOINE HACAULT: Thank you. And
2 then next moving to Mr. Arnold. At, I believe, the
3 second page of your CV you indicate a project which is
4 identified as MATL Transmission Line project, which I
5 understand originates somewhere in Alberta going down
6 to Montana.
7 Is that correct?
8 MR. PAUL ARNOLD: That's correct.
9 MR. ANTOINE HACAULT: Sir, could you
10 explain whether or not your involvement in that project
11 has assisted you or how -- how it relates to your
12 assignment in -- in this project with respect to the
13 500 kV line?
14 MR. PAUL ARNOLD: Primarily from an
15 operational perspective and assessing whether or not
16 the transfer capability limits were appropriate for
17 that line, not only under normal conditions, but for
18 outage conditions.
19 MR. ANTOINE HACAULT: Thank you. Those
20 are all my questions. And we have no objection to the
21 qualification of either of the three (3) witnesses.
22 THE CHAIRPERSON: Merci, Me. Hacault.
23 Ms. Saunders, please?
24 MS. JESSICA SAUNDERS: The MMF has no
25 objection to the qualifications of these witnesses as

1 experts. Thank you.

2 THE CHAIRPERSON: Thank you, Ms.

3 Saunders.

4 MR. SVEN HOMBACH: Mr. Chairman, I

5 would suggest that we canvass Manitoba Hydro as well to

6 determine if there's any concerns.

7 THE CHAIRPERSON: Yes. I'm sorry. Ms.

8 Ramage, please.

9 MS. JENNIFER MOROZ: Good morning, Mr.

10 Chairman. Manitoba Hydro has no objections to the

11 qualifications of the witnesses, but we would ask one

12 (1) point of clarification.

13 Do the panel members with experience in

14 HVDC transmission specifically have any experience with

15 HVDC controls? And by that, we have in mind the

16 control replacement due to plant modernization or life

17 extension.

18 MR. BRIAN FURUMASU: I -- I'm not a

19 controls engineer, but we have -- as part of the

20 project we -- we see and -- and work with all the

21 controls, so we understand the scope of what's being

22 done and -- and what the controls do. So I would say

23 we have understanding of, but I -- I certainly am not

24 an expert in, DC controls.

25 THE COURT REPORTER: Excuse me. Are

1 you Ms. Moroz?

2 MS. JENNIFER MOROZ: That's correct.

3 THE CHAIRPERSON: Consulted the panel,

4 and the panel will accept Messrs. Davidson, Arnold, and

5 Furumasu as expert witnesses for these proceedings. So

6 welcome to these proceedings, and I hope you enjoy your

7 stay in Winnipeg despite the difference in weather.

8 But we're glad you're here.

9

10 EXAMINATION-IN-CHIEF BY MR. MICHAEL WEINSTEIN:

11 MR. MICHAEL WEINSTEIN: Mr. Chair, the

12 -- these -- these witnesses are going to -- unlike some

13 of the previous IECs, they are going to each present a

14 portion of the direct evidence today according to those

15 scopes of work that they had specific control over

16 during the preparation of their report.

17 And I'd now like to turn it over to Mr.

18 Davidson to commence the presentation.

19 MR. GLENN DAVIDSON: Thank you, Mr.

20 Chairman and -- and Board members. I -- I'm going to

21 begin our presentation by talking about the first six

22 (6) term of reference scope items which are -- were --

23 were done and -- by me and -- and under my -- under my

24 supervision.

25 We're -- we're -- as -- as Mr. Weinstein

1 mentioned, we're -- we'll divide our presentation up.
2 I -- I will be presenting the first six (6) topics, Mr.
3 Arnold will be doing -- presenting scope of work items
4 7, 10 to 12, and Brian Furumasu will be talking about
5 scope of -- of work items 8 and 9.
6 Just for reference, I'm not going to
7 read all of this. I don't need to bore you any more
8 than we'll do in the regular course of business. This
9 is our -- these -- these are our scope of work items.
10 We just have them here for ease -- ease of reference as
11 we -- as we go through our project.
12 We'll be talking about our -- talking
13 about and making conclusions as we go through our
14 presentation, but we thought it would be useful at the
15 onset of the presentation just to mention a couple of
16 the -- of the key conclusions.
17 Yes, sir.
18 MR. KURT SIMONSEN: It's Kurt Simonsen.
19 If -- if you don't mind, can you reference your slide
20 numbers during the course of the --
21 MR. GLENN DAVIDSON: Yeah.
22 MR. KURT SIMONSEN: -- presentation?
23 MR. GLENN DAVIDSON: Mr. Weinstein told
24 me to do that, and I forgot it, so okay. We're on
25 slide number 5 here.

1 Our -- our -- briefly, our key
2 conclusions are that we believe Manitoba Hydro's
3 transmission line capital construction -- capital
4 estimates are complete and reasonable within an
5 accuracy tolerance of plus or minus 20 percent, and
6 I'll explain during the presentation why we've selected
7 that tolerance.
8 Our finding is that the existing
9 Manitoba Hydro system is reliable and it meets the NERC
10 standards. This was demonstrated in the Manitoba Hydro
11 2012 System Performance Assessment Report. We believe
12 that the proposed system meets the NERC reliability
13 standards using the current Bipole III model, and that
14 is demonstrated in Manitoba Hydro's Integrated
15 Transmission Plan for Keeyask and Conawapa.
16 However, we have a -- a caveat on that,
17 that the Bipole III controls model is a generic model
18 at this point in time, and we're -- we're recommending
19 that the reliability be reviewed when the Bipole III
20 model is presented by -- is -- is prepared by the --
21 the selector vendor of the HVDC system.
22 Moving on to slide number 6, this begins
23 the part of the discussion about cost estimating. To
24 put things in perspective, I've -- I've referred to the
25 Association for the Advancement of Cost Engineering.

1 This is a -- this is a group that is intending to
2 improve the area of -- of cost estimating, and they
3 have about five (5) categories of estimates. And --
4 and with each increasing category of estimate, the esti
5 -- the tolerance of accuracy is anticipated to get
6 smaller and smaller. You get more accurate the more
7 you know.
8 For a budgetary level, estimating prior
9 to the design of a project their -- right, their
10 conclusion is that those estimates should fall within a
11 plus or minus 50 percent range. In -- in Power
12 Engineers's consulting business, we're making estimates
13 for people all the time. We've got a very large
14 catalogue of -- of estimates that we have made. We
15 have a proprietary estimating procedure that we use and
16 we believe with the amount of knowledge that we have on
17 this project that we can prepare an estimate to the
18 plus or minus 20 percent accuracy range.
19 We -- as I mentioned earlier, we use
20 that plus or minus 20 percent tolerance as our metric
21 against which to judge the Manitoba Hydro estimates.
22 We felt that if their estimate fell -- and our estimate
23 fell within the range of plus or minus 20 percent of
24 one another, that that -- we could conclude that that
25 was a reasonable and accurate estimate.

1 Moving on to slide 7, Power Engineers's
2 cost estimating procedure. I -- I've noted on the --
3 on the slides the location where you can find the topic
4 in our report, and this -- this starts on Power
5 Engineers's report page 1. Within the filing of the
6 NFAT, there was certain very high level descriptions of
7 the -- the projects, their length, types of structures,
8 that kind of information. We used that information to
9 -- to put into our estimating tool. We required more
10 information than high level information and so through
11 an IR or two (2) we got more information from Manitoba
12 Hydro that we could use.
13 At this point where lines are not
14 designed we need a whole lot more information that is
15 generic to a transmission line and we used our
16 experience and expertise to fill in those -- fill in
17 those spaces.
18 Just a note as we go through here.
19 These -- these are point estimates. They're made at a
20 point in time. Manitoba Hydro made theirs at a point
21 in time and we made ours at a point in time. At the --
22 at the point in time that we made these, the -- the
23 Canadian dollar and the US dollar were very close to
24 par. And so we -- we did our estimates in US dollars
25 rather than try to speculate on what might happen to

1 the exchange rate between US dollars and -- and
2 Canadian dollars. If the exchange rate goes up or
3 down, it -- it would affect the -- the closeness of --
4 of our estimates with one another. But we -- we used
5 US dollars.
6 Moving on to slide number 8, Manitoba
7 Hydro's estimating procedure. This is still, on our
8 report, page 1. Manitoba Hydro indicated to us that
9 they use the pricing from -- from tenders that they
10 have received from construction contractors on similar
11 projects in similar terrain. The contractor prices are
12 -- are all-in prices; they include the indirect costs
13 of building roads and providing man-camps and
14 marshalling yards and -- and that sort of stuff.
15 The -- the contractors include their own
16 contingency, and the -- the estimates included a
17 management reserve. They included escalation. The
18 management reserve was added onto the contractor's
19 price. And that's a Manitoba Hydro function.
20 Moving on to slide number 9. This is a
21 summary of the Keeyask transmission project. Manitoba
22 Hydro estimated in 2012 dollars the cost of that
23 construction was 86 million. Power Engineers, in 2012
24 dollars, estimated the cost of that construction as 84
25 1/2 million. The estimates were within 5 percent and

1 we -- therefore, we can conclude that the Manitoba
2 Hydro estimate is -- is complete and reasonable.
3 This -- this is an unusual estimate. It
4 -- it -- I don't have it here on the slide, but it's a
5 very small project. It is in a very remote area and a
6 very hostile climate. The -- the per kilometre cost of
7 this line is extremely high; you'll see higher than
8 some higher voltage lines that are built in the
9 southern part of Manitoba where it's a little bit
10 easier to get to and -- and the -- and the area is
11 easier to work in.
12 We -- we requested information from
13 Manitoba Hydro as to why that -- why that estimate was
14 so high. And it -- it's high because the project is
15 built in two (2) pieces. It -- it requires two (2)
16 mobilizations of men and equipment to a remote area.
17 There is a major crossing of the Nelson River that --
18 that is required. When -- when we reviewed that and
19 incorporated that -- those -- those constraints within
20 our estimating system, that's -- that's where we came
21 up with our $84 1/2 million estimate.
22 Moving on to slide number 10 for
23 Conawapa. Manitoba Hydro estimated these lines, in
24 2012 dollars, to be two hundred and eighty-six thousand
25 dollars ($286,000) a kilometre. Power Engineers has

1 estimated the -- that construction to be three hundred
2 and forty-four thousand dollars ($344,000) a kilometre.
3 The -- our conclusion is that the
4 Manitoba Hydro is at the very low end of our plus or
5 minus 20 percent accuracy tolerance. It's a very --
6 it's a -- again, it's a very small project in -- in the
7 overall project here. It is within our 20 percent
8 tolerance, and therefore we're willing to accept it as
9 being reasonable and -- and complete.
10 Moving on to slide number 11 for the
11 North-South transmission projects. Manitoba Hydro
12 based their estimates on a three hundred thousand
13 dollar ($300,000) a kilometre historical cost. They
14 provided me with a table with about a dozen project
15 tender value -- per kilometre values on it. I reviewed
16 it, and the three hundred thousand dollar ($300,000)
17 per kilometre is indeed an average cost of a -- of what
18 I could determine as being about the five (5) most
19 representative projects.
20 Power Engineers esti -- our independent
21 estimate for that line, in 2013 dollars, is three
22 hundred and forty-four thousand (344,000) a kilometre.
23 And our conclusion is that -- that Manitoba Hydro and
24 Power's estimates are within 14 -- 13 percent of one
25 another, falls within our accuracy tolerance, and we --

1 and we conclude that it's reasonable and complete.
2 Moving to slide number 12 for the
3 Manitoba-Minnesota transmission project. Manitoba's
4 estimate was nine hundred and twenty-five thousand
5 dollars ($925,000) per kilometre in the construction
6 year. Power Engineers -- excuse me -- yeah, in the
7 construction year. Power Engineers's estimate was
8 eight hundred and thirty-one thousand (831,000) per
9 kilometre in the construction year. The Manitoba
10 estimate was higher than Power's estimate by 11
11 percent, within our 20 percent accuracy tolerance, and
12 -- and we conclude that it's reasonable and accurate.
13 Moving to slide number 13, O&M expenses.
14 Operation -- operation and maintenance on -- on a
15 transmission system is -- is variously defined by the
16 owner of the system, based on how they account for
17 certain things. It -- it can include the -- the
18 operation of the system operation centre. It can -- it
19 can include a whole bunch of administrative people in
20 the general office.
21 Narrowing it down to what I call direct
22 operation and maintenance, which is the -- the periodic
23 inspection of the transmission line itself, the
24 trimming of trees, the replacement of minor items of
25 equipment and hardware that get damaged or wear out and

1 are not major enough to be capitalized, I call that
2 direct operation and maintenance.
3 Manitoba Hydro provided their historic
4 cost per kilometre for direct operation and
5 maintenance. They asked that that be treated as CSI,
6 so I haven't indicated what it is here.
7 The costs that Manitoba Hydro provided
8 is lower than we have seen for other systems, and --
9 and that's the only conclusion we can -- we can draw
10 from it.
11 Moving on to slide number 14, the
12 indirect construction costs, we needed to -- we needed
13 to resolve this in an indirect manner. The Manitoba
14 Hydro estimates were -- were all-inclusive estimates.
15 They had indirect costs embedded in them that were not
16 broken out separately.
17 Power Engineers breaks out indirect
18 costs separately. We estimate costs for roads and man
19 camps and marshalling yards and -- and that sort of
20 stuff.
21 Our conclusion is that if the Manitoba
22 Hydro estimate and the Power Engineers estimate are
23 within our accuracy range, then the Manitoba estim --
24 the Manitoba Hydro estimates must have included
25 appropriate amounts for the indirect costs -- the only

1 way that we could -- we could resolve that -- that
2 issue.
3 Moving on to slide number 15, having to
4 do with scope of work item number 3, schedule, just to
5 point out one (1) thing on this slide, and I'll talk
6 about it a little bit more in the next slide. You'll
7 notice at the far right of the slide, there are three
8 (3) blue bars that indicate projects under construction
9 at the same period of time. One (1) of them is the
10 MMTP, and the Keeyask projects are the -- are the other
11 two (2).
12 Having to do with -- with risk, first --
13 first of all, the -- a number of the projects have --
14 have risks because they're dependent on winter weather.
15 Winter is your friend up there when you're trying to
16 drive over frozen ground, and winter is your enemy when
17 it gets really cold and equipment is hard to start and
18 men get inefficient, and so weather is a major risk
19 factor.
20 When we reviewed the overall schedule,
21 we concluded that the time allotments for design
22 procurement and construction were -- were reasonable,
23 that they -- they were -- in other words, they were
24 appropriate for these particular projects.
25 That -- the risk comes with the fact

1 that the Keeyask transmission project, which is small
2 in a very inhospitable part of your beautiful province,
3 is overlapping with a very attractive, large project in
4 the southern part of your province. And contractors
5 are attracted to very large, continuous projects, and
6 they are not well attracted to going to remote, hostile
7 places to work.
8 And so one (1) of our thoughts -- one
9 (1) of our risks in this thing is that the -- the
10 Keeyask project is going -- is going to suffer from
11 some pressure of being able to be adequately staffed,
12 and -- and be of interest to a construction contractor.
13 In conversations with Manitoba Hydro,
14 they -- Manitoba Hydro indicated that their schedule
15 had accounted for that possible ma -- you know,
16 pressure and -- and competition with other projects.
17 THE CHAIRPERSON: Mr. Anderson (sic),
18 you didn't -- on the -- on slide 15, you didn't have
19 anything in there regarding the construction of Bipole
20 III.
21 MR. GLENN DAVIDSON: It did not.
22 THE CHAIRPERSON: Okay. Were you made
23 aware of the schedule for Bipole III?
24 MR. GLENN DAVIDSON: Yes.
25 THE CHAIRPERSON: You were. So does it

1 coincide with the same -- the work that's going on with
2 the transmission project and the Keeyask and so on? It
3 --
4 MR. GLENN DAVIDSON: It does, yes.
5 THE CHAIRPERSON: Yeah.
6 MR. GLENN DAVIDSON: It -- it -- that
7 does coincide. It -- it pro -- it -- it does give some
8 cause for reflection. However, there -- there are a
9 number of very major construction projects going on in
10 the US and Canada, even at the present time, and there
11 seems to be a very adequate workforce capable of
12 executing these -- a -- a bunch of large projects
13 simultaneously, so.
14 Our -- our review of that wasn't that
15 it's -- it's a fatal flaw. Our review of it is -- is
16 the contractor may need to be enticed to go up to
17 Keeyask when he could be basking in Southern
18 Minnesota's beautiful summer.
19 Moving on to slide number 17, the
20 contracting plan. We were informed by Manitoba Hydro
21 that they traditionally use a project where they design
22 the -- the project and procure material, and then they
23 bid construction. Manitoba Hydro also provides
24 construction inspection and construction management.
25 This is a very widely used plan. I

1 personally find it -- it preferable to design build
2 philosophy, even though Power Engineers will -- will
3 work both ways. I -- I think it offers the potential
4 for the lowest cost and the highest quality, because
5 the owner of the facility gets to design it the way
6 that they want it designed, and the owner of the
7 facility gets to purchase the material that they want -
8 - the kind of material that they want.
9 And then by inspecting the -- the
10 construction, you get the quality of construction you
11 want. You give up a lot of that if you use a design
12 build type of -- of philosophy, but that -- that can
13 work well. We -- we've worked under that -- we've
14 worked under that philosophy, and -- and I -- if -- if
15 Manitoba Hydro uses the design, procure, and bid
16 philosophy, it -- it's a very good, well-trusted
17 philosophy.
18 Moving on to slide 18. Manitoba Hydro
19 has described in the NFAT filing a very formal risk
20 management analysis plan -- program. The -- the
21 management of -- of risks involves two (2) things which
22 typically everybody does. We build a contingency in --
23 into our estimates.
24 The contingency is to -- is to cover
25 things that when you were designing or procuring

1 material, you -- you couldn't foresee, things like
2 having extensive amounts of rock that need to be
3 blasted during construction that you didn't know were
4 there under the ground, high water tables in an area
5 where you didn't expect it, tho -- those kinds of
6 things.
7 Typically, the contingency is part of
8 the cost of the project, and -- and you sort of expect
9 to spend it, and if you spend more than that,
10 management gets mad at you, but if you spend up to the
11 contingency or less than the contingency, you become a
12 hero.
13 Manitoba Hydro does something that I've
14 never seen on a -- on a transmission project before.
15 They have a management reserve that they set aside to -
16 - to cover what I've described as global issues, things
17 that don't have anything to do with the design or
18 construction. It would -- it would be something like
19 the inflation rate goes wild, and -- and, you know,
20 Manitoba Hydro and their contractors have nothing to do
21 with that.
22 It's just something that might happen.
23 The price of oil may go up or go -- it never goes down.
24 The price of oil may go up. The Arabs may cut oil off,
25 those kinds of things that you -- you can't handle, and

1 Manitoba Hydro sets aside management reserve to cover
2 those kind of global issues. And -- and I thought that
3 was very sophisticated, and I had never seen that in a
4 -- in a -- on a project before.
5 So moving on to slide number 19. Our --
6 our conclusions are that Manitoba Hydro's estimates are
7 based on similar lines constructed in similar terrain
8 and ground conditions, and their estimates flow within
9 our expected accuracy tolerance. Their transmission
10 lines are mostly on Crown lands that avoid private
11 landowner issues.
12 Just an aside, when I was in New Jersey,
13 we -- we -- I was responsible for selecting a -- an
14 alignment for 100 miles of 500 kV line on a 350 foot
15 wide right-of-way through suburban New Jersey. And I
16 am well aware of what kinds of landowner issues you can
17 run into with large and small landowners on -- on a
18 project.
19 They have -- we conclude they've -- they
20 have included appropriate contingencies in all of -- in
21 all of their estimates. We conclude that they did a
22 sophisticated sensitivity analysis, and it showed that
23 transmission line construction cost variances have an
24 extremely minor impact on the overall project.
25 Moving on to slide number 20, our task

1 number 5, comparable cost estimates. Slide numb --
2 task number 5 and task number 1 were actually, for us,
3 the same task because our way of determining whether --
4 whether -- the reasonableness and accuracy of Manitoba
5 Hydro's estimates was by making our own estimates. And
6 so by -- by doing -- we -- we did -- actually did task
7 1 and task 5 simultaneously.
8 In doing that, as I mentioned before, we
9 used specific input from Manitoba Hydro, whatever we
10 could get. We used our design and estimating
11 experience to fill in all of the minor pieces and parts
12 that you need to know to be able to do an estimate.
13 We believe our estimates are -- have an
14 accuracy tolerance of plus or minus 20 percent. And
15 all of Manitoba Hydro's estimates fell within our
16 accuracy tolerance range, and therefore we conclude
17 that their estimates are complete and reasonable.
18 And an -- an estimate in our system
19 consumes about twenty (20) or twenty-five (25) 11 x 17
20 sheets of paper with all the detail we put into it. So
21 in our report, we just put in a summary page for each
22 of the estimates. So they are -- they are in our
23 report in Appendix E, if you would like to look at
24 them.
25 The -- the last scope item on slide

1 number 21 was to review and assess Manitoba Hydro's
2 estimates for the cost of construction of the US
3 transmission facilities. Manitoba Hydro informed us
4 that the estimates for the US facilities were made by
5 Minnesota Power, and Manitoba Hydro merely adopted
6 those -- those estimates. So that was a fairly trivial
7 item for us.
8 That concludes my --
9 MS. MARILYN KAPITANY: Sorry. Before
10 you leave that point --
11 MR. GLENN DAVIDSON: Excuse me?
12 MS. MARILYN KAPITANY: -- before you
13 leave that point --
14 MR. GLENN DAVIDSON: Yes.
15 MS. MARILYN KAPITANY: -- even though
16 the estimates were done by Minnesota Power, did you
17 have a chance to look at those estimates and get a -- a
18 feeling whether or not they were relatively in the
19 ballpark?
20 MR. GLENN DAVIDSON: We believe they
21 are relatively in the ballpark, yes. There -- there
22 are a lot of pieces -- there are a lot of pieces in
23 that, and we reviewed the Minnesota Power -- what was
24 it -- certificate of need application that -- that had
25 those numbers in there, and they -- and they appeared

1 to be reasonable numbers.

