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NATURAL RESOURCES CONSERVATION BOARD

Application No. 1701

SPRINGBANK OFF-STREAM RESERVOIR PROJECT

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P R O C E E D I N G S

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Volume 6

March 29, 2021

(Via videoconferencing)

1 Natural Resources Conservation Board Proceedings taken  
2 virtually in Calgary and Edmonton, Alberta.

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4 Volume 6

5 March 29, 2021

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Deanna DiPaolo, CSR(A)

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(PROCEEDINGS COMMENCED AT 8:30 A.M.)

9

10 THE CHAIR: Well, good morning, everybody, and  
11 welcome to day 6 of the SR1 hearing, Monday,  
12 March 29th.

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So, hopefully, everybody had a reasonable weekend and didn't have too far to drive on this day, given the incredible gusts and the winds out there today. So, in some cases, I guess the virtual hearings can be helpful, at least for those of us -- many of us that don't have to travel too far.

A couple of notes, and then I'll ask for any prelim matters, but one thing is our -- our document managers, in our view, are doing a wonderful job to getting us documents up, and we at times need to jump around a lot, which is just the nature of the beast, but I would like to ask everyone to have some patience.

In some cases, the exhibits being requested are not necessarily preloaded, and so we do need to load

1           them from the web, it does take some time. So, as I  
2           say, I think they're doing a wonderful job, but just so  
3           we don't put too, too much pressure on them, if we can  
4           cut them a little slack and show some patience, we'd  
5           really appreciate that.

6           Undertakings, we had some undertakings returned.  
7           We will have a look at the ones that have been returned  
8           and be sure they've been entered as exhibits; if they  
9           have not, we'll bring them back, so that we can enter  
10          them as exhibits.

11          And for the undertakings that will be coming back  
12          over this week, or any new ones that are asked for and  
13          then returned, if we could ask for those to be brought  
14          back to the hearing, and we'll just enter them at that  
15          time, give them an exhibit number so that we can ensure  
16          that our record is complete and tracked.

17          As last Friday noted, given the virtual world, we  
18          have some exhibits being entered sort of on the fly,  
19          and that's really on us, so we've cleaned that up a  
20          bit. The record is fine, I think we're all good, but  
21          we just want to make sure that we're doing this in as  
22          orderly a fashion as we can.

23          So we did leave off last week getting ready for  
24          Transportation to cross-examination SCLG and  
25          Mr. Austin.

## SCLG TOPIC #3 PANEL

Examined by Ms. Okoye

1           But before we get there, are there any preliminary  
2 matters that anyone wants to raise this morning before  
3 we get started with that?

4 MS. OKOYE:                   Yes, Mr. Chair. Good morning.  
5 It's Ifeoma Okoye.

6           Mr. Dowsett has some clarifications to make to his  
7 testimony on Friday. I propose that he makes those  
8 clarifications before the cross begins. I have asked  
9 Mr. Fitch about that, and he's okay with that.

10           But that is if it's okay with you, we can have  
11 that done before Mr. Fitch can proceed with his cross.

12 THE CHAIR:                   Mr. Fitch, you've seen this, and  
13 you're in agreement?

14 MR. FITCH:                   Yes.

15 THE CHAIR:                   Thank you. Yes, please. Proceed.

16

17 R. AUSTIN, R. KEYES, D. KLEPACKI, I. DOWSETT (For SCLG  
18 Panel), previously sworn/affirmed

19 MS. OKOYE EXAMINES THE PANEL:

20 Q. Mr. Dowsett, are you there?

21 A. MR. DOWSETT:           Yes, I am.

22 Q. Could you please proceed with your clarifications?

23 A. MR. DOWSETT:           Yes, thank you, and good morning.

24           There's some clarification I wanted to make to my  
25 testimony on Friday. These corrections will clarify

## SCLG TOPIC #3 PANEL

Examined by Ms. Okoye

1 the record.