2 That concludes my part of the -- of our

3 evidence presentation. If you have any questions, I'd

4 -- I'd be happy to answer them. Otherwise, I'll -- I

5 will turn the microphone and the clicker over to Paul

6 Arnold.

7 THE CHAIRPERSON: How -- how much of a

8 risk would be related to, say, for example, NERC

9 changing its standards and impacting the plan that

10 we're seeing, the plan that you examined?

11 Is that a risk, the regulatory risk

12 associated with these?

13 MR. GLENN DAVIDSON: I -- I did not

14 take a look at regulatory risks or -- or things like

15 that. And -- and, you know, I don't -- I don't know

16 how anybody could -- could factor that into a

17 construction cost estimate.

18 That question might be better answered

19 by -- by Paul or -- or Brian since they're more up on

20 the -- on the NERC functions than -- than I am. But

21 they also -- that might be something that would -- you

22 would expect that could be covered under the management

23 reserve, which was to cover non-construction-related

24 things that -- that happen that are out of -- out of

25 anybody's control. Thank you.

1 CONTINUED BY MR. MICHAEL WEINSTEIN:

2 MR. MICHAEL WEINSTEIN: Mr. Chair,

3 before Mr. Arnold starts his portion of the

4 presentation, I just wanted, for the benefit of the

5 transcript, to point out that there are references

6 throughout this slide deck to the Power Engineers's

7 Report. And since this most recent version, Exhibit 3-

8 1, was just received yesterday evening, those

9 references are to Exhibit 3.

10 So if someone were trying to look for

11 those references, they may -- they may not have

12 changed, but if-- if in any way those new changes

13 affected the formatting, and someone is later reading

14 this transcript, I figured I'd better put it on the

15 record now so they would know the right place to look.

16

17 (BRIEF PAUSE)

18

19 MR. PAUL ARNOLD: Okay. I presume

20 we're ready to move on with the next part of the

21 presentation.

22 Again, scope of work item 7 deals with

23 the reliability of the existing and proposed system. I

24 have two (2) slides. I would have a lot more, but much

25 of our report regarding reliability has been redacted,

1 and so there is a lot of CSI information there. So
2 what I want to do with this scope item 7 here is just
3 kind of give you the bookends and what our conclusions
4 are, and if we want to get into the details,
5 fortunately or not, we have to -- we have to cover most
6 of that under -- under the CSI presentation.
7 So the first slide we're looking at is
8 Slide 22. Our assessment of the reliability of the
9 existing system is based on Manitoba Hydro -- it's a
10 confidential report -- their 212 -- 2012 System
11 Performance Assessment Report.
12 The scope of that study is basically to
13 run through all of the NERC outages and the categories
14 of outages that are defined by NERC transmission
15 planning standard 001 through 004, and -- and test the
16 system performance according to those standards.
17 And that -- that's done by, you know,
18 power flow instability flow simulations. The -- the
19 practice is to look at the existing system, but also to
20 look out ten (10) years for facilities that might be
21 proposed within that ton -- ten (10) year window, and
22 to look at both existing problems that may be there and
23 remedies for such problems, and to also test the system
24 for problems that might be coming with -- with new
25 transmission additions, or with changes in load

1 assumptions or changes in new generation. And so it's
2 really to give you a -- not only a sense of how your
3 system is operating today, but how it might operate in
4 the future, and -- and give you some ability to
5 anticipate future problems.
6 We looked through that report, and found
7 that basically, in our opinion, that the existing
8 system is -- is reliable, and does meet the NERC
9 standards. One (1) recommendation that we came up with
10 -- oh, I wanted to also -- I skipped over the -- the
11 bullet about the fact that this report is usually done
12 annually -- on an annual basis, and that we noted that
13 it included facilities such as Bipole III and Keeyask
14 generation. It did not include Conawapa. It did not
15 include splitting the northern colle -- collector
16 buses, or the -- or the new North-South transmission as
17 proposed in the Preferred Development Plan.
18 So it was not a complete assessment of -
19 - of all future planned facilities, because of the
20 normal ten (10) year time horizon, but -- so Power
21 Engineers is recommending that Hydro include the NFAT
22 Preferred Plan facilities at -- at the next opportunity
23 so they can have that advanced look of how all of these
24 facilities perform together with the existing system.
25 So we also -- there -- the -- the other

1 bookend was looking at the reliability of the proposed
2 system, and for that assessment, Power reviewed the
3 Confidential Integrated Transmission Plan for Keeyask
4 and Conawapa report, and we feel that that demonstrates
5 compliance with the NERC planning standard.
6 The caveat there is that they're using
7 what we're calling the -- the existing Bipole III
8 model. This was primarily reference to the control
9 systems that are modelled in the simulations. And we
10 understand that they're using a generic model which is
11 not unlike --which, I should say in a positive way,
12 they are like -- similar to controls that are in place
13 today with Bipoles I and Bipole II. But it's not the
14 model that we -- they will end up with once they select
15 a vendor and the vendor supplies information on the
16 types of control systems.
17 And -- and that will provide a -- a more
18 futuristic view, if you will, of -- of what exactly
19 will be in place with those control systems. And our
20 recommendation is that -- we've noted in our report
21 that that affects the maximum loading limit that you
22 can put on Bipole III because of how it will perform in
23 regard to the rest of the system and the other Bipoles,
24 and that we recommend that -- that further analysis be
25 done to verify that safe operating limit once that new

1 model becomes available.

2 THE CHAIRPERSON: So what could go

3 wrong on that one would be that the model determines

4 that the operating limit is not what they expected, in

5 which case you would have to either accept the -- the

6 operating limit or invest more dollars to bring it up

7 to where you want it to be.

8 Is that -- did I get that right?

9 MR. PAUL ARNOLD: We -- we didn't go

10 that far to -- to actually draw that conclusion.

11 There's been a lot of discussion, I think, about

12 whether or not this -- the -- the -- what is the risk

13 that the new model might show a different answer than

14 the existing model? We don't know. And -- and so we

15 can't speculate on -- on what you might do to cover for

16 that event.

17 It's not uncommon for -- particularly in

18 -- in DC systems, where you're building a new DC line,

19 that a lot of this information about the exact model

20 and the exact controls is proprietary information, as

21 you probably don't get until some point in the

22 procurement process and it's usually done after the

23 initial planning for the project is done.

24 So when you're -- when you're trying to

25 put your best foot forward and dev -- develop a -- a

1 plan for new transmission, you use what is currently
2 available. And based on your -- your past experience,
3 you can determine whether or not that looks reasonable
4 to you or not.
5 And -- and we're not saying it's
6 unreasonable. We're just saying that the importance to
7 reliability, the importance of that loading limit to
8 reliability, is -- is so strong that it -- it's
9 something that definitely requires verification.
10 THE CHAIRPERSON: Mr. Weinstein, I'm
11 sort of wondering how much time Mr. Furumasu would need
12 to go through his slides, because we could -- we could
13 break right now if...
14 MR. MICHAEL WEINSTEIN: I think this is
15 probably a good time to -- to take a moment to pause,
16 Mr. Chair.
17 THE CHAIRPERSON: Let's -- let's take
18 ten (10) minutes then.
19
20 --- Upon recessing at 10:29 a.m.
21 --- Upon resuming at 10:46 a.m.
22
23 THE CHAIRPERSON: I believe that we're
24 ready to resume the proceedings. Me. Monnin?
25 MR. CHRISTIAN MONNIN: Merci, M.

1 President. I just wanted to close the loop on the
2 issue that was raised earlier with respect to La Capra
3 and Associates and the articles in the Free Press that
4 was attributed to them.
5 I have further confirmation from Mr.
6 John Athas and from Ms. Mary Neal that, quite
7 emphatically and quite categorically, that no
8 involvement or input or any contact with the Winnipeg
9 Free Press. So hopefully that will dispel any
10 perceived or any implied inference with regards to
11 their independence and the professionalism of La Capra
12 and Associates.
13 THE CHAIRPERSON: Thank you. Thank you
14 for that. And I'm glad you put it on the public
15 record.
16 MS. PATTI RAMAGE: Mr. Chairman, if I
17 could just comment on that. I think Manitoba Hydro can
18 go on the record based on both Mr. Monnin's
19 representations and our own investigations. We think -
20 - we are certainly satisfied that La Capra did not
21 consent to interviews or participate in -- in that
22 article, so we want to go on the record.
23 And I hope Mr. Weinstein doesn't mind my
24 repeating a little bit of what we discussed. We just
25 said, Who's going to write the Free Press first? And

1 from our perspective, we seem to be doing that a lot
2 lately. So we would encourage the counsel for La Capra
3 to do that, because we think it unfairly puts into
4 doubt the objectivity of the witnesses, and by
5 extension, the -- the NFAT process, when things like
6 that are done.
7 We're not suggesting the Free Press used
8 any quotes improperly or did anything like that. I'm
9 not going down that line. It's just the question --
10 putting a byline on an article that was not written by
11 the party, because I can quote anyone correctly and --
12 and in any circumstance, put together quotes to make
13 the picture I want, and -- and that's not what we're
14 suggesting. But the practice, we don't think is
15 appropriate, and not one the PUB would want to condone.
16 THE CHAIRPERSON: Me. Monnin...?
17 MR. CHRISTIAN MONNIN: Merci, M. Presi
18 -- M. President. I -- I -- I'd like to acknowledge and
19 thank Manitoba Hydro for -- for the comments made to
20 bring this matter to a close. And the comments with
21 respect to contacting the Free Press are -- are duly
22 noted, and we will take that into consideration. Thank
23 you.
24 THE CHAIRPERSON: Thank you. I think
25 it's back to the presentation.

1 MR. PAUL ARNOLD: Thank you. So I
2 think our -- our next slide is -- slide number 24 deals
3 with scope of work item number 10, addressing MISO
4 transmission constraints. This first slide, 24, just
5 starts with the description of the existing
6 interconnection. This information was available in the
7 NFAT submittal.
8 And -- and so the existing
9 interconnection with -- with the US really consists of
10 four (4) -- four (4) lines, three (3) 230 kV lines, and
11 one (1) 500 kV line. The individual line ratings,
12 these would be the thermal ratings, are also listed
13 there, and it's just worth noting that you can't just
14 add up those individual thermal line ratings to get the
15 overall rating of the path. You have to be able to
16 withstand the loss of the largest path, and in doing
17 so, the -- the limit -- the path limit is actually
18 2,175 megawatts with all facilities in service.
19 The export limit, again, as pointed out
20 in NFAT, that's 1,950 megawatts. In addition to that,
21 there's a 75 megawatt transmission reliability margin.
22 It's a built-in margin to account for things such as
23 automatic generation control. When you're changing
24 export schedules from hour to hour, you get some
25 fluctuation. It takes some time to move generation on

1 either side of the -- the transmission path, and so you
2 allow for some fluctuation in -- in flows on a normal
3 basis. That's something that goes into your
4 transmission reliability margin.
5 And a -- and another obligation is 150
6 megawatt contingency reserve obligation. Manitoba
7 Hydro is a -- participates in MISO under the Reserved
8 Sharing Program, and so in order to deliver MISO's
9 share of contingency reserve, you have to reserve firm
10 transmission on the path to be able to deliver it, so.
11 And that -- again, that -- I'm sorry. That's discussed
12 on page 20 of our report.
13 So I guess another consideration in the
14 need for new transmission is, Well, why -- why can't
15 you just upgrade the existing five (5) -- the -- the
16 existing path, or 500 kV line? And I think that was
17 discussed -- I'm -- I'm sorry, I'm a little -- my
18 recall isn't -- isn't great, but I think I -- I got a
19 lot of this information out of the MCON filing for the
20 Manitoba/Minnesota transmission project.
21 And the information in there is pretty
22 reasonable. It just explains that you would have to
23 upgrade a series capacitor rating beyond its current
24 limit. There is also a DC -- HVDC reduction scheme
25 that operates for loss of that 500 kV line. And

1 basically, that is lowering the -- the actual flows on
2 the DC transmission so that you don't overload the
3 underlying transmission, the -- the remaining two
4 thirty (230) transmission.
5 And today I understand that that is
6 MISO's largest single contingency. The -- the exact
7 amount of -- of DC reduction and loss of power into
8 Minnesota, into MISO, is -- is kind of a variable
9 depending on how the system's being operated at that
10 particular time.
11 But MISO policy -- as I understand the
12 reports, MISO policy is that they don't want to
13 increase their largest single contingency. That would
14 -- would be a cost that would be borne by the reserve
15 sharing pool.
16 Basically, in my understanding from how
17 reserve sharing works in the Northwest system is that
18 everybody essentially pools their reserves so that they
19 don't have to carry their own individual largest single
20 contingency.
21 So there's a cost savings for -- for
22 every -- for everyone involved in those programs
23 generally. And -- but if you have to increase your
24 large -- you end up increasing your largest single
25 contingency, then overall, MISO would have to carry

1 more reserves, which is going to end up being a cost
2 that is shared by MISO -- MISO participants.
3 Second item on -- scope of work item 10
4 is basically the issue of whether or not those
5 constraints would require financial participation in US
6 transmission. And so the normal -- well, I would say,
7 normal -- I should say common practice for cost sharing
8 is that if somebody wants to build a line and there are
9 five (5) participants, then you divide the cost, the
10 capital cost of that line, by -- along those five (5)
11 par -- participants on a pro rata basis.
12 So -- but in this case, I understand
13 there were some news articles claiming additional
14 contracts were being put in place. However, what's in
15 the reports and at -- at the time that we reviewed this
16 is that Minnesota Power was the -- the only
17 participant, aside from Manitoba Hydro, for the US
18 portion of the -- of the new transmission path.
19 And their commitment was 250 megawatts.
20 So divided by seven fifty (750), that meant that
21 Minnesota Power would be coming up with one-third (1/3)
22 of the capital, and Hydro would come up with two-thirds
23 (2/3s) of the capital in order to -- in order to fund
24 the -- the development and construction of this new
25 line.

1 It's also understanding that, you know,
2 applying the pro rata principle again, that future
3 commitments, future contracts would ultimately reduce
4 Hydro funding. I don't know -- I don't know what
5 happens in contract negotiations or how this will play
6 out, but that would be -- I think this is what was
7 indicated to us by Manitoba Hydro in our discussions
8 with them, that that would be an expectation that
9 ultimately their costs would come down.
10 Okay. Moving on to scope item 11, we're
11 shifting now to the internal transmission of Hydro,
12 looking at the 100 megawatt incremental increase to the
13 North-South transmission path. And the way we
14 addressed need for this was basically to illustrate or
15 talk about what benefits that actually provides.
16 So in the Preferred Plan, there was
17 discussion about how much Northern generation you can
18 actually put down the DC. And it was related back to,
19 Well, what is my -- not only what is my DC capacity,
20 but how -- how far can I load it up? And so there were
21 studies done to determine how far you can load that DC
22 intertie, and the remainder then would have to be
23 shifted somehow to another transmission path. And I
24 think that was the basic philosophy for developing
25 additional North-South transmission. So again in the

1 Preferred Plan, one (1) Kettle generation unit will be
2 shifted over to the AC transmission system. And that
3 has the effect of offloading the -- the three (3)
4 Bipoles and keeping that within its desired or -- or
5 planned rating.
6 That also has another impact of then --
7 then providing 100 megawatt margin for the DC maximum
8 loading limit and it also has an impact on something
9 that has been defined by Hydro is DC on line valve
10 group sparing. So it increases -- basically increases
11 your reserve on that DC transmission path by 100
12 megawatts, and that essentially reduces non-firm
13 transmission.
14 There was a -- sort of a definition of
15 firm and non-firm on the DC that is being proposed by
16 Hydro, which basically says that if I have a DC online
17 and if I look at the capacity with the largest valve
18 group out of service, I will define that as firm
19 transmission -- as firm transmission capacity. So if
20 you take 100 megawatts of the DC it adds 100 megawatts
21 of firm, or in other words reduces your non-firm
22 component by 100 megawatts.
23 There's an additional benefit for the
24 proposed AC transmission additions, and that is that it
25 tends to firm up the output of Kelsey and Wuskwatim

1 generation by 85 megawatts. So that's an additional
2 system benefit that you get through the North-South
3 transmission upgrade process, and that is discussed in
4 our report again on page 27.
5 Oh, going to slide 28. We looked at the
6 last question, which is -- which is sort of related,
7 but it -- it actually addresses a slightly different
8 issue. It sort of related back to ten (10). And that
9 is, you know, looking at the facilities that are
10 actually needed in the US to -- to develop the new tie-
11 line and the new transfer capability -- I believe it
12 goes up to 2925, I hope I'm quoting the right number
13 there. But a 750 megawatt increase, that's the number
14 I know.
15 So from -- from that perspective then
16 there's really two (2) sets of transmission upgrades
17 are needed. One is the new 500 kV line in the US
18 that's necessary to interconnect with 500 kV facilities
19 in Manitoba. And that's been well -- well defined and
20 well described, the Great Northern Transmission
21 Project, and people know pretty much exactly what they
22 need to do to build that 500 kV interconnection.
23 There is a -- and again, as I mentioned,
24 Hydro, at this -- at the point of time we wrote this,
25 was still planning to fund two-thirds (2/3s) of the

capital of these facilities because of the current level of project commitment.

The second piece that is required is underlying system upgrades in the US to be able to fulfill transmission service requests. Power reviewed the -- another confidential report, a group facility study, which is again, common practice in implementing tariff requirements when a -- when an entity wants to purchase or request transmission service, and there are multiple requests, potential requests. All of those parties get together and -- and produce a joint study that determines just what kind of transmission service requests or -- or how much transmission is needed if there are -- is incremental transmission needed to help fulfill those -- those requests.

Again, it gets back to my initial point on the existing facility. When you add a new -- when you add a new line for an existing path, you have to account for what happens when there's an outage of one (1) of those -- one (1) of those lines in the path. And that determines ultimately what your path rating is.

And so if you put a new 500 line and you pump, you know, another -- an additional 750 megawatts down that line, you have to account for what happens

1 when that line goes out of service. So you find
2 generally that you may need to go in and reinforce the
3 underlying system, add transmission, add power
4 transformers in order to route that power around, or --
5 or at least not overload existing facilities. So
6 there's quite a number of those facilities.
7 Again, these -- the exact facilities
8 here have been redacted, and for reasons that I can --
9 I can certainly understand. I -- I believe that these
10 -- the study process that Hydro's going through today
11 is probably ongoing, but they did have a preliminary
12 report available, which identified quite a number of
13 additional facilities.
14 We covered it because we thought it was
15 part of our scope. However, in Manitoba Hydro's
16 rebuttal, they explained that they are not responsible
17 for contrus -- for the construction or the cost of
18 these upgrades, and we certainly have -- we certainly
19 have no -- no issue regarding that. We were just
20 trying to report what we thought was our
21 responsibility.
22 And that -- I'll pause here for
23 questions, if you have any.
24 THE CHAIRPERSON: To the last point you
25 just made with respect to the rebuttal, and I'm more

1 intrigued about the construction or costs of these
2 upgrades. Are we talking about a significant amount of
3 money here? Are we talking of...?
4 MR. PAUL ARNOLD: I -- I would believe
5 so, yes. I would believe that it would be significant,
6 and that if -- I think there's a process that's
7 governed by the tariff that would decide who actually
8 pays for those facilities.
9
10 (BRIEF PAUSE)
11
12 MR. PAUL ARNOLD: All right. Thank
13 you. I'll turn this over to my colleague, Brian
14 Furumasu.
15 MR. BRIAN FURUMASU: Thanks, Paul. I'm
16 on page 29. This is statement of work item 8, and the
17 -- and what we'll look at here is determining the
18 transmission losses within the Manitoba Hydro system.
19 What we looked at and what we studied was the preferred
20 option, 2A, to look at the losses under that condition.
21 When we're -- started this, we looked at
22 what tool would best be used, especially to look at the
23 different kind of transmission topology configurations
24 and seasonal loading ques -- seasonal loading patterns
25 that would be needed to be looked at in terms of

1 losses, and quickly determined that -- oh, sorry,
2 quickly determined that a power flow programs would be
3 a -- an appropriate tool, 1) because with the power
4 flow tool, you can oper -- you can represent the
5 transmission topology as well as the locations of your
6 generation and your load on the system, and you can do
7 that for different seasonal variations, and also
8 represent a peak, and -- for -- for that seasonal
9 condition.
10 Initially, we were provided with six (6)
11 power flow cases, and we need -- we needed many more
12 cases in order to answer both the questions in the
13 scope of work items 8 and 9. So we requested of
14 Manitoba Hydro twenty-one (21) power flow cases, which
15 they provide -- they set up and provided to us, and it
16 was based on those power flow cases that we derived the
17 data for the losses under the seasonal peak and off-
18 peak conditions.
19 Manitoba Hydro used a -- a 20/20 power
20 flow as the base case, and again, they adjusted the --
21 the twenty-one (21) cases for the different winter peak
22 and summer peak offloading -- excuse me, the winter
23 peak and summer off-peak cases, as well as adjusted
24 them for the various load and export conditions that
25 we're wanting to be answered.