2 In Exhibit 373, PDF 1335, on line items 12 to 16,  
3 I said the following: (as read)

4 "...on the current requirements and, as  
5 a result of my -- as a result, I  
6 included a summary of those components  
7 based on my experience in pages 9 and 10  
8 of my report for the purpose of asking  
9 questions to ensure that appropriate EMS  
10 was in place.

11 In looking at the directive, it  
12 checks all the boxes for me, and I find  
13 the materials in my report are  
14 redundant."

15 The page references on line 14 are incorrect. It should  
16 be pages 11 and 12, and these pages of my report are  
17 redundant.

18 The correction should be: (as read)  
19 "...on the current requirements and, as  
20 a result, I included a summary of those  
21 components based on my experience in  
22 pages 11 and 12 of my report for the  
23 purpose of asking questions to ensure  
24 that appropriate EMS was in place.

25 In looking at the directive, it

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 checks all the boxes for me, and I find  
2 pages 11 and 12 of my report are redundant."  
3 Further, in Exhibit 373, PDF 1338, lines  
4 24 to 25, I said the following:

5 (as read)

6 "...and my report does not represent my  
7 testimony."

8 I misspoke. I meant to say: My report does not  
9 accurately represent my testimony because of the  
10 corrections that I had made to it. As such, my report  
11 should be considered together with my testimony.

12 Thank you.

13 MS. OKOYE: Thank you, Mr. Dowsett.

14 Mr. Chair, that will be all.

15 THE CHAIR: Thank you, Mr. Dowsett.

16 Ms. Okoye, thank you.

17 Mr. Fitch, is Transportation ready to  
18 cross-examine?

19 MR. FITCH: Yes, Mr. Chair, we are.

20 And I'll start with Mr. Austin so he can get off  
21 to his dam site or job site, whatever it is he needs to  
22 do.

23 **MR. FITCH CROSS-EXAMINES THE PANEL:**

24 Q. So I understand your consulting -- consulting  
25 engineering company is located in Trail, BC; correct?

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1     **A. MR. AUSTIN:**                    **That is correct, yeah.**

2     **Q.** And before you started Austin Engineering, you worked  
3       at Fortis in Trail?

4     **A. MR. AUSTIN:**                    **That's actually South Slokan,**  
5       **halfway between Trail and Nelson, yes.**

6     **Q.** And I also note that you worked in Revelstoke?

7     **A. MR. AUSTIN:**                    **Yes. That wasn't for Fortis.**  
8       **That was for Peter Kiewit Sons Construction Company.**

9     **Q.** Right, okay. So should I take it from the choices of  
10      all the places that you've worked that you're a skier?

11    **A. MR. AUSTIN:**                    **I do ski from time to time, but**  
12      **not nearly as good as my kids.**

13    **Q.** Revelstoke and Red Mountain are two of my favourite  
14      hills. So, anyways, with that little bit of tomfoolery  
15      out of the way.

16                So, in your CV, you list several dam projects that  
17      you've worked on at Austin Engineering since 2014, and  
18      you would agree with me that all of those projects are  
19      in BC, not Alberta?

20    **A. MR. AUSTIN:**                    **That is correct, yes.**

21    **Q.** So I'm really just asking these questions to get a  
22      sense of how familiar you are with the process used in  
23      Alberta to approve and regulate dams. Could you tell  
24      us that?

25    **A. MR. AUSTIN:**                    **Yeah. So it's a fair question.**



## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           Specifically we've not gone through the approval  
2 process within the jurisdiction zone of Alberta or  
3 specifically, you know, in this jurisdiction; however,  
4 you know, we have worked across Canada in Ontario, in  
5 BC, and in the US, and I'm familiar with kind of the  
6 designing principles and safe operating principles of  
7 dams.

8           The actual permitting process, you are correct in  
9 suggesting that we have not gone through the permitting  
10 process in Alberta.

11 Q.   Okay. So are you aware that in Alberta, approval to  
12 construct and operate a dam must be authorized under  
13 the *Water Act*?

14 A.   **MR. AUSTIN:**           I will take your word for that?

15 Q.   Okay.

16 A.   **MR. AUSTIN:**           I believe that's correct, yeah.

17 Q.   And are you aware that in Alberta, dam and canal safety  
18 is regulated under Part 6 of the Water Ministerial  
19 Regulation?

20 A.   **MR. AUSTIN:**           I'm not familiar with the exact  
21 part, but I believe that to be correct?

22 Q.   Now, I did see in your presentation reference to the  
23 dam and canal safety -- the Alberta Dam and Canal  
24 Safety Directive, so I take it you have at least  
25 reviewed that document?

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1       **A. MR. AUSTIN:**                   **Yes.**

2       **Q.** And were you familiar with it before this job or did  
3       you really review it for, more or less, the first time  
4       in order to prepare for this particular task that  
5       you've undertaken for the SCLG?

6       **A. MR. AUSTIN:**                   **I would say that we reviewed it in**  
7       **detail to prepare for this task for the SLC [verbatim].**

8       **Q.** Okay, thank you. And, sir, I guess, really, the point  
9       of all this is are you aware that, under the Water  
10      Ministerial Regulation and the Alberta Dam and Canal  
11      Safety Directive, that it is Alberta Environment and  
12      Parks that regulates dam safety, not the NRCB?

13      **A. MR. AUSTIN:**                   **I am aware of that. I -- that was**  
14      **something that was discussed early on. I do realize**  
15      **that this is a little out of step in terms of the**  
16      **permitting process, but I'm certainly aware of that.**

17      **Q.** And in your report that you prepared for the SCLG,  
18      Austin Engineering made a number of recommendations.  
19      And, sir, would you agree with me that whether or not  
20      those recommendations should be accepted is actually up  
21      to the director of dam safety, not the NRCB?

22      **A. MR. AUSTIN:**                   **I do agree with that statement. I**  
23      **think, you know, the purpose of our review was to**  
24      **inform SLCG [verbatim] what the risks were and**  
25      **potential improvements for the dam, and I believe that**

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           their intent was to utilize those to ensure that they  
2           felt safe, and maintained a sense of safety downstream  
3           of the structure.

4           Q.    Okay, thank you.

5                        Now, sir, given that Austin has accepted many of  
6           the responses from Stantec to your recommendations, I  
7           don't think there's actually too many areas where you  
8           and Stantec are in any kind of material disagreement.  
9           Would you agree with that?

10          A.    MR. AUSTIN:                I would not quite agree with that.  
11           I think there's two areas that we are still in a little  
12           bit of disagreement here.

13          Q.    And would they be the diversion inlet design and the  
14           emergency spillway design?

15          A.    MR. AUSTIN:                I -- I would suggest that the  
16           diversion inlet design is simply a caution that needs  
17           to be reviewed and confirmed. I would suggest that  
18           they are the emergency spillway and, you know, the  
19           potential for an additional outlet as a low-level  
20           outlet.

21          Q.    So I'm going to ask a few questions about the diversion  
22           inlet, though I do appreciate your comment that it's  
23           more a caution than anything.

24                        And these questions might be better addressed to  
25           Ms. Keyes since she was the one who testified about

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 this.

2 Ms. Keyes, are you with us this morning?

3 **A. MS. KEYES: Yes, I am.**

4 **Q.** And so you have expressed a concern about the diversion  
5 inlet capacity; correct?

6 **A. MS. KEYES: Yes, that's correct.**

7 **Q.** And as I understand it, you recommend that the access  
8 bridge design be reviewed to ensure that adequate  
9 freeboard between the bridge and the water surface is  
10 achieved during passage of the design flow of  
11 600 metres cubed per second. Do I have that right?