1 In our definitions, and -- and our --
2 though our use of the words 'existing systems', that
3 means that there is no Bipole III included in that
4 power flow case, and that there are no US tie-lines
5 included in the case.
6 In the cases where we have the proposed
7 system, which was again proposed option 2A, in those
8 cases, the Bipole III was adde -- added. So in the
9 Bipole, you had Bipoles I, II, and III represented in
10 the case, as well as a US -- a -- a new 500 kV US tie-
11 line, plus the generators of Keeyask and Conawapa.
12 On page 30, this table shows a
13 comparison of the generation to load and the -- the
14 resulting losses for both the existing and the proposed
15 system, and this table was filled out from the cases
16 that we could make a comparison of -- of between the
17 proposed and the existing system.
18 So as we kind of walk from the left to
19 the right on this table, for the summer off-peak case,
20 you have two (2) cases: one (1) with no export and one
21 (1) with 2,175 megawatt export.
22 We see that on the proposed system, that
23 for one (1), when you look between the proposed and the
24 existing system, the proposed system has just slightly
25 higher losses when there's no load, but as the loading

1 on this system gets higher, such as illustrated by the
2 20 -- 2,175 megawatt, your proposed system losses are -
3 - go down. They decrease.
4 And as we keep on going to the right on
5 the summer on-peak cases, again, when there is no
6 exports, the proposed system has slightly higher
7 losses, but as we get to 2,175 megawatts of export, and
8 that's in addition to your load you're serving, you are
9 seeing lower levels of losses on the proposed system,
10 and even more, and we couldn't do a comparison on the
11 twenty-nine seventy-five (2975), because the existing
12 system cannot export at that level.
13 The winter peak, again, you're seeing
14 the proposed system has 267 megawatts under the
15 proposed system, versus the existing system with 308
16 megawatts, and I did take a look at this.
17 As you look on this table, the first
18 cell, which is summer off-peak, that would be the
19 lowest level of loading. The next level of loading
20 would be zero exports on summer on-peak.
21 The next higher level of loading would
22 be summer off-peak, which would be 2,175 megawatts, and
23 then summer on-peak of 2,175 megawatts would be --
24 excuse me. The next one would be the winter peak of
25 twenty-six hundred and seven (2607) -- 267 megawatts,

1 and then under summer on-peak, that would be the
2 highest level of loading on this system.
3 So as you went across, it would be one
4 (1), three (3), two (2), five (5), four (4). And I
5 didn't show that here, but when you plot it, you can
6 definitely see that on this system, as you go to higher
7 levels of loading, your loading goes up, and it's not a
8 linear curve. It's a -- it kind of goes up as R-
9 squared.
10 So -- so on this system, initially, you
11 will have a lower level of losses generally, and there
12 -- there must be a little bit of a curve, because at
13 the very lowest level, the proposed system does have a
14 higher -- a little bit higher level of losses.
15 Going --
16 THE CHAIRPERSON: Mr. Furumasu, just --
17 just --
18 MR. BRIAN FURUMASU: Yes.
19 THE CHAIRPERSON: -- just a -- a
20 question in terms of you -- you assessed the exports,
21 but didn't address the imports? You -- you addressed -
22 - you addressed the exports, but you didn't address the
23 flows coming back into Canada, imports from US?
24 MR. BRIAN FURUMASU: These were net
25 exports. Sorry. Yeah, well, so -- and I was

1 corrected. The scope specifically asked for exports,
2 but when we looked at it, we were looking at net
3 exports.
4 On the next slide, on slide -- slide 31,
5 we looked at the average energy flow, and to determine
6 these, we used the NFAT tables in Appendix 4.2, and it
7 specifically was a system firm winter peak demand and
8 capacity resource tables -- Table K19/C25/250. And
9 what we found there is that the Bipole peak loss
10 savings with Keeyask generation in-service are 90
11 megawatts. So, you know, that's actually added --
12 actually was treated as a capacity addition in -- in
13 the way that that's treated.
14 When Conawapa comes online, and -- and
15 as I said previously, as the load increases, the -- the
16 peak loss savings will decrease on the Bipole, and
17 that's what, in fact, happens when Conawapa comes
18 online. The Bipole III loss saving is reduced to 18
19 megawatts, and this is referenced in PE report page 18.
20 Scope of work state -- 9 basically
21 addressed what were the incremental losses on the
22 system for exports to the US for both the existing and
23 the proposed system. On this table, basically, I
24 highlighted those areas that we could compare and had
25 power flow results to compare with. So they are shown

1 in yellow. So in the summer off-peak case, with 2,175
2 megawatts of exports to the US, we can see that on the
3 proposed system, there's 127 megawatts of loss, versus
4 on the existing system, that is, without Bipole III or
5 the -- or -- or no new US tie, it would be 242
6 megawatts.
7 When you look at a -- a summer on-peak
8 case, again, at an export level of 2,175 megawatts, the
9 export losses under the proposed system would be 152
10 megawatts, and under the existing system, it would be
11 204 megawatts. So in -- in -- consistently, the
12 proposed system under these loading conditions would
13 have less system losses.
14 And on the statement of work 9, this is
15 on slide 33, we've looked at the average energy flows
16 under export conditions. We used, again, NFAT Appendix
17 4.2, this time using the Manitoba Hydro system firm
18 energy demand and dependable resource table. What we
19 found on that table, looking for the years 2020 -- 2020
20 to 20 -- 2021, we have 27,762 gigawatt hours energy
21 flow, which is equivalent to an average hourly load of
22 3,163 megawatts.
23 The exports for this same year are
24 estimated at 2,012 gigawatt hours, or about 230 average
25 megawatt hours, and this can be found in our report on

1 page 19. That reclude -- really, concludes my
2 findings, and if there are any questions, I'd be happy
3 to answer those.
4 THE CHAIRPERSON: I'm trying to find
5 the reference in your report regarding the fact that
6 the current system, Bipoles I and II, have a 200
7 megawatt shortfall relative to expected capacity.
8 Now, could you -- could -- could you go
9 over that for me? There -- I can't find the reference,
10 but it seems to me when I read the report, there was a
11 reference to the fact that --
12 MR. BRIAN FURUMASU: Oh --
13 THE CHAIRPERSON: -- there's a -- I'm
14 looking at page 11, and I'm not sure if that -- I'm
15 addressing the question to -- to the right --
16 MR. BRIAN FURUMASU: Right.
17 THE CHAIRPERSON: -- to you, Mr.
18 Furumasu, but I'm looking at page 11, middle of the
19 page, line 18.
20
21 (BRIEF PAUSE)
22
23 THE CHAIRPERSON: So I -- I guess, I
24 just wanted that -- if -- if you could interpret that
25 for me because I -- I don't understand it. And it's a

1 bit of a surprise. I expected that -- it -- it's
2 clearly saying a shortage of firm transmission of about
3 200 megawatts.
4 And I -- I -- I want to know what the
5 consequence of that shortage is from your perspective.
6 MR. PAUL ARNOLD: Yeah, you're --
7 you're referring to page 11, line 18, talking about a
8 shortage of 200 megawatts. Yes, that I -- I think is
9 another point that was rebutted by Hydro and it was
10 actually an error in assumption on our part. We've
11 acknowledged that in our responses back.
12 And under the existing system today
13 there is no shortfall of transmission. All the
14 transmission is firm. And what -- this came about by
15 my assuming that the new valve group generation
16 criteria would be put in place or was in place under
17 the current system. And the truth of the matter is
18 that new criteria is not going to be put in place until
19 after Bipole III. So with today's system there is no
20 shortfall of transmission.
21 THE CHAIRPERSON: I would -- I would
22 like to turn the microphone over to you, Me. Hacault,
23 if you're ready.
24
25 CROSS-EXAMINATION BY MR. ANTOINE HACAULT:

1 MR. ANTOINE HACAULT: Thank you.
2 Merci, M. President.
3 There is a couple of matters that I
4 would like to address with -- with the panel. I repeat
5 the caution repeated often by counsel of the Board: If
6 I -- you think I'm getting into commercially sensitive
7 information, take a pause, consider it, speak to your
8 counsel. I don't think I will, but...
9 And secondly, the general areas that I
10 wish to follow or expa -- expand upon are as follows.
11 One (1) of the themes I've been exploring with a lot of
12 the panels is have we chosen an appropriate stress test
13 on construction costs. So I'll look a little bit at
14 that theme.
15 The other thing that you've given us
16 some help on is the 230 option that was out there and
17 now the revised option of 750 kV. So I'll be touching
18 that general option.
19 So with those general introductory
20 remarks, is it your considered opinion that a 20
21 percent range is sufficient testing for facilities on
22 transmission that are proposed in this particular
23 application, both on the low side and the high side?
24 I'm not focussing on -- on one side necessarily.
25 MR. GLENN DAVIDSON: The -- the

1 adoption of a -- of a plus or minus 20 percent range
2 merely -- merely reflects Power Engineers's opinion
3 that -- that given the amount of information that we
4 have on the project today, an -- an estimate with that
5 degree of accuracy can be prepared. That's not
6 speculative on our part. That's based on years of --
7 of performing these estimates.
8 And so the -- the -- the conclusion that
9 I -- that I was trying to draw from that was that
10 Manitoba Hydro made a construction cost estimate
11 perhaps with more -- probably with more information
12 than we had. But with the amount of information we had
13 and the amount of information that Manitoba Hydro had,
14 we -- we conclude that they are making an accurate
15 construction cost estimate because it falls within 20
16 percent of where we think it ought to be. And that's -
17 - that's -- we believe that if -- if we make an
18 estimate on a line, its construction costs will flow
19 within plus or minus 20 percent of where we -- where we
20 should be.
21 So I -- I was -- I was not intending to
22 imply that plus or minus 20 percent is a -- as you've
23 been calling it, a stress test ratio. It's just our
24 expected degree of accuracy of an estimate at -- at
25 this point in time.

1 Could there be something that would
2 happen that would increase or decrease the cost of
3 construction? Certainly there -- there could very well
4 be. Our charge was -- was merely to determine whether
5 or not the -- the estimates provided by Manitoba Hydro
6 were reasonable, complete, and accurate. And that --
7 and that's what we did.
8 Does that answer your question?
9 MR. ANTOINE HACAULT: Thank you.
10 That's helpful. If we could turn to slide 10 of --
11 THE CHAIRPERSON: Excuse me, Me.
12 Hacault. Could I ask a follow-up on that question?
13 And I recognize that you're dealing with estimates at a
14 certain point in time. But the nature of these
15 projects, given the length of time that we're dealing
16 with, is what? Like what's the range of outcomes here?
17 I mean, you -- you examined the estimate that Manitoba
18 Hydro prepared and determined plus or minus 20 percent
19 of your -- of your methodology.
20 But looking at the project ten (10)
21 years out, I mean, what's the range of outcomes here
22 irrespective of the methodology you're using?
23 MR. GLENN DAVIDSON: M-hm.
24 THE CHAIRPERSON: Could you -- could
25 you address that? I mean, you know, we are looking at

1 some of these projects going ahead in the interim.
2 But, you know, there's a range of
3 outcomes here that flow from these -- from estimates
4 generally taken at this point in time relative to the
5 future, and I'd like to know what that is.
6 MR. GLENN DAVIDSON: In -- in general,
7 when -- when anybody makes an estimate at a point in
8 time for a future project, we -- we include two (2)
9 things. We -- we include a contingency. And the
10 contingency is irrespective of when this line will be -
11 - will be completed. It's just an accounting for
12 things that happened that you can't anticipate on a --
13 on a project having to do with conditions in the fee --
14 on the ground.
15 The other thing that happens is that
16 projects estimated at a point in time for future
17 construction, we escalate in accordance with our --
18 with our best understanding of -- of how labour costs
19 and material costs might increase over -- over time.
20 That's one of the -- the escalation is kind of a
21 wildcard that get -- gets handled, in certain respects,
22 in the construction cost estimate. The engineer and --
23 and the company make their best estimate of
24 escalation's going to go up 2 percent a year or 3
25 percent a year or 1 percent for the next two (2) years

1 and 5 percent for the years after that, or something
2 like that, and -- and that's applied.
3 The -- the management reserve, which is
4 -- is kind of an additional factor that I haven't seen
5 before, and it -- and it strikes me as being an
6 extremely good idea, is when management says, What
7 happens if escalation, instead of being the 2 percent
8 you think it's going to be is 6 percent. When you're
9 talking about a billion dollars, 4 percent additional
10 escalation rate over ten (10) years amounts to a fairly
11 substantial amount of money.
12 And -- and so the -- the management
13 reserve is an attempt to say, Okay, if this might
14 happen, what's the risk that it might happen. Well, if
15 the risk that it might happen is 2 percent, you
16 discount that back to the current date and -- and you
17 end up with a fairly small management reserve. If
18 management says, Son of a gun, I think it's 50 percent
19 likely that it might happen, you end up with a bigger
20 management reserve.
21 So I -- I believe that the -- that the
22 methodology that Manitoba Hydro used to take a point
23 estimate and -- and turn it into a future year estimate
24 covered both the -- the engineering estimate of -- of
25 the escalation for labour and material and the

1 management assessment of, if the world starts to come
2 to an end, what's going to happen and how probable is
3 that. And so they've got -- they've both of those
4 built in.
5 And -- and so, you know, in terms of
6 bandwidth, I think -- I think they have -- they've got
7 a fairly big bandwidth. And they're looking at, I -- I
8 would believe, the upper end of that bandwidth.
9 THE CHAIRPERSON: So looking at the
10 project overall, there -- you know, there's a --
11 there's a generation component which is significant and
12 there's a transmission component which is also
13 significant.
14 In terms of -- of the ultimate cost of
15 those, I mean, what's the riskiest in terms of hitting
16 the mark? Is it the transmission that's the -- that's
17 the riskiest? Or is it a -- the generation aspect
18 that's the riskiest, from -- from a cost perspective?
19 MR. GLENN DAVIDSON: I -- I would like,
20 I could give you an opinion, but my opinion would be
21 speculating. And if you would like me to do that, I
22 will, but...
23 THE CHAIRPERSON: Well, your opinion
24 would probably be more informed than mine. And -- and
25 let's really get a sense --

1 MR. GLENN DAVIDSON: Well, I -- I would
2 -- I would be happy to do that. As a -- as a
3 transmission line guy for the last forty-nine and nine-
4 tenths (49 9/10) years, I -- I have always been amazed
5 at how expensive generation is and how relatively
6 inexpensive transmissions lines are. And -- and my
7 opinion would be that the -- the risk of large
8 variances in costs -- and I'm not talking about only
9 incr -- only increases. They could be -- they could be
10 decreases.
11 The largest variances in cost, in terms
12 of absolute sums of money, would be with the -- with
13 the generation, obviously. Working on -- on huge,
14 billion dollars civil engineering projects in a -- in a
15 hostile environment, there -- there can be tremendous
16 impacts on costs.
17 Tran -- transmission lines, while I
18 think they are one of the most elegantly designed
19 facilities in the world, are relatively simple to
20 construct. It -- it is unusual, if you've done a good
21 job in design of a transmission line, that you have a
22 huge variance in -- in cost of construction.
23 And when you compare the -- the pot of
24 money that's set aside for generation, which is very
25 large, and the pot of money that is set aside for

1 transmission, which com -- which is large but
2 comparatively is very small, the -- the impact on the
3 overall economics of the project is very definitely
4 swung by the -- by the -- the power plant construction
5 costs. You could double the cost of the -- of the
6 transmission line construction, and I -- and I doubt
7 that you would see very much of an impact on the
8 overall cost of the project.
9 THE CHAIRPERSON: Now, with respect to
10 the schedule, the construction schedule, I mean, let's
11 talk about that, in terms of the difficulty of
12 addressing a transmission schedule for -- relative to a
13 construction schedule for a generation facility.
14 Could -- could you -- could you talk --
15 discuss that for me, please, in terms of how reliable
16 is that estimated construction schedule for
17 transmission relative to the other one?
18 MR. GLENN DAVIDSON: In -- in my mind,
19 on a project like this, the -- the biggest risk is
20 weather. A -- a project the size of the MMTP project,
21 I'm -- I'm recalling now, but I -- like, I think I
22 concluded that in -- in the construction period
23 allotted, you -- that was -- that was a project that
24 would probably require an average manpower loading of -
25 - of perhaps two hundred and fifty (250) men. Two

1 hundred and fifty (250) people, excuse me.
2 The -- the -- over the course of a
3 transmission line project, they start out to -- to be
4 very -- with a very small crew of people. They build
5 up to a certain point. And transmission lines are --
6 are built like a -- like a moving assembly line. The -
7 - the assembly line moves; not the -- not the pieces on
8 the assembly line. There are -- there are crews that
9 go through from one end of the line to the other and
10 perform a function. They set foundations and move on.
11 Following them at a -- at a appropriate time comes a
12 construction crew that -- that sets -- assembles and
13 sets structures. And they move on. And then the --
14 and then the wire people come on.
15 On a project of this length, there will
16 -- there will be a significant amount of -- of time in
17 those -- in the project where all -- where all three
18 (3) people will be -- all three (3) crews will be on
19 simultaneously. You'll have people doing foundations
20 at one (1) end, structures following them, and -- and
21 constru -- and the line -- and conductor installation
22 following along behind them.
23 So I -- I -- my test for -- for myself
24 was to -- was to kind of make an estimate as to what I
25 thought the manpower requirement would be to be able to

1 construct the MMTP project within the time period that
2 Manitoba set aside for it.
3 I -- I -- it -- it's not in my report,
4 but I -- in -- in my recollection, I believe it was two
5 hundred and fifty (250) comp -- a crew complement of
6 two hundred and fifty (250) people, and -- and that is
7 not an unusual crew complement for a large transmission
8 project as -- of this nature.
9 I would think on Bipole III, there would
10 probably be three hundred and fifty (350) people, maybe
11 three seventy-five (375) work -- working on that
12 project. There are many construction contractors that
13 can mobilize that number of people, and -- and so I --
14 I believe that that was -- that was nec -- that was
15 accom -- able to be accomplished.
16 The -- the question -- the risk comes in
17 in -- in the northern parts of -- of the system of:
18 What's the weather going to do to you?
19 THE CHAIRPERSON: Thank you.
20 MR. GLENN DAVIDSON: Thank you.
21
22 CONTINUED BY MR. ANTOINE HACAULT:
23 MR. ANTOINE HACAULT: Thank you very
24 much. Now, as I understood the interaction between you
25 and the Chairperson, it's your opinion, sir, that

1 Manitoba Hydro's current cost estimates capture an
2 appropriate range of high and low scenarios, is that
3 correct, with respect to transmission, which is your
4 area of responsibility?
5 MR. GLENN DAVIDSON: I -- I need to be
6 careful how -- how I answer your question. My -- my
7 intent in -- in preparing the estimates was not for the
8 purpose of preparing a expected cost and a doomsday
9 cost. My -- my purpose in preparing the estimates was
10 to prepare an ex -- expected cost.
11 Can a series of very bad things happen
12 simultaneously? And the answer is yes. Could I tell
13 you what -- to what magnitude that might be? The
14 answer is no.
15 It -- it's just that, in my experience,
16 I've -- I've not observed things that happen in -- in -
17 - between transmission design and transmission
18 construction that are of such a major catastrophe that
19 line costs would double or line costs would go up 150
20 percent. It -- it just doesn't happen.
21 And -- and I've been on construction
22 projects where weather has just been terrible, or -- or
23 where -- where something else has happened, and the --
24 there's a fairly narrow bandwidth of -- of what you can
25 anticipate between everything just going the way it's

1 supposed to go, and everything going to pot.
2 So I don't know if I'm answering your
3 question, but my int -- my intention in preparing the
4 estimates and discussing it was just to say, This is
5 the most probable. And I -- I would expect the
6 bandwidth of accuracy of that to be within my plus or
7 minus 20 percent.
8 MR. ANTOINE HACAULT: Thank you, sir.
9 If we could just see how that plays out on some of your
10 slides, then? If we can look at slide 10, this was
11 part of the project infrastructure, and you noted that
12 Manitoba Hydro's estimate in 2012 dollars was two
13 hundred and eighty-six thousand dollars ($286,000) per
14 kilometre, correct?
15 MR. GLENN DAVIDSON: Correct.
16 MR. ANTOINE HACAULT: And that your
17 estimate was somewhat higher, at three hundred and
18 forty-four thousand dollars ($344,000), at that time,
19 US dollars, correct?
20 MR. GLENN DAVIDSON: Yes.
21 MR. ANTOINE HACAULT: And that three
22 hundred and forty-four thousand (344,000) per kilometre
23 is what you say is the expected value?
24 MR. GLENN DAVIDSON: That's the --
25 that's our expected value, yes.

1 MR. ANTOINE HACAULT: And in this
2 proceeding, you may or may not be aware we've tried to
3 have expected values and reference values. So at least
4 from your perspective, if we were looking at an
5 expected cost and this repeats itself throughout the
6 slides, the number that you came out to would be the
7 expected cost as best you can estimate it, sir, at this
8 time?
9 MR. GLENN DAVIDSON: That -- that's
10 correct.
11 MR. ANTOINE HACAULT: Do you have any
12 sense, because you said this is the most probable cost,
13 that if we go to the 20 percent higher or lower range,
14 could you assign any kind of probability to the high
15 and low ranges?
16 For example, might it be 20 percent for
17 each, and 60 percent for your -- your middle one? Can
18 you do that, or is that not something that you've given
19 thought to?
20 MR. GLENN DAVIDSON: I -- I have -- I
21 have not given -- given thought to that, and I don't
22 know how I would answer that, you know, right at this
23 moment.
24 MR. ANTOINE HACAULT: Now, if we can go
25 to Slide 12 of your deck, as I understand it, this

1 slide was to deal with the US portion of the 500 kV
2 line.
3 Is that correct?
4 MR. GLENN DAVIDSON: This is for the
5 Canadian portion of the 500 kV line.
6 MR. ANTOINE HACAULT: The Canadian
7 portion. Okay. Do you have the -- perhaps I missed
8 it. I thought -- okay. So was it your evidence, sir,
9 that you had a -- a sense as to whether or not the US
10 portion was correctly estimated?
11 MR. GLENN DAVIDSON: Yeah, I have a --
12 I have a sense that it is, yes.
13 MR. ANTOINE HACAULT: Okay. And during
14 the break, we looked at that quickly, sir, and I
15 pointed you to the application for certificate of need
16 for that line, and perhaps we can just go to MIPUG 20-5
17 at page, I believe it's 203. Oh, that can't be. I had
18 a different version. There was -- just let me check
19 here.
20
21 (BRIEF PAUSE)
22
23 MR. ANTOINE HACAULT: Diana, could you
24 try going about -- in -- in our 20-5? For some reason,
25 the PUB document that's online shows two hundred and

1 thirty (230) pages, and that's why I had put the
2 notation of two-oh-three (203). So it was about
3 twenty-seven (27) pages from the end. So if you go to
4 the one that you pulled up, and go twenty-seven (27)
5 pages back, hopefully we'll come to the right slide.
6 I'm not too sure why I get a different number on the
7 PUB site than -- than what you bring up.
8
9 (BRIEF PAUSE)
10
11 MR. ANTOINE HACAULT: It -- it really
12 doesn't matter, as long as we get that 20-5 back up
13 again.
14
15 (BRIEF PAUSE)
16
17 MR. ANTOINE HACAULT: Perhaps I can
18 continue while Diana is looking for the particular
19 slide.
20 The estimates that were part of the
21 certificate of need have a 20 percent range going
22 upwards and downwards side consistent with your
23 methodology, correct?
24 MR. GLENN DAVIDSON: I -- I don't know,
25 I -- I was not involved in preparing any of those

1 estimates, but I -- I don't know. I -- I could only
2 speculate, yes.
3 MR. ANTOINE HACAULT: Well, when the
4 slide comes up, we'll see that the midpoint was about
5 500 million. The low end was about 400 million.
6 MR. GLENN DAVIDSON: M-hm. Okay.
7 MR. ANTOINE HACAULT: There's about a
8 hundred thousand dollars down or --
9 MR. GLENN DAVIDSON: Okay. M-hm.
10 MR. ANTOINE HACAULT: -- 20 percent
11 down. And finally, the high end was 600 million, which
12 was about 20 percent higher. So I just wanted to point
13 out that there was some consistency. It's up now. So
14 this was part of the application for certificate of
15 need. And we see the project totals.
16 Now, the one thing in the -- the
17 midpoint for this project if we look at the dollars per
18 mile, we're looking in millions, $2.166 million per
19 mile.
20 Do you see that, sir?
21 MR. GLENN DAVIDSON: Yes.
22 MR. ANTOINE HACAULT: And if we
23 converted that to dollars per kilometre, we'd be
24 somewhere in the range of $1.3 million per kilometre,
25 correct?

1 MR. GLENN DAVIDSON: Yes. M-hm.

2 MR. ANTOINE HACAULT: Is there a reason

3 why the Canadian costs are -- well, looking at your

4 estimate, it's about eight hundred (800) and some per

5 kilometre, and on the state side they're looking at

6 actually about a half a million dollars more per

7 kilometre?

8 MR. GLENN DAVIDSON: First -- first of

9 all, thank you for coming up and -- and chatting me

10 with -- chatting with me about that to give me a couple

11 of minutes to think about it. But that there are --

12 there -- there are two (2) major things -- major

13 differences in the estimates on the US side and the

14 Canadian side. I don't know whether they account for

15 the whole four hundred thousand dollars ($400,000) a

16 mile.

17 But first of all, on the -- on the

18 Canadian side, most of that -- most of the lands being

19 crossed is Crown lands, where the cost of -- of real

20 estate is negligible to acquire the rights to construct

21 on it. And in the US, that's -- it's property that has

22 to be -- easements have to be acquired on it. And the

23 -- the cost of acquisition of right-of-way is -- is a

24 significant part of -- of any 500 kV transmission line

25 project.

1 I can't tell you how -- how much at this
2 point in time, but I -- one (1) or two hundred thousand
3 dollars ($200,000) a mile would not surprise me in the
4 -- in the slightest. You -- you are encumbering more
5 than an acre of land for every hundred feet of line
6 that you have. So just figure an average cost of -- of
7 an acre of -- of land and -- and multiply that out.
8 And the -- the second thing is that the
9 -- that there are -- the ground conditions in -- in
10 Northern Minnesota are quite similar to the ground
11 conditions in Northern Manitoba. It's high water
12 table, marshy. The -- the -- in Northern Manitoba,
13 lines are being constructed in wintertime, when the
14 ground is frozen solid and you're able to drive over
15 it.
16 Northern Minnesota, as cold as it is,
17 doesn't -- doesn't quite compare. And there are
18 significant -- it's called mats, big 40 x 40 timber
19 mats that are placed on the ground for equipment to --
20 to drive on and spread the pressure on the soil so
21 you're not chewing up the -- chewing up the soil.
22 Those kinds of mats are required for a significant
23 portion of the -- of the lines on -- in the -- south of
24 the border, in Northern Minnesota. And the -- the
25 degree to which those mats can be picked up and

1 relocated to the next span and the degree to which they
2 wear out can also affect the -- the cost of the line by
3 a very significant amount, probably at least a hundred
4 thousand dollars a mile.
5 That would be -- you know, I haven't had
6 an opportunity to consult with anybody or do anything
7 other than think about it since you asked me the
8 question. But I -- I would think that that would --
9 those two (2) items would -- would be that the most
10 significant elements that would affect the -- the cost
11 of the -- cost diff -- would -- would be responsible
12 for the cost differential that you've pointed out.
13 MR. ANTOINE HACAULT: Thank you very
14 much, sir. I -- I don't think I need any more. It
15 just -- it's just it seemed to be a fairly big
16 difference, so thank you very much for helping us
17 understand why there might be that pretty significant
18 difference.
19 MR. GLENN DAVIDSON: Thank you.
20 MR. ANTOINE HACAULT: The next area --
21 and I'm not too sure whether it's Mr. Arnold who would
22 be able to answer this or whether he's able to provide
23 an opinion. We've been -- we've had various
24 alternatives that are set out for this panel. And
25 we've had some discussion with some witnesses as to

1 whether the 230 kV -- hope -- hopefully I'm getting the
2 right terminology here -- might still be an option.
3 And if not, why not?
4 Could you address that question, sir?
5 MR. PAUL ARNOLD: So just to clarify,
6 you're talking about the -- are you talking about the
7 250 megawatt interconnection --
8 MR. ANTOINE HACAULT: That's correct.
9 MR. PAUL ARNOLD: -- versus the seven-
10 fifty (750)?
11 MR. ANTOINE HACAULT: That's correct.
12 MR. PAUL ARNOLD: Okay. Well, to be
13 honest I didn't spend a lot of time on that. What we
14 mostly focussed our attention on was, again, whether
15 the existing transmission system was reliable and --
16 and reasonable, or -- and whether the proposed system
17 was reasonable and reliable. And we did not probably
18 interpret that to say, Look at all of the options. We
19 more -- more so interpreted our scope of work to
20 determine reliability of the proposed 750 megawatt --
21 the Preferred Plan.
22 And so I have to say, no, we didn't
23 really address the 250 option. I -- I guess that's all
24 I'll say at this point unless -- do you have further
25 questions on that?

1 MR. ANTOINE HACAULT: Do you have any
2 sense what would be involved to back out of the 750
3 megawatt application for a certificate of need and
4 pursue a 230 -- or a 250 megawatt application?
5 Do you have any experience or advice on
6 that?
7 MR. PAUL ARNOLD: I - I think I have
8 some thoughts. I haven't really -- I haven't really
9 done any real analysis on that or -- or investigation
10 on that. But it seems -- just seems to me that, you
11 know, as we're just coming up and thoughts that are
12 coming up right now in response to your question is
13 there seems to be -- have been work on both sides.
14 On the Canadian side with Hydro, and
15 then on the -- on the Minnesota side with Minnesota
16 Power filed a certificate of need, basically, I think -
17 - I think they got approval. I think they're -- I
18 think they -- I don't know for sure, but I think they
19 have -- they are essentially approved to move forward
20 with that interconnection at 500 kV and at 750
21 megawatts.
22 And so I think there's a lot of
23 processes that has gone on. There's a lot of study
24 that has gone on that, in my -- my estimation, would --
25 and this is not a reliability or a technical issue.

1 But in my estimation there's a lot of process that's
2 gone on to help determine the need for seven-fifty
3 (750) and on -- on both sides.
4 And so I would imagine, you know, if
5 you're referring to unwinding that and going back to
6 two-fifty (250), that there would be a significant
7 amount of process that would have to take place to --
8 to get all the parties to agree that that was the
9 correct option.
10 MR. ANTOINE HACAULT: Thank you, sir.
11 That's helpful. Now, the one (1) thing that some of
12 the other witnesses wouldn't be able to answer as well
13 as you can I think, sir, is I've been asking about
14 advantages and disadvantages of various things trying
15 to get a balanced view.
16 And could you list five (5) or six (6)
17 of what you believe are advantages to the proposed 750
18 megawatt US interconnection, as opposed to the 250
19 megawatt interconnection? I think you've discussed
20 some of those in -- in the report.
21 MR. MICHAEL WEINSTEIN: Mr. Chair, I
22 just -- Mr. Hacault has asked some questions that are
23 slightly outside the scope of work of -- of Power
24 Engineers. And -- and these witnesses have ably done
25 their best to answer them, but I think we're getting a

1 little further outside of the scope of work than I'd be
2 comfortable having these witnesses answer.
3 MR. ANTOINE HACAULT: Well, I think --
4 THE CHAIRPERSON: I am of the same
5 view, and so I -- although I -- I would like to hear
6 what they have to say, I -- you know, frankly, it's
7 well beyond I think what they were expected to address
8 as part of their work.
9
10 CONTINUED BY MR. ANTOINE HACAULT:
11 MR. ANTOINE HACAULT: Well, I could
12 provide some references in their report. I mean, I
13 could take them through -- firstly, one of the issues
14 that you bring in your reports; scope item 7, for
15 example, is liability. And specifically dealing with
16 the 750 line, there's a comment on reliability.
17 I'm -- I'm -- so I'm not asking you
18 necessarily to go outside your -- your scope, but you
19 do discuss different things in your -- in your report,
20 and that's one of them. And I didn't want to lead you
21 to all the responses.
22 But, for example, on reliability -- and
23 that's discussed in this report -- what does the 750
24 megawatt line give to Manitobans as compared to the 250
25 megawatt line?

1 THE CHAIRPERSON: Now, I -- I just --
2 from a point of clarifica -- clarification, addressing
3 the reliability of the seven fifty (750) is fine.
4 Addressing the reliability of seven fifty (750) versus
5 two fifty (250), I'm not -- I -- that may be out of
6 scope, I would think, because you -- you didn't examine
7 the two fifty (250) reliability relative to the seven
8 fifty (750) reliability.
9 Am I wrong or --
10 MR. MICHAEL WEINSTEIN: That -- that's
11 correct, Mr. Chair. And I -- I would also ask that if
12 Mr. Hacault wants to refer the witnesses to comments in
13 their report, I'd ask that we're actually directly
14 referred to those comments, to the extent that this
15 line of questioning is going.
16 THE CHAIRPERSON: So I think that I
17 would like to discuss reliability with the witnesses of
18 the 750 line. I -- I think that's within scope and I -
19 - I think that's a topic that has been raised before by
20 Manitoba Hydro. So I think we should -- you know, if
21 you want to explore that, Me. Hacault, I -- I think
22 that would be fine.
23
24 CONTINUED BY MR. ANTOINE HACAULT:
25 MR. ANTOINE HACAULT: Let me go

1 specifically -- and I don't know if the page numbers
2 stay the same, but pages 29 and 30 of the report. And
3 that's Exhibit 3-1 -- I don't have an updated version -
4 - at line 33. I don't know if Diana can bring it up on
5 the screen for the other people of the public. I just
6 want to make sure I have the same version.
7 First, you describe the 750 megawatt
8 project without the additional upgrades. And at line
9 37, that includes Winnipeg Dorsey to Blackberry; and
10 line 38, a second Riel 500/230 kV 1,200 MVA
11 transformer, correct?
12 MR. PAUL ARNOLD: M-hm.
13 MR. ANTOINE HACAULT: You have to
14 indicate 'yes' or 'no' for the record. Otherwise, we -
15 - we don't know what happened.
16 MR. PAUL ARNOLD: Yes. I -- I see
17 where you are in the report.
18 MR. ANTOINE HACAULT: And if we go to
19 page 30, below the diagram, at line 5, and I'll read
20 into the record that paragraph:
21 "The need for the Manitoba Hydro
22 financial participation in US
23 transmission is based not only on
24 technical reasons, but on approved
25 contracts and pending negotiations.

1 The only approved contract in place
2 today is 200 -- MP 250 megawatt power
3 sales. As pending agreements come to
4 fruition, Manitoba ownership and
5 costs can be transferred to new
6 project participants."
7 So dealing with the first statement, the
8 need being based on technical reasons, what are the
9 technical advantages or -- with respect to the system
10 upgrades that will be occurring?
11 MR. PAUL ARNOLD: Okay.
12 MR. ANTOINE HACAULT: Broad sense. I
13 don't need a very technical explanation, but --
14 MR. PAUL ARNOLD: Yes. Well, I'll --
15 I'll do my best. I -- I didn't really address these
16 points specifically in my analysis, but I -- I think
17 it's a -- I think it's a fair question in terms of what
18 I might expect some advantages to be with the 500 kV
19 interconnection. For -- for one (1) thing, on the
20 existing system, you have a -- a fairly loosely coupled
21 connection between Dorsey and -- and Riel.
22 MR. ANTOINE HACAULT: Diana, could you
23 bring the diagram down so we can see --
24 MR. PAUL ARNOLD: The diagram would be
25 good.

1 MR. ANTOINE HACAULT: Thank you.
2 MR. PAUL ARNOLD: Thank you. And the -
3 - the new line, essentially, I think, strengthens the
4 interconnection. I think it makes it less prone to
5 adverse impact for loss of a single 500 kV line,
6 because now you have two (2) 500 kV lines, and so I
7 think there's also -- I -- I think as Brian pointed out
8 in his presentation, there's some loss savings with --
9 with the new line, and I believe that the flows will
10 distribute better and produce less 'I' squared 'R'
11 losses with two (2) lines.
12 I think there's another project here,
13 and this doesn't show it, and it think it's -- I think
14 there's been -- it's not part of this Preferred
15 Development, but I think was already a plan in place to
16 loop that Dorsey/Blackberry line into Riel, and -- and
17 also further strengthen, I think, the southern portion
18 of the Manitoba grid.
19 And so I -- I guess in general, and I'm
20 -- I'm trying to keep this in very general terms,
21 because I don't recall any -- any specifics associated
22 with the actual benefits of this, but I -- I think you
23 can -- I think also, I -- I referred to earlier the
24 HVDC reduction scheme.
25 Now, some of these new facilities are

1 going to require additions that will trigger that
2 scheme, but for -- since the flows are now going to be
3 divided across two (2) lines, that the amount of
4 reduction you might have to take for loss of a single
5 line would be lower.
6 So I think it -- I don't know this for a
7 fact, because I haven't thought about it a lot until
8 you asked this question, but it may -- it may move you
9 in a direction away from being the largest single
10 contingency, where, say -- today, it is the largest
11 single contingency. But as you add additional lines,
12 and you lose one (1) line, it's loaded at a lower
13 level. That should reduce your -- the amount of -- of
14 generation reserve that might have to be called on for
15 loss of the line.
16 MR. ANTOINE HACAULT: Okay. Thank you.
17 that's very useful. The one (1) thing that you stated
18 in that fairly lengthy explanation was that there was
19 looping between Dorsey and Riel, which would further
20 strengthen the reliability.
21 Would that be both from the perspective
22 of Manitobans to also include the reliability of the
23 power that can be exported to the Americans?
24 MR. PAUL ARNOLD: My -- my speculative
25 answer is yes, it -- it would increase reliability of

1 both.

2 MR. ANTOINE HACAULT: Thank you, sir.

3 THE CHAIRPERSON: For your benefit, the

4 pronunciation of -- of that station is "Riel," who

5 happens to be the founder of the Province, but anyways,

6 I just --

7 MR. PAUL ARNOLD: I'm so -- I'm sorry.

8 Thank you very much for that.

9

10 (BRIEF PAUSE)

11

12 CONTINUED BY MR. ANTOINE HACAULT:

13 MR. ANTOINE HACAULT: Now, sir, another

14 thing I just wanted to get a little bit of

15 clarification on is the statement at the -- the end of

16 the paragraph that I quoted that's under this diagram,

17 the last statement:

18 "As pending agreements come to

19 fruition, Manitoba Hydro ownership

20 and costs can be transferred to new

21 project participants."

22 MR. PAUL ARNOLD: Yes.

23 MR. ANTOINE HACAULT: To the extent

24 it's not CSI, are you able to say whether or not you

25 can make that statement, sir, or do you actually know

1 that costs -- ownership and costs will be transferred
2 to new project participants?
3 MR. PAUL ARNOLD: No, I don't actually
4 know that. The statement, I think, was reflecting some
5 interaction, some discussion between Power and Manitoba
6 Hydro. Again, just referring back to, you know, common
7 practice on how transmission capital costs were shared,
8 it's usually on a pro rata basis among participants.
9 And I don't know if it may have been
10 stretching my assumption to assume that that would
11 happen in the future. I -- I think that when -- when
12 folks get together at the table to talk about cost
13 sharing, other things can happen, and I have no
14 knowledge of that or control of that.
15 MR. ANTOINE HACAULT: Thank you. So it
16 wasn't based on any -- any specific knowledge of the
17 demand for participation in transmission projects? For
18 example, you know, that people want to invest in these
19 projects, and -- and want to participate and pay for
20 this new 750 megawatt line, it -- it wasn't based on
21 knowledge of actual participants out there who wanted
22 to invest in the 750 megawatt line?
23 MR. PAUL ARNOLD: Well, if I -- I
24 understand your question to be, How -- how does -- how
25 -- how does the process work for people who might want

1 to participate in the line?

2 MR. ANTOINE HACAULT: No. You said

3 that it was an assumption, so I'm trying to confirm

4 certain things either exist or don't exist. One might

5 have made that assumption on the basis, I know so-and-

6 so who, because of -- I'm involved in transmission

7 work, who would be very interested in -- in investing

8 in that 750 megawatt line.

9 That isn't the case, isn't it?

10 MR. PAUL ARNOLD: Well, as I recall,

11 and I didn't address it in our report, as I recall,

12 there were discussions in the report about other

13 parties who were interested in this line. I think --

14 who is WSP? Wisconsin Public Service, I'm sorry, was

15 also interested in this line, but had made a decision

16 that they weren't ready to participate, and that's --

17 so I think there was some discussion about cost sharing

18 and NFAT that related to the Minnesota Power and

19 Wisconsin Public Service and others.

20 And also, in the confidential report,

21 there is a long list of parties who have requested

22 transmission service. And so, from that, I gather that

23 there are other interested parties, but that contracts

24 haven't been consummated for that participation.