12 **A. MS. KEYES: On day 4 of the hearing, I believe**  
13 **Mr. Menninger addressed that by indicating that the**  
14 **bridge was designed to have the flow hit the bridge.**

15 **Q.** Okay. So can we say that you're now good with this  
16 point; you don't have any further outstanding concerns?

17 **A. MS. KEYES: From the point of dam safety, no.**

18 **Q.** Thank you.

19 I'll stay with you, Ms. Keyes, because again  
20 you're the one I think that wrote the report and raised  
21 this as a concern. So I want to turn to the emergency  
22 spillway design.

23 And, as I understand it, you say in your report  
24 that the emergency spillway maximum discharge capacity  
25 of 360 metres cubed per second is less than the

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 in-stream design flow; correct?

2 **A. MS. KEYES: That is correct.**

3 **Q.** And that based on the Canadian Dam Association Dam  
4 Safety Guidelines, the spillway of a dam must be able  
5 to discharge the IDF while maintaining the minimum  
6 freeboard; right?

7 **A. MS. KEYES: With a consideration of reservoir  
8 routing, yes.**

9 **Q.** Yeah. And you suggested in your report that the design  
10 of SR1 does not meet the Canadian Dam Association Dam  
11 Safety Guideline requirement; correct?

12 **A. MS. KEYES: That is my belief, yes.**

13 **Q.** Is that still your belief after hearing all the  
14 evidence to date?

15 **A. MS. KEYES: Yes, it is.**

16 **Q.** Okay. And so you've already alluded to it, but Stantec  
17 responded to your concern by basically saying we took  
18 into effect the routing -- or we considered the routing  
19 effect of the reservoir; correct? You've heard them  
20 say that?

21 **A. MS. KEYES: Yes, I have. And they say that  
22 taking into effect the routing effect of the reservoir,  
23 the emergency spillway and reservoir can safely pass  
24 the probable maximum flood without relying on the  
25 diversion inlet gates closing and, while maintaining**

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           adequate freeboard, this meets the CDA design  
2           guidelines and the industry standard of practice. You  
3           understand that that's Stantec's position?

4           **A. MS. KEYES:                    I understand that's Stantec's**  
5           **position.**

6           **Q.** All right. So you obviously don't accept that. And,  
7           as I understood your testimony on Friday, the reason  
8           you don't accept is is because your position is that  
9           the design of the emergency spillway should include a  
10          flood routing through the spillway that starts with the  
11          reservoir at full service level, and then you route the  
12          IDF; correct?

13          **A. MS. KEYES:                    That is correct.**

14          **Q.** Okay. And the IDF is the probable maximum flood;  
15          right?

16          **A. MS. KEYES:                    The IDF in this case is 600 metres**  
17          **cubed per second, which is a portion of the PMF.**

18          **Q.** Okay, all right. So, Ms. Keyes, you understand, I'm  
19          sure, that the operating approach for the project is  
20          that the diversion inlet gates will be closed when the  
21          reservoir is full?

22          **A. MS. KEYES:                    Provided that power is maintained**  
23          **and that the operator's able to operate the gate, then**  
24          **yes.**

25          **Q.** Okay. And you also understand, I'm sure, that SR1 is

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 an off-stream reservoir that only accepts flow into the  
2 diversion channel when the gates are opened by the  
3 operator; correct?

4 **A. MS. KEYES:** That is correct.

5 **Q.** Okay. So opening the gates to allow the probable  
6 maximum flood into the channel and reservoir when the  
7 reservoir is already full would go against the designed  
8 operating procedures for the project, would it not?

9 **A. MR. AUSTIN:** May I take this one, Gavin?

10 So I believe -- you know, what we're trying to  
11 suggest here is Stantec has routed the flood from a  
12 near empty reservoir. They also considered the  
13 480 cubic metre per second, which we understand is  
14 their ideal operating inflow into the diversion, and in  
15 the figure they provided in our -- to their -- to us  
16 for their response, they allowed seven hours to the  
17 loss of diversion control.