25 MR. ANTOINE HACAULT: Thank you very

1 much. That's helpful information, and thank you for
2 the panel for doing its best to answer my sometimes
3 awkward questions. Thank you.
4 THE CHAIRPERSON: Thank you, Me.
5 Hacault. I wonder, just for the sake for organizing
6 this afternoon, Ms. Menzies, do you have any questions
7 for these witnesses?
8 MS. MEGHAN MENZIES: CAC (Manitoba) has
9 no -- no questions for this panel. Thank you.
10 THE CHAIRPERSON: Thank you. And Ms.
11 Saunders, have you have -- do you have questions for
12 the panel?
13 MS. JESSICA SAUNDERS: I do, and my
14 questions would be under ten (10) minutes.
15 THE CHAIRPERSON: Okay. Well, why
16 don't we do those right now then --
17 MS. JESSICA SAUNDERS: Okay.
18 THE CHAIRPERSON: -- and then with
19 that, we can -- we can proceed after lunch to the
20 closed session.
21 MS. JESSICA SAUNDERS: Okay. I'll move
22 over so you can see me better.
23
24 (BRIEF PAUSE)
25

1 THE CHAIRPERSON: Sorry, I made a
2 mistake. I -- I -- after Ms. Saunders, I -- I will be
3 canvassing Ms. Ramage, and we may not have the closed
4 session immediately after lunch. It may be after --
5 after Manitoba Hydro and Public Utilities Board has had
6 an opportunity to ask questions, so correct the record,
7 but let's do Ms. Saunders right away.
8
9 CROSS-EXAMINATION BY MS. JESSICA SAUNDERS:
10 MS. JESSICA SAUNDERS: Thank you. I
11 have questions in two (2) areas, and again, my name is
12 Jessica Saunders. I represent the Manitoba Metis
13 Federation.
14 So starting with Mr. Davidson. On slide
15 9 of the presentation -- if we could just bring up
16 slide 9, please? Thank you.
17 Mr. Davidson, you went through Manitoba
18 Hydro's and Power Engineers's cost estimates for
19 transmission associated with Keeyask, and you explained
20 that Manitoba Hydro provided Power Engineers additional
21 information as to why Manitoba Hydro's cost estimate
22 was higher than Power Engineers's estimate, correct?
23 MR. GLENN DAVIDSON: That's correct.
24 MS. JESSICA SAUNDERS: And you had said
25 that Manitoba Hydro informed Power Engineers that the -

1 - that the high estimate was due to the project being
2 built in two (2) pieces, and mentioned equipment and
3 major crossing on the Nelson River as other factors
4 that Hydro indicated as contributing to this higher
5 cost estimate.
6 Have I got those comments correct?
7 MR. GLENN DAVIDSON: Yes. Yes, you do.
8 MS. JESSICA SAUNDERS: So then on slide
9 12, you went through Manitoba Hydro and Power
10 Engineers's cost estimates for the Manitoba/Minnesota
11 transmission project, and noted that Manitoba Hydro's
12 cost estimate was higher than Power Engineers's, but
13 you didn't speak to any additional information received
14 by Na -- Manitoba Hydro or discuss reasons why the
15 estimates might be higher.
16 I'm wondering, did Power Engineers make
17 any inquiries to Manitoba Hydro as to why their
18 estimates were higher for the Manitoba/Minnesota
19 transmission project, as was similarly done for the
20 Keeyask estimates?
21 MR. GLENN DAVIDSON: The -- the reason
22 why we approached Manitoba Hydro and asked them about
23 the -- the Keeyask project is that it's extraordinarily
24 unusual to find the cost of a 138 kV transmission line
25 like they have up at Keeyask costing seven hundred and

1 thirty-eight thousand dollars ($738,000) a kilometre.
2 We -- we -- when we do a quick estimate
3 like that, it comes nowhere near that expensive, and so
4 we knew there -- there had to be certain -- either we
5 were missing something in -- when we were putting our
6 estimate together, or there had to be some special
7 circumstances that we didn't understand, so we asked
8 Manitoba Hydro, and -- and they -- they passed that
9 information along to us.
10 On the -- on the MMTP projects, we
11 prepared our estimate, and -- and we compared our
12 estimate to their estimate. The -- the numbers were
13 within 11 percent, and therefore they didn't raise any
14 red flags on -- in our minds. There may be -- there
15 may be lots of reasons why their estimate is higher
16 than ours, other than just, they estimated differently
17 than we estimated, but as long as the -- in -- in our
18 mind, as long as the tolerance is plus or minus 20
19 percent, we -- we were satisfied with that.
20 MS. JESSICA SAUNDERS: Okay. Thank
21 you. And on slide 19 of the presentation, I believe
22 this was Mr. Arnold's portion of the presentation?
23 MR. MICHAEL WEINSTEIN: I believe this
24 is still within Mr. Davidson's portion of the
25 presentation, Ms. Saunders.

1

2 CONTINUED BY MS. JESSICA SAUNDERS:

3 MS. JESSICA SAUNDERS: Okay. Thank you

4 very much for the correction. Then, Mr. Arnold, so

5 this speaks of Manitoba Hydro's cost estimating risks,

6 risk management, sensitivity, and contingencies.

7 So your comments in this regard, are

8 they -- they're partic -- they're -- they apply to all

9 of the projects you examined, so that would be

10 inclusive of the Manitoba/Minnesota transmission

11 project on this page as well?

12 MR. GLENN DAVIDSON: Yes. Yes. That -

13 - that's a general comment.

14 MS. JESSICA SAUNDERS: Okay. I'm just

15 wondering, because you've indicated that the

16 appropriate contingencies have been included in all

17 estimates, did Manitoba Hydro provide you with any

18 information on writing -- or sorry, routing or siting

19 programs or transmission compensation funds that they -

20 - they sometimes do when it comes to impacts to

21 communities, particularly when the projects involve a

22 significant amount of Crown lands?

23 MR. GLENN DAVIDSON: They did not give

24 us any information on that. That's something I'm not

25 aware of.

1 MS. JESSICA SAUNDERS: Okay. Thank you
2 very much. Those are all my questions.
3 THE CHAIRPERSON: Thank you. I think
4 that it's probably an appropriate time to break for
5 lunch, so I would -- oh, Ms. Ramage, please.
6 MS. PATTI RAMAGE: Yes. I -- I was
7 trying to get distributed before the lunch break, on
8 the assumption that some parties may not be back, a --
9 a number of undertakings. If I could just get those
10 entered?
11 THE CHAIRPERSON: Yes, let's do that,
12 please.
13 MS. PATTI RAMAGE: There's four (4).
14 The first one is Manitoba Hydro Exhibit 168. And I --
15 I should say I've left the panels copies -- oh, Diana
16 is distributing them. I left them with Mr. Simonsen.
17
18 --- EXHIBIT NO. MH-168: Response to Undertaking 52
19
20 MS. PATTI RAMAGE: Manitoba Hydro
21 Exhibit 168 is Manitoba Hydro's response to Undertaking
22 number 52, where it outlines the costs included in
23 IFF13 for the US portion of the Great Northern
24 Transmission Line.
25 Exhibit number 169 is Manitoba Hydro's

1 response to Undertaking 18, which is the provision of
2 projected savings per program aggregated over fifteen
3 (15) years as represented in the 2013 Power Smart Plan,
4 as Levels 1, 2 and 3 in the scenario analysis.
5
6 --- EXHIBIT NO. MH-169: Response to Undertaking 18
7
8 MS. PATTI RAMAGE: The third
9 undertaking, and I think this is one that has been
10 heavily anticipated, is Manit -- or, I'm sorry, it's
11 not the third undertaking, it's the third one I'm
12 filing today, but it's Manitoba Hydro Exhibit 170, and
13 this is Undertaking number 55, and here Manitoba Hydro
14 provides both the economic and financial analysis of
15 the high capital cost scenario. That would be the
16 reference economics revenue and high capital costs
17 related to those plans that are currently being
18 updated, ref/ref/high, and provide the narrative on the
19 impact of such changes on the economics and finances of
20 the plans, and this is including DSM Level 2.
21
22 --- EXHIBIT NO. MH-170: Response to Undertaking 55
23
24 MS. PATTI RAMAGE: And then the fourth
25 filing this morning is Manitoba Hydro Exhibit 171, and

1 that's the economics of the 750 interconnection plans,
2 included, the return on equity embedded in weight of
3 average capital cost. This was not an undertaking per
4 se. It was information requested by Mr. Williams
5 offline, and we're just filing it as an exhibit.
6
7 --- EXHIBIT NO. MH-171: Economics of the 750
8 interconnection plan,
9 including the return on
10 equity embedded in weight
11 of average capital cost
12
13 MS. PATTI RAMAGE: Now before I go off
14 the mic, if I could turn back to Manitoba Hydro Exhibit
15 170? And something we often do in GRAs with some of
16 these more complex undertakings is have the Manitoba
17 Hydro witness speak to it very briefly in an effort to
18 maybe reduce some cross-examination and not have people
19 have to puzzle through the undertaking itself. And I'm
20 wondering if you'd like Mr. Wojczynski to speak to the
21 --
22 THE CHAIRPERSON: Yes, we would. Mr.
23 Wojczynski, please.
24 MR. ED WOJCZYNSKI: Yes. Good morning,
25 everybody. This was an undertaking requested by the

1 panel through the Chair, and this was -- there was a
2 concern that we have the new capital costs -- the new
3 2014 capital costs for Keeyask and Conawapa that we've
4 been talking about the last two (2) months, and there
5 was a concern that there's -- what happens if not only
6 the -- these cost increases happen, but what if the
7 high capital costs that are part of the range of
8 possible costs occur for Keeyask and for Keeyask and
9 Conawapa? So we were asked to do sensitivities with
10 those risks, and so that's what's contained here.
11 And if you just turn briefly to the thir
12 -- the last page which has the graph, the graphs, what
13 we did was we increased the Keeyask and capital costs,
14 Keeyask and Conawapa costs to be the high, and the --
15 the high numbers were ones that you were provided
16 earlier, and discussed by a -- a Mr. Bowen, and we did
17 not increase the capital costs for the gas generation,
18 nor did we change any of the export prices or gas
19 prices or anything.
20 So the only thing that changed from the
21 2013 reference and -- and the Conawapa/Keeyask costs
22 were -- were to make the Keeyask/Conawapa costs high.
23 So we've got Plans 5 and 6, it's only -- they only have
24 Keeyask, and you see that in those two (2) cases, there
25 was -- when you evaluate the NPV using the weighted

1 average cost to capital, there's a loss of around a
2 hundred and sixty-eight (168), $192 million between the
3 two (2). Fairly similar.
4 And if you look -- that's the dark blue.
5 If you look at the light blue or grey, I'm not -- I
6 don't know what you call that colour, that is the --
7 the return on the equity that's embedded in that WAC
8 calculation, and so there's some of that embedded ROE
9 is taken up by that loss, but there's still in the
10 order of over 500 million left for further risks and to
11 contribute to the debt-equity ratio. And then of
12 course, on top of that, there's the provincial
13 transfers as well.
14 If you go to the third one, the Plan 14,
15 the Preferred Plan that has both Keeyask and -- and
16 Conawapa, you see a much, much worse situation. In
17 that case, the loss is $1.3 billion. And in that
18 analysis, the -- the negative number is larger than
19 even the embedded return on equity.
20 And you still -- even with that, you
21 still end up with a negative. So you've used up all
22 your sort of buffer, so to speak, that's embedded in
23 the return on equity, and you have nothing left to
24 contribute to the debt-equity ratio.
25 Now, all of this is assuming there's no

1 offsets at all.

2 You will notice that on that third set

3 of lines in the graph, we have a little note there that

4 says, "Not plausible." And as we said earlier on the

5 record, if we were building Keeyask and we experienced

6 the high capital costs that are assumed here, we would

7 know that before we committed Conawapa. And we would

8 know that the factors that were contributing to that

9 high capital cost for Keeyask, if they're the type that

10 would be transferred to Conawapa, then our estimate for

11 Conawapa would also then reflect these high capital

12 costs.

13 And at that point -- and I -- and I

14 would say, before we get to January '18, well before

15 that time, we would know that and we would have slowed

16 down on Conawapa and -- and in all likelihood would not

17 proceed with Conawapa unless there was some offset.

18 So we provided this sensitivity and risk

19 analysis as requested, but do not consider the -- the

20 joint Keeyask-Conawapa risk scenario as being a

21 plausible risk scenario.

22 I won't repeat that for the -- the below

23 part of the graph, where we did it with the pipeline

24 load as well. You get similar answers. Thank you.

25 THE CHAIRPERSON: I don't believe there

1 are any follow-up questions from the panel. So it's
2 probably -- I'm looking for advice from Mr. Hombach.
3 Do we -- do we seek comments from the Intervenors on
4 this, or is it the appropriate time to do that?
5 MR. SVEN HOMBACH: I assume, Mr.
6 Chairman, that all parties may -- may need some time to
7 digest it. Currently, the panel is planning to have
8 two (2) days reserved for the Manitoba Hydro panel to
9 return. I would be happy to have an offline discussion
10 with Intervenors if anybody would like to comment and
11 to -- today, perhaps the schedule will allow it. But I
12 don't anticipate that to be the case.
13 THE CHAIRPERSON: So I would suggest
14 that we recess now and resume proceedings at one
15 o'clock. Thank you.
16
17 --- Upon recessing at 12:20 p.m.
18 --- Upon resuming at 1:06 p.m.
19
20 THE CHAIRPERSON: I believe that
21 everybody's in position to recommence the proceedings.
22 Mr. Hombach, please.
23 MR. SVEN HOMBACH: Yes, Mr. Chairman,
24 we are ready to proceed. In the public session,
25 there's two (2) more cross-examinations to be

1 completed. That's Manitoba Hydro and Board counsel.
2 Following that, there will be a brief CSI session.
3 I'm advised that Jennifer Moroz, an in-
4 house lawyer with Manitoba Hydro, will be cross-
5 examining on behalf of Hydro.
6 MS. PATTI RAMAGE: Before --
7 THE CHAIRPERSON: Ms. Moroz, welcome
8 back. Oh, Ms. Ramage...?
9 THE CHAIRPERSON: Before Ms. Moroz
10 begins, if I could introduce these exhibits to the
11 record.
12 THE CHAIRPERSON: Absolutely. Please.
13 MS. PATTI RAMAGE: As you can see, when
14 Manitoba Hydro staff leaves the -- are able to get away
15 from the room, they -- they can get things done. So
16 the first of what I distributed is Manitoba Hydro
17 Exhibit 172, which is Undertaking number 53. And that
18 is the twenty (20) year costs of electric demand-side
19 management, comparing CEF base Level DSM with Levels 1,
20 2 -- and 2 in nominal dollars.
21
22 --- EXHIBIT NO. MH-172: Response to Undertaking 53
23
24 MS. PATTI RAMAGE: The second of what -
25 - of the pieces I distributed should be -- it's a

stapled bunch of papers. It's labelled, "Manitoba Hydro Exhibit 104-11." This is more of the economic analysis. It's the high capital cost stress test, Keeyask and Conawapa Plan 5, 6, and 14. I'm just not sure how many pages that is so that -- it doesn't appear to be numbered, in terms of pages. We will call it a bunch of pages, the technical term.

--- EXHIBIT NO. MH-104-11: High capital cost stress test of Keeyask and Conawapa Plan 5, 6, and 14

MS. PATTI RAMAGE: The next document, which is actually a three (3) parter, this will be Manitoba Hydro Exhibit 104-12. And these are the financials that -- that we've been discussing.

When I say, "Three (3) parts," the -- whoops, the first part is the overview. It's the 8 x 10 page, and it provides the overview of the DSM financial evaluation. And that is a six (6) page document. The next part to it is the -- the -- it's the spreadsheet analysis of the -- of various options. And that would be a three (3) page document.

And then the third part, the -- oh, this Exhibit 104-12, I believe. And then the third part is

1 -- and not everyone in the room will have this piece.
2 It is the -- the very thick document, which is the pro
3 forma financial statements. These are being made
4 available electronically.
5 So we followed the pattern of the last
6 thick document like this; so we didn't produce very
7 many because most parties are using the electronic
8 version. So we have paper versions available, but I
9 haven't distributed them. And I'll just wait for
10 parties to come to me, because we don't want to be
11 making thirty (30) copies of this.
12 That is all one (1) exhibit. It's 104-
13 2.
14 MR. KURT SIMONSEN: Twelve.
15 MS. PATTI RAMAGE: Twelve. Sorry, 104-
16 12. And each of these undertakings, we're expecting
17 that Manitoba Hydro will be speaking to on April 21st
18 and 22nd. And I think that's when we'll be speaking to
19 all of the undertakings.
20 THE CHAIRPERSON: Could we agree that
21 the overview becomes 104-12.1, if that's okay with you,
22 and then the -- the rate methodology, the three (3)
23 page table, would be point two (2). And then the major
24 bound document would become 104-12.3. That may
25 simplify things.

1 MS. PATTI RAMAGE: I think that's an
2 excellent idea.
3
4 --- EXHIBIT NO. MH-104-12.1: Financials overview
5
6 --- EXHIBIT NO. MH-104-12.2:
7 Financials rate methodology table
8
9 --- EXHIBIT NO. MH-104-12.3: Financials bound document
10
11 MR. KURT SIMONSEN: I would agree with
12 that for the purpose of posting, as well, on the
13 internet. Thank you. Thank you, Mr. Chairman.
14
15 (BRIEF PAUSE)
16
17 MS. PATTI RAMAGE: The first two (2)
18 exhibits, for the record, were Manitoba Hydro Exhibit
19 172, which is the response to Undertaking 53. And the
20 second is Manitoba Hydro Exhibit 104-11, which was the
21 high capital cost stress test of Keeyask and Conawapa
22 Plan 5, 6, and 14. And that was the one I had
23 indicated that it's supporting documentation for
24 Undertaking 55, but it doesn't appear to have page
25 numbers on it, so.

1 THE CHAIRPERSON: So I think that it's
2 now Ms. Moroz's time to -- to take over the microphone.
3 I guess you liked it so much you came back?
4
5 CROSS-EXAMINATION BY MS. JENNIFER MOROZ:
6 MS. JENNIFER MOROZ: Is this on? Thank
7 you, Mr. Chairman, panel members. Good afternoon. And
8 as well, good afternoon to Power Engineers. There are
9 again three (3) issues that I'd just like to canvass
10 with the witnesses this afternoon.
11 And the first is regarding the table
12 which we saw earlier this morning, the one from Mani --
13 sorry, Minnesota Power's application for a certificate
14 of need, and I believe that is Exhibit MIPUG-20-5 at
15 page 177, and Table 4.3.1, which is the project cost
16 estimates for what is called the Great Northern
17 Transmission Line.
18 I just wanted to review a few issues
19 stemming from this chart with Power Engineers. The
20 first thing, if you could take a look at this chart?
21 And I don't know if it's Mr. Davidson or Mr. Arnold who
22 wants to respond, but I note that one of the items
23 listed on the left-hand side is, "Substation
24 construction."
25 Is that correct?

1 MR. GLENN DAVIDSON: Yes, that's
2 correct.
3 MS. JENNIFER MOROZ: And, sir, would it
4 be customary to include substation construction costs
5 in this type of an estimate for a transmission line?
6 MR. GLENN DAVIDSON: Generally not. I
7 -- I haven't seen substation construction costs divided
8 up by the number of miles in a transmission line.
9 MS. JENNIFER MOROZ: And when you
10 performed your own estimate, did you include substation
11 costs?
12 MR. GLENN DAVIDSON: We did not.
13 MS. JENNIFER MOROZ: And as far --
14 MR. GLENN DAVIDSON: Not in our line
15 costs. Not in our line costs.
16 MS. JENNIFER MOROZ: And as far as you
17 are aware, did Manitoba Hydro include substation
18 construction costs in its estimate?
19 MR. GLENN DAVIDSON: I believe they did
20 not.
21 MS. JENNIFER MOROZ: So if you were
22 trying to compare, as was done this morning, the per
23 kilometre cost of a transmission line, or this
24 particular line on the Canadian side of the border
25 versus the US, would the inclusion of substation

1 construction cost account for some of that discrepancy?
2 MR. GLENN DAVIDSON: Yes, it would.
3 MS. JENNIFER MOROZ: The other issue
4 that I'd like to canvass is the type of towers that are
5 going to be used in -- on the Canadian side of the
6 border for this line versus the US side. I'd like to
7 take you to a figure in this report. Sorry, 4.2.2.
8
9 (BRIEF PAUSE)
10
11 MS. JENNIFER MOROZ: Page 51.
12
13 (BRIEF PAUSE)
14
15 MS. JENNIFER MOROZ: Sorry for that
16 diversion, but are you aware of the type of towers that
17 Manitoba Hydro intends to use for its portion of the
18 international power line?
19 MR. GLENN DAVIDSON: I -- I was made
20 aware of them. I'm not sure I could tell you for sure.
21 I'm -- I think they were guide structures.
22 MS. JENNIFER MOROZ: That's your
23 recollection?
24 MR. GLENN DAVIDSON: That's my
25 recollection, yes.

1 MS. JENNIFER MOROZ: And are you aware
2 of the type of towers that Minnesota Power intends to
3 use for the Great Northern Transmission Line?
4 MR. GLENN DAVIDSON: I -- I don't
5 recall right now, but I was thinking that they were
6 self-supporting steel poles, but I'm not -- I -- I'm
7 not certain on that.
8 MS. JENNIFER MOROZ: And if you were
9 correct that Minnesota Power intends to use self-
10 supporting towers, would that again account for a
11 higher cost --
12 MR. GLENN DAVIDSON: Yeah.
13 MS. JENNIFER MOROZ: -- in terms of the
14 per kilometre...
15 MR. GLENN DAVIDSON: I'd -- structures
16 are probably the most efficient and -- and cost-
17 effective structures for transmission systems, lowest
18 cost.
19 MS. JENNIFER MOROZ: Thank you.
20 THE CHAIRPERSON: I'm sorry, which ones
21 are those costs?
22 MR. GLENN DAVIDSON: The guyed
23 structures.
24 THE CHAIRPERSON: Okay.
25

1 CONTINUED BY MS. JENNIFER MOROZ:

2 MS. JENNIFER MOROZ: I'm afraid I may

3 have mispronounced it as 'guy' instead of 'guyed'.

4 MR. GLENN DAVIDSON: I knew what you

5 meant.

6 MS. JENNIFER MOROZ: The second issue

7 that I wanted to canvass with you briefly is the costs

8 of the US network upgrades that Manitoba Hydro referred

9 to in its rebuttal evidence.

10 And in your presentation this morning, I

11 believe you had understood Manitoba Hydro, in its

12 rebuttal evidence, to state that Manitoba Hydro would

13 not be responsible for paying the costs of the US

14 upgrades.

15 Is that correct?

16 MR. PAUL ARNOLD: That -- that was my

17 recollection, yes.

18 MS. JENNIFER MOROZ: All right. I

19 think, just to clarify that rebuttal evidence, I'd like

20 to refer to it right now. And that is Exhibit 85, and

21 that would be at page 88. And starting at line 15,

22 there's a paragraph through line 30 that's relevant.

23 And just to read that paragraph:

24 "However, it is not Manitoba Hydro's

25 role under its OATT to determine the

1 necessary network upgrades on
2 adjacent systems such s MISO's or
3 determine their costs. As provided
4 in Section 19.8 of the OATT, the
5 scope of a facilities study is to
6 determine network upgrades and direct
7 assignment facilities which are
8 defined as upgrades done by Manitoba
9 Hydro to its own transmission system.
10 Although a facilities study conducted
11 by Manitoba Hydro in coordination
12 with another transmission provider
13 may alert the customer to the
14 possibility of required upgrades on
15 another system, the determination of
16 the need for those network upgrades
17 and their cost is the responsibility
18 of the adjacent transmission
19 provider. In this case, MISO must
20 determine the need for additional
21 upgrades in the MISO region and their
22 associated costs in accordance with
23 the MISO tariff. Accordingly, it
24 would be inappropriate for Manitoba
25 Hydro to include the costs of

1 potential US network upgrades in its
2 Group Facilities Study Report. Based
3 on Manitoba Hydro's communications
4 with MISO arising from the
5 coordination of the respective
6 studies, it is unlikely that MISO
7 will identify any network upgrades
8 other than the US portion of the
9 international power line. However,
10 MISO's study has not been completed,
11 and no report has been issued
12 identifying the upgrades."
13 Now, reviewing that rebuttal evidence,
14 is it your understanding that Manitoba Hydro was
15 stating that it was not responsible for determining the
16 costs or paying for the costs of those US network
17 upgrades?
18 MR. PAUL ARNOLD: I think my original
19 understanding was that they were not responsible for
20 paying those costs.
21 MS. JENNIFER MOROZ: And is that still
22 your impression from reading the rebuttal evidence?
23 MR. PAUL ARNOLD: You know, I have to
24 say I'm not sure. Yes, I believe it is still my
25 impression that they're not responsible for paying

1 those costs.

2 MS. JENNIFER MOROZ: And were you aware

3 through this rebuttal evidence that recent

4 communications between Manitoba and MISO -- Manitoba

5 Hydro and MISO indicate that it is unlikely that will -

6 - that there will be additional upgrades beyond the

7 international line itself?

8 MR. PAUL ARNOLD: No, I'm not aware of

9 those discussions.

10 MS. JENNIFER MOROZ: But you're aware,

11 through this rebuttal evidence, that Manitoba Hydro has

12 provided that evidence.

13 MR. PAUL ARNOLD: Correct.

14 MS. JENNIFER MOROZ: Thank you. And

15 the last issue that I'd like to canvass with you is --

16 I believe Mr. Chairman had raised the issue of the

17 possible risk of changing NERC reliability standards.

18 I assume, because you are familiar with

19 NERC standards and your expertise, and you've had

20 familiarity and experience with NERC certifications and

21 NERC standards, that you are somewhat familiar with the

22 history of the NERC transmission planning standards,

23 the regulatory history of --

24 MR. PAUL ARNOLD: The regulatory

25 history somewhat. Yes, somewhat.

1 MS. JENNIFER MOROZ: So you're aware
2 then that, in specific, NERC Standard TPL-002 has had a
3 long history in front of the US Federal Energy
4 Regulatory Commission?
5 MR. PAUL ARNOLD: Tha -- there's been a
6 fair amount of discussion regarding all of the NERC
7 standards, I would say. But, yes, that one as well.
8 MS. JENNIFER MOROZ: And are you aware
9 that over the course of the past five (5) or six (6)
10 years, NERC has spent considerable time revising TPL-
11 002, in response to FERC orders?
12 MR. PAUL ARNOLD: Not -- I'm not
13 specifically familiar with that -- what happened there.
14 I don't deny that it did happen.
15 MS. JENNIFER MOROZ: Okay. So you're
16 not familiar then with FERC's order of last December,
17 which approved a new transmission planning standard,
18 which amalgamated and clarified previous -- the
19 previous TPL-002 standard and others?
20 MR. PAUL ARNOLD: We're not
21 specifically aware of FERC actions, but I have called
22 up the standard and looked at the current standard.
23 MS. JENNIFER MOROZ: So you have looked
24 at what is now known as TPL-001-4?
25 MR. PAUL ARNOLD: No. I think I look

at TPL-002. The dash four (4) I was not totally familiar with.

MS. JENNIFER MOROZ: All right, then you're not familiar with the standard that's been most recently approved by FERC in the US?

MR. PAUL ARNOLD: Perhaps not. I -- I was -- I did call up the sta -- I did -- go to the NERC website and downloaded the TPL standards, and I have that copy. So if there was one that was approved, you know, in tran -- in that transition before I downloaded it -- or, I mean, after I downloaded it that standard, I'm not aware of that.

MS. JENNIFER MOROZ: Do you have any reason to believe that the NERC transmission planning standards will change significanly -- significantly over the next few years?

MR. PAUL ARNOLD: No.

MS. JENNIFER MOROZ: Thank you. I don't have any further questions.

THE CHAIRPERSON: Thank you, Ms. Moroz.

Mr. Hombach, please.

CROSS-EXAMINATION BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Thank you, Mr.

1 Chairman. And good afternoon, Mr. Davidson, Mr.
2 Arnold, and Mr. Furumasu. My name is Sven Hombach.
3 I'm counsel to the Public Utilities Board. And I just
4 have a few questions for you, as well, trying to
5 clarify some of the evidence that we heard this morning
6 and set out in your report.
7 Now, I provide you the same caution that
8 Mr. Hacault gave you this morning. I'm not trying to
9 elicit any commercially sensitive information in this
10 public session.
11 MR. PAUL ARNOLD: M-hm.
12 MR. SVEN HOMBACH: If you feel that my
13 questions require you to advise some, you can simply
14 defer to the in camera session that we're going to have
15 a bit later.
16 The other caution I'm gibing you is
17 that, I believe, I -- I heard that all three (3) of you
18 have master's degrees in electrical engineering; I do
19 not. So if some of my questions seem a bit basic, I'm
20 really just seeking some clarification on my own behalf
21 and on behalf of the panel.
22 MR. PAUL ARNOLD: Thank you.
23 MR. SVEN HOMBACH: I refer -- I may
24 direct some of my questions to -- to individual
25 witnesses, but if you believe that somebody else is

1 more appropriate to answer this, by all means feel free
2 to punt the question to -- to whoever should answer it.
3 MR. PAUL ARNOLD: Thank you.
4 MR. SVEN HOMBACH: Mr. Davidson, this
5 morning you spoke about the cost estimates per
6 kilometre or per mile for various transmission
7 facilities.
8 And you refer to AACE; that's the
9 Association for the Advancement of Cost Engineering,
10 correct?
11 MR GLENN DAVIDSON: That's correct.
12 MR. SVEN HOMBACH: I take it you're
13 quite familiar with their recommended protocol for
14 determining cost estimates?
15 MR GLENN DAVIDSON: Quite familiar
16 would probably be an exaggeration. I -- I have read
17 their -- I've read their material and have -- have
18 satisfied myself that, I believe, I understand their --
19 their approach. I wouldn't characterize myself as
20 being quite familiar.
21 MR. SVEN HOMBACH: I just wanted to
22 take you through something conceptually to get a better
23 understanding of where on the scale the transmission
24 cost estimates that you provided actually fit it.
25 And if I could ask Ms. Villegas to open

1 Knight Piesold Exhibit 2 and go to page 6.

2

3 (BRIEF PAUSE)

4

5 MR. SVEN HOMBACH: I'm -- I'm not

6 looking for

7 the report. I'm looking for the KP/Manitoba Hydro

8 Round 2 Information Requests.

9

10 (BRIEF PAUSE)

11

12 MR. SVEN HOMBACH: Sir, this is a chart

13 that tries to visualize some of the steps in

14 determining a cost estimate.

15 You're familiar with the general

16 concepts set out in a chart like this, I assume?

17 MR. GLENN DAVIDSON: Yes, I am.

18 MR. SVEN HOMBACH: And it's my

19 understanding that the cost estimating process starts

20 with developing a point estimate, or what is also known

21 as an overnight estimate, correct?

22 MR. GLENN DAVIDSON: It begins with a -

23 - with a point estimate, yes.

24 MR. SVEN HOMBACH: And a contingency is

25 then layered on top of the point estimate, and that

1 contingency is developed based on an analysis of the
2 probabilities of cost under or cost overruns?
3 MR. GLENN DAVIDSON: I think that's a
4 fair statement, yes.
5 MR. SVEN HOMBACH: And there's
6 different methodologies to determine the contingencies?
7 MR. GLENN DAVIDSON: Yes. And a lot of
8 times, on something like transmission lines that are
9 constructed repetitively by a utility company using the
10 same kinds of structures and under the same design
11 criteria, the -- the staff of the utility starts to
12 become familiar with the kinds of things that cost --
13 that cause cost overruns or under-runs and develops a
14 contingency to apply to -- to that that's
15 representative of what might happen on a project.
16 MR. SVEN HOMBACH: So you're saying
17 utilities generally have a pretty good handle on what
18 the contingencies would be for a transmission line?
19 MR. GLENN DAVIDSON: Generally
20 speaking, yes.
21 MR. SVEN HOMBACH: Now, sir, if I
22 understand it correctly, there's also some debate as to
23 whether one should apply a P50 contingency, meaning
24 there's an equal likelihood of cost under-runs or cost
25 overruns, or whether one should use a P90 contingency

1 or something in between to make sure that the
2 likelihood of cost overruns is diminished.
3 You're familiar with that debate?
4 MR. GLENN DAVIDSON: I am, yes.
5 MR. SVEN HOMBACH: The estimates that
6 you provided in your report, are those point estimates
7 or are those estimates that include some level of
8 contingency?
9 MR. GLENN DAVIDSON: The estimates that
10 we provided include contingency.
11 MR. SVEN HOMBACH: And is it a P50
12 contingency or is it a different one?
13 MR. GLENN DAVIDSON: It's probably
14 closer to a P90 contingency.
15 MR. SVEN HOMBACH: The estimates that
16 you received from Manitoba Hydro, are you aware whether
17 those are a P50 contingency or some other probability?
18 MR. GLENN DAVIDSON: I am not aware of
19 that, no.
20 MR. SVEN HOMBACH: And you didn't
21 inquire with Manitoba Hydro?
22 MR. GLENN DAVIDSON: I did not.
23 MR. SVEN HOMBACH: Okay. Now, you
24 indicated earlier that project owners usually expect
25 people to dig into the contingency. And I believe your

1 phrase was that you're a hero if you don't use it all
2 up.
3 Do you recall that?
4 MR. GLENN DAVIDSON: I -- I believe I
5 said that, yes.
6 MR. SVEN HOMBACH: And it's fair to
7 assume that the higher the level of the contingency,
8 the less of a hero you will be if you come in under?
9 MR. GLENN DAVIDSON: No, I don't -- I
10 don't think that's -- I don't think that's true. When
11 an engineer is asked to make -- make an estimate and --
12 and figures his costs and his budget, if -- if you
13 greatly exaggerate the contingency, you are making the
14 project look more -- less economic to your -- to your
15 management and your project has less of an opportunity
16 or less of a chance of being approved.
17 And so if what you said was true,
18 everybody would just double the cost of their estimate
19 and they'd always look like heroes. And so, basically,
20 estimates are typically found in a 10 to 20 percent
21 range unless there is some extraordinary reason why a
22 higher or lower estimate ought to -- ought to be done.
23 If you exceed the budget, which includes
24 an estimate, you have an overrun and you've got to
25 explain it to management. If you do not exceed your

1 estimate, which includes the contingency you -- and you
2 don't have to explain anything to management, that's a
3 -- that's a good thing.
4 So that's a long answer to a simple
5 question, wasn't it?
6 MR. SVEN HOMBACH: It was actually
7 quite helpful, sir. And I --
8 MR. GLENN DAVIDSON: Okay.
9 MR. SVEN HOMBACH: -- I thank you for
10 that. And just to follow up on your comment about the
11 approval then, there's -- it's fair to say that there's
12 some competing incentives in determining the estimate,
13 because you don't want it to be too conservative, or
14 you can't it approved, whereas if you come in too low,
15 there's a higher likelihood of cost overruns?
16 MR. GLENN DAVIDSON: If -- if you come
17 in too low, there is -- there is a high -- there is a
18 much higher probability of -- of a cost overrun. From
19 my own perspective in -- in putting estimates together,
20 my goal with an estimate is that it be as accurate as I
21 can possibly make it, in -- including what
22 contingencies I believe are appropriate for the
23 particular project.
24 And it's up to the management of the
25 company to decide whether or not my best opinion of

1 what this facility will cost fits within their budget
2 parameters and -- and accounting procedures, and
3 whether they want to go ahead with the project or not.
4 I have -- I have estimated projects that management has
5 dropped out of the budget, because they don't -- the --
6 the -- they don't have in -- in aggregate, that amount
7 of money to spend on a -- on projects.
8 MR. SVEN HOMBACH: Getting back to your
9 comment that your estimates probably have something
10 closer to a P90 contingency.
11 MR. GLENN DAVIDSON: M-hm.
12 MR. SVEN HOMBACH: Would it be of any
13 concern to you if you had figured out that Manitoba
14 Hydro was using a different contingency level?
15 MR. GLENN DAVIDSON: That -- that would
16 have helped flavour my comparison of my estimates with
17 Manitoba Hydro's estimates, yes.
18 MR. SVEN HOMBACH: But if you came in
19 within that 20 percent range that you indicated in your
20 report and that you spoke to, and you found out that
21 Manitoba Hydro used a probability of less than P90, and
22 you used P90, that would mean you're actually more
23 satisfied that Manitoba Hydro can come in on budget,
24 because your estimate assumes that there's only a 10
25 percent chance of overruns?

1 MR. GLENN DAVIDSON: I have to think
2 about that for a second. If -- if Manitoba Hydro used
3 a P10 contingency that, in my opinion, would -- would
4 make their cost estimate artificially low.
5 MR. SVEN HOMBACH: Sorry. Let's say,
6 for example, if -- if they used a P50 --
7 MR. GLENN DAVIDSON: Okay.
8 MR. SVEN HOMBACH: -- that means
9 there's a 50 percent chance the project could go over
10 budget?
11 MR. GLENN DAVIDSON: Correct.
12 MR. SVEN HOMBACH: In contrast, you are
13 telling me that you used a P90, so there's only a 10
14 percent chance?
15 MR. GLENN DAVIDSON: That's correct.
16 MR. SVEN HOMBACH: If, based on your 10
17 percent chance, you're satisfied that Manitoba Hydro's
18 numbers are accurate, then it follows on a P50 basis,
19 you'd also be satisfied, because the cost estimate
20 would be less if you applied a P50.
21 MR. GLENN DAVIDSON: Yeah, I -- I think
22 that's true.
23 MR. SVEN HOMBACH: Having now caused as
24 much confusion as I could, let me move on and --
25 MR. GLENN DAVIDSON: Can we speak in

1 something in master's in electrical engineering terms?
2 MR. SVEN HOMBACH: I -- I will do my
3 very best. I can't make that promise, sir. Now, let's
4 talk about escalation. We've discussed the point
5 estimate. We've discussed the contingency, and it's my
6 understanding, sir, that when you're developing an
7 estimate, the -- the escalation is layered on top of
8 the contingency and not usually built in.
9 Is that correct?
10 MR. GLENN DAVIDSON: That's correct,
11 yes.
12 MR. SVEN HOMBACH: And there's material
13 escalation and there's labour escalation?
14 MR. GLENN DAVIDSON: Yes.
15 MR. SVEN HOMBACH: And there's
16 different standards that are published. Like, for
17 example, for materials, you could have the Consumer
18 Price Index, or you could have the Bureau of Labour
19 Statistics produce a price index?
20 MR. GLENN DAVIDSON: There are -- there
21 are a number of those kinds of indices that are
22 published, yes.
23 MR. SVEN HOMBACH: And there's separate
24 construction industry indices that deal with specific
25 types of projects?

1 MR. GLENN DAVIDSON: Yes, there are.
2 MR. SVEN HOMBACH: And then for labour
3 escalation in an environment like a Crown corporation,
4 you'd be looking primarily at collective agreements, I
5 assume. Those would determine the labour
6 escalation you might have to budget for?
7 MR. GLENN DAVIDSON: I don't know if I
8 can answer that question. I'm -- I'm not certain that
9 I understand it. Could you -- could you --
10 MR. SVEN HOMBACH: If -- let me be more
11 specific. Are -- have you heard of the Burntwood
12 Nelson agreement?
13 MR. GLENN DAVIDSON: I have not.
14 MR. SVEN HOMBACH: Is that term
15 familiar? That -- that is a collective agreement that
16 we have learned applies to the major civil projects
17 that Manitoba Hydro is constructing.
18 MR. GLENN DAVIDSON: Okay.
19 MR. SVEN HOMBACH: And that sets out
20 wages for various unionized trades. So those are the
21 issues you have to look at, in any case, in determining
22 what the escalation would be.
23 MR. GLENN DAVIDSON: Right. Okay.
24 MR. SVEN HOMBACH: Have -- is it fair
25 to say that as -- as part of your estimate, you haven't

1 taken escalation into account?
2 MR. GLENN DAVIDSON: No, I have taken
3 escalation into account.
4 MR. SVEN HOMBACH: If -- if those are
5 included in your estimates, perhaps you can explain to
6 the panel and to myself how you actually arrived there
7 --
8 MR. GLENN DAVIDSON: Okay.
9 MR. SVEN HOMBACH: -- if -- if you
10 didn't look at specific indices.
11 MR. GLENN DAVIDSON: What I -- what I
12 did was there are -- there were a number of Manitoba
13 Hydro estimates that had a point estimate in the year,
14 let's say 2012, and a construction -- and -- and a
15 construction cost escalated to the in-service year,
16 let's say 2021.
17 And then in some of those analyses that
18 were in Appendix 11.1, the -- the point estimate the --
19 and -- and escalation were broken out separately to
20 arrive at the construction year cost; not in all of
21 them, but in some of them.
22 And -- and there's another factor that's
23 included in there on -- on projects, I'm not sure what
24 it's called in Manitoba, interest during construction
25 or allowance for funds during construction, that also

1 gets -- gets capitalized as part of a project. And
2 that was also included in some of those -- those --
3 they called it capitalized interest, that was also
4 included in there.
5 And all -- and -- and I just assumed a
6 straight-line relationship. I just calculated what
7 percentage escalation over -- over a five (5) or a ten
8 (10) year period would be required to produce those
9 numbers. And -- and I -- I utilized that same
10 escalation factor in preparing my estimates.
11 MR. SVEN HOMBACH: And can you tell us
12 what percentage you applied?
13 MR. GLENN DAVIDSON: No, I -- I can't
14 tell you offhand.
15 MR. SVEN HOMBACH: Perhaps -- perhaps,
16 sir, I could ask you for an undertaking to advice what
17 percentage of escalation you assumed in your numbers.
18
19 (BRIEF PAUSE)
20
21 MR. GLENN DAVIDSON: Go ahead.
22 MR. MICHAEL WEINSTEIN: Yes, we're
23 prepared to do that if you want it clarified.
24 MR. SVEN HOMBACH: Thank you. I'm
25 seeking an undertaking for Power Engineers to advise

what escalation percentage was included in its transmission line cost estimates.

MR. MICHAEL WEINSTEIN: Yes, we'll give that undertaking.

--- UNDERTAKING NO. 116: Power Engineers to advise what escalation percentage was included in its transmission line cost estimates

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Now let me turn to the Power Engineering report. And I'll refer to the one that is Exhibit 3.1, the initial report filed in January, not the one that was circulated last night.

(BRIEF PAUSE)

MR. SVEN HOMBACH: If we could go to page 3.

(BRIEF PAUSE)

MR. SVEN HOMBACH: And I'm not sure who

1 I should direct this question to, but there's two (2)
2 different estimates for the generator outlet
3 transmission for Keeyask. And there's an initial
4 estimate of 203 million. And then there's a different
5 estimate for 111 million, which seems to be about half
6 of the original one.
7 Can you explain why there was this very
8 significant downward revision?
9 MR. GLENN DAVIDSON: The -- the NFAT
10 documentation in Appendix 11.1, page 10, had the first
11 breakdown adding up to $203 million. I -- I sent an IR
12 request to Manitoba Hydro and -- and -- asking for some
13 construction details, types of structures being used,
14 wire sizes, right-of-way widths, average span lengths,
15 the kinds of things that you need to -- to prepare an
16 estimate.
17 And I received back all of that
18 information plus a revised estimate for Keeyask with
19 the indication that they had included one (1) lengthy
20 transmission line in their original estimate whose sole
21 purpose was to provide construction power for the
22 generating station.
23 And, therefore, that transmission line
24 cost should have been accounted for as a generating --
25 as -- as a generating station cost, not as a

1 transmission system cost, because it -- its sole
2 purpose was to provide construction power. It was a
3 tap off of an existing line, KR36 or KN36. I -- I
4 don't recall what the -- what the line number was.
5 MR. SVEN HOMBACH: So you're satisfied
6 then that the lower number that's set out in your
7 report, the 111 million, is reasonable?
8 MR. GLENN DAVIDSON: For the -- for the
9 purpose of -- of looking at transmission line system
10 costs rather than construction costs of the generating
11 station, yes.
12 MR. SVEN HOMBACH: If we could go to
13 your presentation for a moment, slide 15, you'd spoken
14 this morning as to the competition risk because there's
15 going to be several projects at the same time.
16 And the Chairman had asked you a
17 question about where the Bipole III construction fit
18 in, and you'd indicated that there would be some --
19 some overlap.
20 Is that a risk that you would normally
21 include with the contingency that you're building into
22 your estimates, the risk of labour competition?
23 MR. GLENN DAVIDSON: It's -- it's
24 included in a -- in the manner of being aware that if
25 you were in a tight construction market, the

1 construction contractors are going to bid -- bid higher
2 to -- to make that project attractive for them.
3 It's sort of law of supply and demand:
4 If there's demand for a lot of construction
5 contractors, the -- the construction costs -- their bid
6 costs go up. If -- if there's very little activity
7 going on and they need work to do, their bid costs go
8 town. It's just supply and demand.
9 And so it -- it could be included within
10 the contingency, or -- or it could be included in the
11 base estimate just by knowing that -- that labour costs
12 or contract costs are going to be higher.
13 MR. SVEN HOMBACH: Did you include that
14 risk in your cost estimate?
15 MR. GLENN DAVIDSON: Yes.
16 MR. SVEN HOMBACH: Now, did you -- as
17 part of reviewing Manitoba Hydro's numbers, did you
18 obtain any specific indicators as to what risks
19 Manitoba Hydro had enumerated it would see for these
20 projects?
21 MR. GLENN DAVIDSON: I did not.
22 MR. SVEN HOMBACH: And just a brief
23 follow-up on some of the items that Mr. Hacault took
24 you through earlier, the -- the Great Northern
25 Transmission Line.

1 You'll recall the chart that we looked
2 at that had a low estimate, a medium estimate, and a
3 high estimate?
4 MR. GLENN DAVIDSON: Yes.
5 MR. SVEN HOMBACH: And the midpoint
6 was, I believe, $507 million?
7 MR. GLENN DAVIDSON: Yes.
8 MR. SVEN HOMBACH: From looking at a
9 chart like this, can -- can you tell what the low end
10 and the high end actually mean in terms of probability?
11
12 Are those P10 and P90s, or can you not
13 tell?
14 MR. GLENN DAVIDSON: I can't tell that.
15 MR. SVEN HOMBACH: If we could go to
16 page 4 of your report, let's have a look at the chart
17 on the top of the page. And on the computer screens,
18 it's not a very clear scan, but perhaps I can walk
19 through it.
20 In the top right corner of the section,
21 where there's a smaller square, you see a yellow line
22 that looks like a dam. And it's my understanding
23 that's the proposed Conawapa generating station.
24 Is that your understanding as well, sir?
25 MR. GLENN DAVIDSON: I --

1 MR. SVEN HOMBACH: Or will you accept
2 it subject to check?
3 MR. GLENN DAVIDSON: I -- I will. Yes,
4 I will. Yeah.
5 MR. SVEN HOMBACH: And the green line
6 that we see emanating from slightly south of the
7 Conawapa generating station and moving westwards is the
8 proposed Bipole III transmission line?
9 MR. GLENN DAVIDSON: I believe -- it's
10 hard to read on here, but I believe that says, "Bipole
11 III HVDC," near the left end of that line.
12 MR. SVEN HOMBACH: Right. And on the
13 bottom of the chart, there's another dam that you can
14 see. It's about an inch from the bottom of the chart,
15 and that's the Limestone generating station.
16 MR. GLENN DAVIDSON: M-hm.
17 MR. SVEN HOMBACH: Will you accept
18 that, subject to check?
19 MR. GLENN DAVIDSON: Yes.
20 MR. SVEN HOMBACH: Okay. There's been
21 some discussion over the course of this hearing -- and
22 I appreciate, sir, that you may not have been privy to
23 it 00 as to whether or not Manitoba Hydro would proceed
24 with Keeyask and if and when it would proceed with
25 Conawapa. So my question's on that context.

1 If -- if Conawapa was not built, would
2 you assume that the Bipole III transmission line would
3 actually have to be constructed to that point where
4 Conawapa is currently located? Or would it presumably
5 be shortened to be closer to the terminus of an
6 existing generating station? And if you're not
7 prepared to speculate, I understand.
8 MR. GLENN DAVIDSON: I -- I have -- I
9 have no knowledge of that at all.
10 MR. SVEN HOMBACH: But as part of your
11 transmission engineering practice, is it fair to assume
12 that within a suitable corridor you usually try to go
13 for the shortest route?
14 MR. GLENN DAVIDSON: Yes.
15
16 (BRIEF PAUSE)
17
18 MR. SVEN HOMBACH: So it's my
19 understanding, from looking at this chart, that the
20 distance between Limestone and Conawapa is
21 approximately a hundred kilometres.
22 Are you prepared to accept that?
23 MR. GLENN DAVIDSON: Subject to review,
24 yes.
25 MR. SVEN HOMBACH: So as a transmission

1 engineer, if you knew that a station wasn't going
2 ahead, you'd presumably look to see if it was possible
3 to build something shorter?
4 MR. GLENN DAVIDSON: Yes.
5 MR. SVEN HOMBACH: And if we can go to
6 page 10 of your report.
7 On line 15 you gave a Bipole III
8 estimate of about nine hundred and fifty-nine thousand
9 dollars ($959,000) per kilometre in 2012 dollars?
10 MR. GLENN DAVIDSON: Yes.
11 MR. SVEN HOMBACH: So if it was
12 possible -- and again I appreciate, sir, that you're
13 not prepared to speculate.
14 If it was possible to shave off about a
15 hundred kilometres if the second generating station
16 wasn't built, then the potential savings would be about
17 a hundred million dollars?
18 MR. GLENN DAVIDSON: Yes, but could --
19 could I add -- just add something into that?
20 MR. SVEN HOMBACH: Yes, please.
21 MR. GLENN DAVIDSON: Our -- our
22 original scope of work specifically excluded Bipole --
23 any consideration of Bipole III. We were originally
24 asked to prepare estimates for all of the construction
25 facil -- all of the transmission construction

1 facilities, excluding Bipole III.

2 MR. SVEN HOMBACH: And I -- I

3 appreciate that caveat and I'm not trying to get you

4 beyond your point. So let me ask -- let me ask you

5 this way.

6 When you're providing a cost estimate on

7 a per-kilometre basis and you have an opportunity to

8 shave off a certain percentage, is that more or less a

9 linear relationship?

10 So if -- let's say you're building a

11 hundred kilometre line and you're shaving off 10

12 percent, would you expect a 10 percent cost reduction?

13 MR. GLENN DAVIDSON: Yes.

14 MR. SVEN HOMBACH: Okay. Now, let's go

15 to page 31 of your report.

16 Now, you'd indicated, sir, that you felt

17 Manitoba Hydro had demonstrated a technical need for US

18 transmission?

19 MR. PAUL ARNOLD: Sorry. I -- I

20 apologize. That page again?

21 MR. SVEN HOMBACH: It's page 31 of your

22 report.

23

24 (BRIEF PAUSE)

25

1 MR. SVEN HOMBACH: And let's scroll
2 down a little bit on the page. I'm looking at line 29,
3 which says:
4 "In conclusion Power believes that
5 Manitoba Hydro has demonstrated a
6 technical need for US transmission,
7 namely the 500 kV line and network
8 upgrades."
9 Do you see that?
10 MR. PAUL ARNOLD: Yes, I see that.
11 MR. SVEN HOMBACH: And you indicated
12 today that you didn't really look at the 250 megawatt
13 alternative.
14 And my question to you is: Did you
15 actually turn your mind as to whether, from a technical
16 perspective, a 750 megawatt line was needed or whether
17 a 250 megawatt line would be sufficient?
18 MR. PAUL ARNOLD: Oh, yeah, just to
19 clarify. My -- the conclusion is based on the
20 assumption that it -- it's already been decided that
21 you need to move forward with the 750 megawatt
22 interconnection.
23 MR. SVEN HOMBACH: So then you didn't -
24 - you didn't actually consider whether or not 250
25 megawatt would be sufficient.

1 You saw it as an either/or proposition?
2 MR. PAUL ARNOLD: I did not. I -- I
3 think, to clarify it further, you know, without having
4 evaluated the 250 megawatt line option, I would assume
5 that Manitoba Hydro is going to apply the NERC
6 standards for whatever interconnection is decided to be
7 built, and that in doing so they would have provided
8 for a reliable transmission system.
9 I did not consider whether or not the
10 option of a 250 megawatt interconnection versus a 750
11 megawatt interconnection was, for example, in line with
12 export capabilities or the desire to export or -- or
13 the need for export.
14 I would have, you know, caveat that with
15 having seen confidential reports expressing interest
16 for transmission service requests in excess of two
17 fifty (250) that -- that would tell me that there is at
18 least interest in -- in a 750 megawatt interconnection
19 versus a 250 megawatt interconnection.
20 But that is really not the question I'm
21 addressing here. The question I was addressing in the
22 report was, yeah, they -- Hydro had proposed a 750
23 megawatt interconnection, and that the transmission
24 facilities that they identified to achieve that
25 increase was, in fact, reliable.

1 MR. SVEN HOMBACH: And I suspect that
2 electrical engineers may have a more nuanced
3 understanding of the word 'technical' than -- than us
4 lawyers, too. So let me just follow up with -- with
5 one (1) question so that I'm clear on the issue.
6 Did you turn your mind as to what export
7 contracts could actually be fulfilled without any new
8 transmission line or what exports could presumably be
9 fulfilled with a 250 megawatt line? Did you --
10 MR. PAUL ARNOLD: I did not make --
11 make that analysis, no.
12 MR. SVEN HOMBACH: Okay. Thank you.
13 MR. PAUL ARNOLD: Okay.
14 MR. SVEN HOMBACH: Let's go to page 7
15 of your report. That describes the Manitoba-Minnesota
16 Transmission Project. And to be clear on the record,
17 that is the Canadian portion of the project, correct?
18 That is the line from the Dorsey
19 substation to the Minnesota border?
20 MR. GLENN DAVIDSON: That is the --
21 that's the lines from Dorsey to the US border, yes.
22 MR. SVEN HOMBACH: If I could ask Ms.
23 Villegas to put Manitoba Hydro Exhibit 95 up on the
24 screen and go to page 80 of the document.
25 Sir, I appreciate you may not have seen

1 this presentation. This was a presentation given by
2 the Manitoba Hydro panel. And we're looking at a slide
3 that describes at a high level the Manitoba-Minnesota
4 Transmission Project and indicates that 2013 estimated
5 costs would be about $281.4 million.
6 You don't have any reason to disagree
7 with -- with that number?
8 MR. GLENN DAVIDSON: No, I do not.
9 MR. SVEN HOMBACH: If we can go back to
10 the page in your report we just looked at, page 7,
11 there's a description on line 22 that says that, as
12 part of that project, there's going to be a three (3)
13 phase 300 MVA 230 kV phase shifting transformer in
14 Glenboro Station.
15 It's your understanding that that forms
16 part of the current Manitoba-Minnesota Transmission
17 Project?
18 MR. GLENN DAVIDSON: Yes, it is.
19 MR. SVEN HOMBACH: And it's my
20 understanding, sir, that if Manitoba Hydro had opted
21 for a 250 megawatt line, that that is actually the only
22 component that would have had to be built, and the rest
23 could have been dispensed with.
24 Is that your understanding, as well?
25 MR. GLENN DAVIDSON: That's -- that's -

1 - I'm not aware of that at all.

2 MR. SVEN HOMBACH: If we could, Diana,

3 if -- if it helps, let's go to the PUB/Manitoba Hydro

4 Information Request, and Ms. Villegas, I'm looking for

5 PUB/Manitoba Hydro-286. That should be a Round 1

6 Information Request.

7

8 (BRIEF PAUSE)

9

10 MR. KURT SIMONSEN: There's 86a, 'b',

11 and 'c'.

12

13 CONTINUED BY MR. SVEN HOMBACH:

14 MR. SVEN HOMBACH: Let's scroll down.

15 I may have my reference on this wrong, so why don't we

16 just stand that issue down, and perhaps I'll deal with

17 it after the break.

18

19 (BRIEF PAUSE)

20

21 MR. SVEN HOMBACH: If we could go back

22 to Manitoba Hydro Exhibit 95, please, and go to slide

23 83?

24

25 (BRIEF PAUSE)

1 MR. SVEN HOMBACH: That's, again, a
2 slide from a -- a presentation that Manitoba Hydro gave
3 on the record, and it provides a high-level description
4 of the North-South Transmission Upgrade Project.
5 Are you generally familiar with this, or
6 would it help you if I spend a minute just walking you
7 through it?
8 MR. GLENN DAVIDSON: I -- I would
9 appreciate it if you would walk me through it.
10 MR. SVEN HOMBACH: Now, you're aware
11 that there's currently two (2) large HVDC lines as
12 Bipoles I and Bipole II in existence?
13 MR. GLENN DAVIDSON: Yes, I am.
14 MR. SVEN HOMBACH: And these lines are
15 currently moving energy south from the Kettle, Long
16 Spruce, and Limestone generating stations?
17 MR. GLENN DAVIDSON: Yes.
18 MR. SVEN HOMBACH: You -- you see all
19 of those stations on top of the chart?
20 MR. GLENN DAVIDSON: Yes.
21 MR. SVEN HOMBACH: And there will be
22 two (2) new generating stations, Keeyask, which you see
23 on the left of the slide, and Conawapa, which you will
24 see on the right of the slide?
25 MR. GLENN DAVIDSON: Yes.

1 MR. SVEN HOMBACH: And it is my
2 understanding that as part of the North-South Upgrade
3 Project, there's going to be a split between Kettle and
4 Long Spruce. You can see that in the purpled dashed
5 line?
6 MR. GLENN DAVIDSON: Yes, I can.
7 MR. SVEN HOMBACH: Can you see that?
8 MR. GLENN DAVIDSON: Yes.
9 MR. SVEN HOMBACH: After which, Long
10 Spruce, Limestone, and Conawapa will bring energy south
11 on Bipoles II and III, and after which, Kettle and
12 Keeyask will no longer have access to Bipoles II or
13 III, but will be on Bipole I?
14 MR. GLENN DAVIDSON: Yes.
15 MR. SVEN HOMBACH: Do you see that?
16 MR. GLENN DAVIDSON: Yes.
17 MR. SVEN HOMBACH: And as an addition,
18 an existing unit from Kettle will be placed on the
19 northern AC project. You can see that on the far left
20 of the slide?
21 MR. GLENN DAVIDSON: Yes, I can.
22 MR. SVEN HOMBACH: And the total cost
23 that Manitoba Hydro had presented for this project was
24 340 million, and I believe we can see that on the next
25 slide. So if we could just scroll down one (1) page?

1 Let's go one (1) slide further down. There we go.
2 You -- you see the $340 million number
3 on the bottom of slide 85?
4 MR. GLENN DAVIDSON: Yes.
5 MR. SVEN HOMBACH: Now, you had looked
6 at this project, and I believe at page 6 of your
7 report, you actually indicated that, with an escalator,
8 the number would be about 498 million, so close to 500.
9 Do you accept this, or would it help you if I took you
10 to the page in the report?
11 Maybe let's go to the report. It's your
12 report, page 6.
13 MR. GLENN DAVIDSON: Page 6. Going the
14 wrong way.
15 MR. SVEN HOMBACH: If you look at line
16 10.
17 MR. GLENN DAVIDSON: M-hm.
18 MR. SVEN HOMBACH: The total in-service
19 cost that you're estimating is 498 million?
20 MR. GLENN DAVIDSON: That's correct.
21 MR. SVEN HOMBACH: In a situation where
22 Conawapa was not proceeded with, is it your
23 understanding that this project would actually be
24 needed, or that it could be dispensed with?
25 MR. GLENN DAVIDSON: I -- I don't have

1 -- I don't -- I'm not sure that I know that. I -- I do
2 not know that.
3
4 (BRIEF PAUSE)
5
6 MR. SVEN HOMBACH: So that is not
7 something you'd be prepared to comment on without
8 further research or further evaluation?
9 MR GLENN DAVIDSON: Somebody would have
10 to do that research for me and -- and -- a system
11 person would -- would have to tell me that.
12 MR. SVEN HOMBACH: Let me take you to
13 page --
14 MR GLENN DAVIDSON: Could -- could we
15 hold for a second?
16 MR. SVEN HOMBACH: Absolutely, if you
17 need you canvass with your colleagues for a minute,
18 please go ahead.
19
20 (BRIEF PAUSE)
21
22 MR. MICHAEL WEINSTEIN: There's nothing
23 further to add from the other witnesses at this time.
24 Please continue.
25

1 CONTINUED BY MR. SVEN HOMBACH:

2 MR. SVEN HOMBACH: I will. Thank you,

3 Mr. Weinstein.

4 If we could go to page 27 of your report

5 for a moment and look at line 25. Now, this is where

6 Power Engineers comments on the impact of switching a

7 unit for the Kettle generating station from HVDC to the

8 EC System. And your conclusion on page 26 states that:

9 "Note that even though the total

10 effect of no -firm for Manitoba Hydro

11 system is minimized, the Preferred

12 Operating Plan never totally

13 eliminates non-firm transmission for

14 connected generation for both NCS1

15 and NCS2 simultaneously."

16 And NCS, that stands for Northern

17 Collector

18 System? Okay.

19 Is that still your conclusion today?

20 MR. PAUL ARNOLD: Excuse me. Yes --

21 yes, it is. There is a pro -- if you add up the total

22 gen -- the total generation connected to NCS -- the NCS

23 bus, even after splitting the generation between

24 Bipoles I, Bipoles II and III, you -- you still end up

25 with a -- a total non-firm transmission of

1 approximately 207 megawatts.

2 The switching of the Kettle generation

3 units between Bip -- NCS1 and NCS2 tends to

4 redistribute that non-firm transmission value. So

5 depending on the operating mode you choose, you can

6 apply -- you split that non-firm between NCS1 and NCS2,

7 or you can eliminate it on NCS1 and transfer the two

8 hundred and seven (207) to NCS2.

9 So you have some options -- you have

10 some flexibility with Kettle generation switching.

11 But, no, you never simultaneously get a situation where

12 all the transmission is firm under the proposed plan.

13 MR. SVEN HOMBACH: And firm

14 transmission is transmission that you can rely on being

15 available if -- if you need it.

16 Is that a -- a basic description of it?

17 MR. PAUL ARNOLD: Firm -- firm is --

18 firm here is the definition provided Manitoba Hydro

19 using the valve group over spare generation criteria,

20 whereby the DC -- the maximum firm transmission you can

21 transmit over DC is the capacity with the largest valve

22 group out of service.

23 MR. SVEN HOMBACH: And this is where

24 I'm being grossly outgunned by your expertise. So I'm

25 might delve into some very basic questions. I

1 circulated yesterday a -- a document called, "HVDC for
2 Beginners," which was appropriate, because I definitely
3 am a beginner.
4 And just for the record, before I refer
5 to it, I -- I don't propose to -- to put it to you as
6 evidence, but I just want you to illustrate some things
7 for the panel using this document. And I'd like to
8 have that entered as PUB Exhibit 60 --56.
9
10 --- EXHIBIT NO. PUB-66: Document: HVDC for
11 Beginners
12
13 MR. KURT SIMONSEN: Sixty-six (66).
14 MR. SVEN HOMBACH: Sixty-six (66).
15 Let's go to page 12 of the document. And, perhaps, we
16 can blow this up a little bit.
17
18 CONTINUED BY MR. SVEN HOMBACH:
19 MR. SVEN HOMBACH: Now, can you take a
20 minute to actually explain what a valve group is and
21 what it means when Manitoba Hydro discusses the valve
22 group sparing?
23 MR. PAUL ARNOLD: Thank you, yes. I'm
24 going to, if you don't mind, turn this over my
25 colleague, Mr. Furumasu.

1 MR. SVEN HOMBACH: Absolutely.

2 MR. BRIAN FURUMASU: Yes. Okay. The

3 valve group -- let's see, is there a -- I don't know if

4 there's a good way to use a pointer. But the valve

5 group is, if you look at it, there's an upper and a

6 lower valve -- valves for this. And in this case, this

7 configuration, it's on the -- on the diagram, it's

8 shown as a quad valve. So if you look at the -- oh, I

9 don't -- it's hard to point to, but it looks like

10 diodes, four (4) of them in a series. All taken

11 together, that is a valve -- that is a -- a qua -- what

12 we would call a quad valve.

13 And -- and in this case, it's all one

14 (1) valve group when it's configured this way. Now,

15 with separate valve groups, you can actually operate

16 them independently. In this case, if any part of that

17 valve is -- goes out of service, the whole valve goes

18 out of service and the whole pole is out of services.

19 In a -- say in a two (2) valve group,

20 there's a number of ways to do it, but what you would

21 do is you would have two (2) of these quad valves in a

22 series. And what that allows you to do -- and this

23 would be like a configuration that would be similar and

24 analogous, but not maybe exactly, how Bipole II and was

25 proposed for Bipole III. And the advantage is when you

have two (2) valve groups in a series, is that if you have a problem in one (1) valve group, it's bypassed and you can use the other valve group that's still intact.

So if this was, say, plus and minus 500 kV, which is typically the voltage that Manitoba Hydro was using, each of these -- if you had two (2) valve groups in a series at 250 kV, when they're both in service that would be 500 kV. And you would do the same on the other side. So that would -- you could have a, say, in this case four (4) valve groups.

What that allows you to do is a lot of operating flexibility, and what it also buys you is availability, because if you have one (1) valve group out, it means you can operate with the other three (3). So that means you can have up to three-quarters (3/4s) of the power with one (1) valve group out.

And -- and it also allows you to operate, for example, in this case you could operate at two hundred and fifty (250) on one (1) pole and five hundred (500) in the other. Or you could operate on five hundred (500) and five hundred (500). Or you could operate at two-fifty (250) and two-fifty (250). So because of that, it allows you a lot of flexibility. And -- and it keeps a little higher availability in --

1 in the way you use your HVDC converter.
2 Does that help?
3 MR. SVEN HOMBACH: It -- it very much
4 helps. So if I have to demonstrate my ignorance, again
5 it's basically a spare tire for transmission lines? It
6 -- it allows you to cope with an outage better?
7 MR. BRIAN FURUMASU: It -- it adds more
8 equipment, but allows you to have the flexibility of
9 par -- of a partial outage and still have availability
10 of your -- of your -- at least partial availability of
11 your converter.
12 MR. SVEN HOMBACH: And is this
13 currently -- is -- is it your understanding that this
14 is currently included in Manitoba Hydro's budget? You
15 -- you discussed the valve group sparing at page 28 of
16 your report, but is -- is that a recommendation that
17 you're making or is it --
18 MR. BRIAN FURUMASU: No, no, no, no.
19 That was -- it was our -- it was our understanding that
20 was included in the way that it's -- it was proposed.
21 And it's consistent with Bipoles I and Bipoles II which
22 -- so they -- it didn't strike us as any different than
23 what had already been done in -- in the use of these
24 converters.
25 MR. SVEN HOMBACH: Staying with you, I

1 -- I believe, let's go to page 5 of your report for a
2 moment.
3 MR. BRIAN FURUMASU: Okay.
4 MR. SVEN HOMBACH: If we can scroll
5 down and -- and look back at the requirement set out
6 there for the North-South transmission system upgrade
7 project.
8 Do you see at line 30 that there's a
9 reference to a synchronous condenser and CB
10 replacements and a 230 kV AC line sectionalization at
11 Riel?
12 MR. BRIAN FURUMASU: M-hm.
13 MR. SVEN HOMBACH: Now --
14 MR. BRIAN FURUMASU: Yes.
15 MR. SVEN HOMBACH: -- you are aware
16 from looking at the diagrams earlier, Riel is going to
17 be the southern terminus of the Bipole III transmission
18 line?
19 MR. BRIAN FURUMASU: Yes.
20 MR. SVEN HOMBACH: Okay. And can you
21 comment? If this is something that's going to be
22 placed at the southern terminus of Bipole III, should
23 it be included in the Bipole III cost or is it
24 something that you would actually contribute to the
25 North-South transmission system upgrade project?

1 MR. BRIAN FURUMASU: And just to
2 clarify, you're asking about the synchronous condenser
3 in 1C?
4 MR. SVEN HOMBACH: Correct, yes.
5 MR. BRIAN FURUMASU: Okay. So if -- if
6 there is a Bipole III that's terminating at this
7 station, I can't say for certain, but it would not
8 surprise me in -- in that it may be needed as part of
9 the converter station at that -- terminating at Riel --
10 Riel station. It may be needed to support the AC
11 system.
12 MR. SVEN HOMBACH: And the reason I'm
13 asking you, Mr. Furumasu, is, as you're aware, Bipole
14 III is outside the scope of -- of this NFAT and -- and
15 the PUB panel is not being asked to look at it, but it
16 is being asked to look at the costs of the Preferred
17 Development Plan.
18 So when -- when we see something being
19 added to the Riel substation be included as a component
20 of the Preferred Development Plan, I'm just trying to
21 get an understanding if you believe that that's
22 appropriate that this is where it belongs or whether
23 that is something that's attributable to the Bipole III
24 transmission line.
25 MR. BRIAN FURUMASU: So let me make

1 kind of a broader statement. Just when we looked at
2 the HVDC collector system upgrades, it wasn't clear to
3 us all of what that meant, in terms of did it mean only
4 Bipole III or was it Bipole I and II.
5 So we did ask clarification -- or I
6 asked clarification and was provided clarification.
7 And it does turn out that some of the collector system
8 upgrades -- for example, there was -- part of -- you
9 had it on an earlier slide, but it was -- I think it
10 was the 58.5 million. Part of that was not for just
11 the Bipole III, but it also included items that were
12 needed to support Bipole I.
13 And, in fact, the statement that I --
14 that was made to me was, let me see, that the cost was
15 -- on that fifty-eight point five (58.5) was recently -
16 - it was based on recently completed filter replacement
17 project at Radisson for Bipole I. So it -- it was
18 clear that there was some costs to upgrade the DC
19 system comprising the three (3) Bipoles.
20 So in our mind, not all of the -- the
21 dollars in -- in that north -- in the DC collector
22 system upgrades was only for Bipole III, so. But I --
23 I couldn't tell you right now on what -- what item or
24 what improvement went to which project.
25 MR. SVEN HOMBACH: Okay. If it -- if

1 it helps at all, maybe let's turn to page 6 of your
2 report. There's a paragraph that starts on line 37, at
3 the bottom of the page, that refers to a rating
4 increase for Bipole III from the originally planned
5 2,000 megawatts to 2,300 megawatt. And then you
6 discuss a document. And it states that it estimates
7 the cost for the enhancement to be about 38 million.
8 Is that, by any chance, related to the
9 synchronous condenser that we just looked at, or is
10 this a different item?
11 MR. BRIAN FURUMASU: It's different.
12 And part of that was an error we found on my part. We
13 misunderstood the -- the scope of the HVDC upgrades at
14 this stage. And I think we later responded to that,
15 but... So -- so the 38 million was -- the way we used
16 it was -- was in error, so.
17 MR. SVEN HOMBACH: So for the
18 synchronous condenser then, what number approximately
19 would we be looking at?
20 MR. BRIAN FURUMASU: In costs, you're
21 saying?
22 MR. SVEN HOMBACH: Yes.
23 MR. BRIAN FURUMASU: I -- I don't have
24 any different costs than what was provided by the --
25 MR. SVEN HOMBACH: You said fifty-eight

1 (58) point something?

2 MR. BRIAN FURUMASU: No, that...

3 MR. SVEN HOMBACH: There's no cost

4 component listing for -- listed for that item in your

5 report. That's why I'm asking.

6 MR. BRIAN FURUMASU: Okay, this -- the

7 fifty-five (55) was -- when I -- when you had that

8 slide that showed the HV sys -- HVDC system upgrades,

9 the fifty-five (55) was the Radisson 300 megawatt

10 filter. And that actually has quite a number of

11 components to it. So that does -- and that doesn't

12 have any relationship to the thirty-eight (38).

13 MR. SVEN HOMBACH: Okay. So you're not

14 -- sitting here, you can't give a ballpark estimate on

15 -- on -- or you wouldn't be prepared to give a ballpark

16 estimate.

17 MR. BRIAN FURUMASU: I would not.

18 MR. SVEN HOMBACH: Okay. That --

19 that's fair. Thank you.

20 Now, you were asked repeatedly about

21 NERC standards earlier, and just so that we're clear --

22 and NERC, that's the North American Electric

23 Reliability Corporation, correct?

24 MR. BRIAN FURUMASU: Correct.

25 MR. SVEN HOMBACH: And that's, in

1 essence, a regulatory reliability agency that then
2 reports to FERC, which is the Federal Energy Regulatory
3 Commission?
4 MR. BRIAN FURUMASU: That's correct.
5 MR. SVEN HOMBACH: Okay. And at page
6 11 of your report, you discuss this concept of a
7 designated network resource, line 4 on page 11, in
8 order to qualify as a designated network resource when
9 transmission is required.
10 Can you provide a brief description of -
11 - of what exactly a designated network resource is, or
12 what that means?
13 MR. PAUL ARNOLD: Yes. It's -- it's a
14 -- my understanding is that it's a firm resource, for
15 example, a firm generator delivered over firm
16 transmission. And -- and that's the qualification. I
17 think that is the qualification for being a designated
18 network resource.
19 And a designated network resource also
20 has priority in terms of its -- where it is in -- in
21 the priority for curtailment.
22 MR. SVEN HOMBACH: So let's explore
23 this a -- a bit further. Of course, with the
24 hydroelectric dam, most of the time, there's a
25 difference between the name plate capacity and the

1 actual capacity, because you're only going to reach the
2 name plate capacity if you're getting as much flow
3 through as possible.
4 MR. PAUL ARNOLD: That's correct, and
5 it's particularly with hydro being a fuel-limited
6 resource, it is dependent on water behind the -- the
7 dam.
8 MR. SVEN HOMBACH: And that's usually
9 dependent on the level of water that's available in the
10 reservoir. So it's -- it's a hydraulic limit.
11 MR. PAUL ARNOLD: Correct.
12 MR. SVEN HOMBACH: So if you had more
13 than one (1) plant connected to a transmission line --
14 and you'll recall I took you through the slide on
15 Manitoba Hydro's presentation that shows the various
16 generating stations -- to reach the maximum name plate
17 capacity, you'd have to have maximum flow of all of
18 those generating stations at the same time?
19 MR. PAUL ARNOLD: You'd have to have
20 enough hydraulics, water, yes, flowing through the
21 generators.
22 MR. SVEN HOMBACH: And is it fair to
23 say that most of the time, that's an unrealistic
24 assumption, that's actually a relatively rare
25 occurrence?

1 MR. PAUL ARNOLD: Sure. Relating it
2 specifically to Manitoba's hydro system and any
3 particular -- the operation of any particular plant, I
4 have to say I don't have the -- the knowledge of
5 availability of -- of gen -- of generation or the
6 capacity factor of that generation.
7 But yes, it's typical that hydro
8 systems, you know, fill and refills on a seasonal
9 basis, and that the amount of energy available is
10 dependent on -- on that water flow.
11 MR. SVEN HOMBACH: And for energy,
12 switching from capacity to energy for a moment, are you
13 familiar with this concept that Manitoba Hydro uses
14 called 'dependable energy'?
15 MR. PAUL ARNOLD: I've heard the term
16 used. I have to say I'm not intimately familiar with
17 that, but I --
18 MR. SVEN HOMBACH: And --
19 MR. PAUL ARNOLD: -- it -- it sounds --
20 it -- I interpret it to mean that which you might be --
21 be able to depend on on a -- say, more of an average
22 basis.
23 MR. SVEN HOMBACH: Well, it -- it's my
24 understanding that what Manitoba Hydro does is it looks
25 at the lowest flow on record --

1 MR. PAUL ARNOLD: Okay.
2 MR. SVEN HOMBACH: -- and it says, The
3 energy that we could produce if we had the lowest flow
4 on record, that's dependable energy.
5 MR. PAUL ARNOLD: Thank you for --
6 thank you for reminding me. I do remember reading
7 about that, yes.
8 MR. SVEN HOMBACH: And -- and that's
9 considered firm energy, and I -- I trust that if I'm
10 misstating it, that Ms. Moroz will correct me, but --
11 so let me ask you. The -- the NERC requirement for
12 firm transmission, is there any similar NERC
13 requirement for hydraulic reliability for something to
14 be considered a firm resource?
15 MR. PAUL ARNOLD: Not to my knowledge.
16 MR. SVEN HOMBACH: And as a corollary
17 to that, are you aware of any standards within NERC
18 that have a hydraulic reliability limit as opposed to a
19 transmission reliability limit? And -- and maybe let
20 me explain what I mean by that.
21 Let's say you have a -- a situation
22 where one (1) or more of the units on a generating
23 station are out of service.
24 It's a hydraulic issue, it's not a
25 transmission issue, but does NERC concern itself with

1 issues like that in determining what is a designated
2 network resource?
3 MR. PAUL ARNOLD: I don't know -- I
4 don't know if I can really answer that. From the
5 perspective of transmission reliability, no. However,
6 I think that there's another arm of NERC that considers
7 resource planning, and would speak to the appropriate
8 level of -- of reserves, and that would want to assure
9 that there is enough available energy to meet peak
10 loads. And so, from that perspective, they -- there
11 may be some things that address that within NERC. I am
12 not personally familiar with them.
13 MR. SVEN HOMBACH: So did you look at
14 any hydraulic constraints in determining how much
15 capacity you would actually need as firm capacity under
16 NERC?
17 MR. PAUL ARNOLD: No. No, I did not.
18 MR. SVEN HOMBACH: Let me briefly turn
19 to the issue of transmission losses, and Mr. Furumasu,
20 I believe you addressed it earlier. I'm not sure if
21 you've been following the transcript at all, or if
22 you've looked at what's on the record, but Mr.
23 Wojczynski, on behalf of Manitoba Hydro, earlier
24 advised that Manitoba Hydro is looking at an export
25 proxy for transmission losses of around 10 percent, and

if we could go to the charts that you had included in your slides for a moment, specifically slide 30?

MR. BRIAN FURUMASU: Okay.

MR. SVEN HOMBACH: You included some losses on slide 30 of your presentation for the proposed system and the existing system, and the proposed system, just so that we're clear, that would include Bipole III. It would include the northern transmission upgrade.

MR. BRIAN FURUMASU: That is correct.

MR. SVEN HOMBACH: And -- and it would include the new line from Dorsey to the Minnesota border.

MR. BRIAN FURUMASU: That's correct.

MR. SVEN HOMBACH: Okay. The -- the losses that we're looking here on this slide, are those losses attributable to exported energy, or are those total transmission losses to be incurred in Manitoba?

MR. BRIAN FURUMASU: The -- for the -- for the proposed -- or actually for -- for both the proposed and existing, where we have an export level, those were the total system losses, and to find out what the export losses would -- would be, you'd have to subtract the export level from the level that there were no exports.

1 MR. SVEN HOMBACH: Okay. And we had
2 that discussion with the Manitoba Hydro panel earlier,
3 but loss is on exponential relationship, right? If the
4 -- if the power flow is higher, there's an
5 exponentially higher loss?
6 MR. BRIAN FURUMASU: And -- and
7 actually when you plot that it shows that.
8 MR. SVEN HOMBACH: Okay.
9 MR. BRIAN FURUMASU: And I -- I didn't
10 include it here, but I have plotted it myself.
11 MR. SVEN HOMBACH: So if -- if we look
12 at the percentages here for the proposed system -- I
13 appreciate, sir, they're not on the slides, but the
14 numbers that I'm getting are 11 percent for the summer
15 off-peak, 15 percent for the middle summer on-peak, and
16 14 percent for the right summer on-peak?
17 MR. BRIAN FURUMASU: Okay.
18 MR. SVEN HOMBACH: You're prepared to
19 assume that my lawyer math is correct on those?
20 MR. BRIAN FURUMASU: When I -- when I
21 did the plot, actually, it varies from when it's about
22 a -- a 2,000 megawatts overall power level at about 5
23 percent of total losses. And at -- near the 7,000
24 megawatts, it's about 7 1/2 percent. So I think those
25 -- I'm not sure where you're --

1 MR. SVEN HOMBACH: So where were you
2 looking at?
3 MR. BRIAN FURUMASU: I'm looking --
4 what I did is I looked at the values in the -- this is
5 a table, I believe --
6 MR. SVEN HOMBACH: The front of your
7 report?
8 MR. BRIAN FURUMASU: -- A-1 in the
9 report.
10 MR. SVEN HOMBACH: Maybe -- maybe let's
11 go to that.
12 MR. BRIAN FURUMASU: Okay.
13 MR. SVEN HOMBACH: It's just easier for
14 the panel and for myself.
15 Can you refer us to the page number that
16 you were looking at, sir?
17 MR. BRIAN FURUMASU: It's -- yeah, let
18 me take a look here.
19
20 (BRIEF PAUSE)
21
22 MR. SVEN HOMBACH: And -- and if it
23 helps, maybe let -- let us know if you're looking at
24 page 18. Or, sorry, page 17.
25 MR. BRIAN FURUMASU: Oh, here it is.

1 It's -- it's Table 1-A. So I'm looking at page 80,
2 Table 1-A.
3 MR. MICHAEL WEINSTEIN: Mr. Hombach, I
4 just want to confirm that we're all looking at the same
5 version of the report. If Mr. Furumasu -- if the cover
6 of his report says "April 2014 Redacted," or if it is
7 the January 24th report.
8 MR. BRIAN FURUMASU: Redacted.
9 MR. SVEN HOMBACH: I -- I was working
10 with the old one (1), but I'm happy to work with either
11 one (1), so.
12 MR. MICHAEL WEINSTEIN: Okay, let's --
13 he has it open to 3-1. Perhaps we could go there.
14
15 CONTINUED BY MR. SVEN HOMBACH:
16 MR. SVEN HOMBACH: Well, if -- if it
17 helps you look at the April 14 one, that's...
18 MR. BRIAN FURUMASU: This is the table.
19 MR. SVEN HOMBACH: Okay.
20 MR. BRIAN FURUMASU: So --
21 MR. SVEN HOMBACH: And that's page 80?
22 MR. BRIAN FURUMASU: This is page 80.
23 That's correct.
24 MR. SVEN HOMBACH: If you could scroll
25 down and let us know the actual page number in paper,

1 as well.

2 MR. BRIAN FURUMASU: It is page 80.

3 Okay. So in this slide, if you -- you spoke about

4 percentage losses, so the system losses and --

5 represented as percentage of load is -- and you can see

6 the percentages along that line. That is the

7 percentage. And the -- let's see here. And the total

8 load and exports is four (4) columns above that. And

9 so at the different loading levels, this shows -- or

10 the table illustrates the percent of loss -- system

11 losses and percent of load.

12 MR. SVEN HOMBACH: And what you see

13 underneath, that incremental losses percent of expert -

14 - export --

15 MR. BRIAN FURUMASU: Export.

16 MR. SVEN HOMBACH: -- what did you use

17 as a baseline to determine the incremental losses? Did

18 you use the current Manitoba demand?

19 MR. BRIAN FURUMASU: No. What we did

20 in that case is we looked at just those losses, the

21 incremental losses as attributed to the export. And --

22 MR. SVEN HOMBACH: Okay. But what I'm

23 asking you is: What did you use as a baseline to

24 determine incremental losses? Did you look at what the

25 domestic Manitoba peak or off-peak demand is and use

1 that as a baseline?

2 MR. BRIAN FURUMASU: That's correct.

3 We looked at the case when there was no exports at that

4 seasonal case.

5 MR. SVEN HOMBACH: So if you were to

6 hear that Manitoba Hydro uses a 10 percent proxy, based

7 on these numbers, you would say that's reasonable?

8 MR. BRIAN FURUMASU: For -- for the

9 same -- for incremental export losses?

10 MR. SVEN HOMBACH: For incremental

11 export losses.

12 MR. BRIAN FURUMASU: I would say that's

13 -- it -- it's in the range. It's in the range that we

14 studied. And it depends on -- and it -- what it shows

15 here is it depends on load level at the -- at the

16 higher loss levels, as you've pointed out, you have

17 higher loss levels when you have higher system loading.

18 So at -- at higher export levels or --

19 and combined total system level, you will have higher

20 losses, and it'll be in the area of around 10 percent

21 and, in fact, in some cases, just a little greater than

22 10 percent. But it can also be lower on the cases

23 where the system is not loaded as heavily.

24 MR. SVEN HOMBACH: Okay. Those are all

25 my questions to you. Thank you very much. I

1 appreciate your time.
2 THE CHAIRPERSON: Okay. I don't know
3 that there are any other additional matters to address
4 before we recess.
5 MR. SVEN HOMBACH: Perhaps, Mr.
6 Chairman, the panel can canvass Ms. Moroz as to whether
7 or not she has any further questions, bearing in mind
8 that the panel has decided in the past that if Board
9 counsel raises new issues, Manitoba Hydro is given
10 additional time to examine.
11 THE CHAIRPERSON: Ms. Moroz, do you
12 wish to address any issues?
13 MS. JENNIFER MOROZ: If I could just
14 have one (1) moment to confer.
15
16 (BRIEF PAUSE)
17
18 THE CHAIRPERSON: Ms. Moroz, please?
19 MS. JENNIFER MOROZ: Yes, I just have
20 one (1) additional question to clarify.
21
22 RE-CROSS-EXAMINATION BY MS. JENNIFER MOROZ:
23 MS. JENNIFER MOROZ: Going back to the
24 10 percent proxy for losses, is it your understanding
25 that that 10 percent was based on load or export or

generation?

MR. BRIAN FURUMASU: That 10 percent was based on a total system load. Well, it was -- it was based on an export condition. And that's under the condition that you have total system losses. That's all the -- the total system losses on the system. That's AC and DC losses.

(BRIEF PAUSE)

MS. JENNIFER MOROZ: I think that's fine now.

THE CHAIRPERSON: Thank you. Mr. Hombach, have you got anything else you'd like to address?

MR. SVEN HOMBACH: I -- I do not. There -- I am advised that there will be a brief CSI presentation. So following the procedure that has established for CSI, I would ask that all members of the public and anybody that has not signed the applicable undertaking or non-disclosure agreement be excused and that the video feed is cut.

So I would suggest, Mr. Chairman, perhaps we can stand down for a few minutes to allow that to take place.

1 THE CHAIRPERSON: I think that's an
2 excellent idea. So let's stand down for a few minutes,
3 and I estimate ten (10) minutes. Ten (10) minutes.
4 Ten (10) minutes.
5
6 (PANEL RETIRES)
7
8 --- Upon adjourning at 2:32 p.m.
9
10 Certified Correct,
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14 _____
15 Cheryl Lavigne, Ms.
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