18 Now, I agree that the loss of diversion control is  
19 a low probability. I -- I know that 480 is the  
20 probable and best optimized case, but I believe  
21 that's -- that starting from near-empty seven hours to  
22 loss of diversion control and minimizing the gates'  
23 intake to 75 percent are three pretty major assumptions  
24 for the design of the spillway. And we're simply  
25 suggesting that there needs to be a sensitivity

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 analysis. What happens if that reservoir is not empty.

2 You know, the US Bureau of Reclamation recommends  
3 that, when routing, you either start at a full-service  
4 or full-supply level, or you start at the level the  
5 reservoir would be expected to be at with half the IDF  
6 entering the reservoir before the flood. Now, neither  
7 of those is empty. Now, I agree that this is an  
8 off-stream reservoir and that you could defend the  
9 potential for it to be empty.

10 Any one of those assumptions on their own is  
11 defensible, but there needs to be a sensitivity  
12 analysis to look at, you know, what happens if we do  
13 start at a different level? What happens if we do  
14 allow the gates to be fully open?

15 And, you know, we realize that we're constrained  
16 by the hydrograph from the time the flows begins at  
17 that 160 to the time that peak has passed and we're no  
18 longer taking water in.

19 I simply think that the spillway needs to be  
20 considered from a sensitivity analysis standpoint to  
21 see whether or not that 360 metres cubed per second is  
22 capable of passing the idea if we change any one of  
23 those assumptions.

24 Q. Would you agree with me, Mr. Keyes [verbatim], that  
25 your suggestion that the sizing of the spillway should



## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 be based on reservoir routing starting with the IDF  
2 entering the reservoir when it is full is appropriate  
3 for an in-stream dam, but the difference here is that  
4 we're dealing with an off-stream dam?

5 A. MS. KEYES: I'm not sure who your question was  
6 addressed to.

7 Q. Either of you.

8 A. MS. KEYES: Roger, I'll let -- do you want me  
9 to take this one?

10 A. MR. AUSTIN: No, I can take that one.

11 So I do agree that there is some inherent  
12 additional safety with an off-stream reservoir. The  
13 ability to lower the weir and discharge flows  
14 downstream is certainly a consideration in terms of  
15 where we begin that actual service level when we start  
16 to apply the flood; however, I believe that starting at  
17 a near empty reservoir is not as conservative as  
18 Stantec suggests.

19 Q. Well, let's try to break down your position here,  
20 Ms. Keyes and Mr. Austin.

21 So, as I understand it, the scenario that you're  
22 suggesting that should be looked at, at least from a  
23 sensitivity analysis perspective, is you start with a  
24 full reservoir; correct?

25 A. MS. KEYES: That would be great to see.

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 Q. Yeah. And that's a condition that has a recurrence  
2 interval of approximately once every 200 years;  
3 correct?

4 A. MR. AUSTIN: Yes, correct.

5 A. MS. KEYES: Actually, it depends on the  
6 operation of the diversion inlet. The recurrence  
7 interval of the reservoir filling depends on the  
8 operator's decision to open the gate. That could be --  
9 that could be every year if they wanted to.

10 The recurrence interval in the river would be  
11 different to the recurrence interval of the operator  
12 opening the gate.

13 Q. Well, I'm sure the operator can open the gate at many  
14 different times, but the point is there's only one  
15 scenario we're interested in, which is that the gates  
16 are open and it fills to the full supply level. And  
17 that recurrence is every once every 200 years  
18 approximately; correct, Ms. Keyes?

19 A. MS. KEYES: I cannot verify that.

20 Q. You cannot verify that. Okay. So we start with the  
21 position -- the point that you say that the analysis  
22 should begin with a full reservoir. Then after that,  
23 your scenario would have us then say, in addition to  
24 the full reservoir, now there's a probable maximum  
25 flood entering through the diversion channel into the

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 reservoir; correct?

2 **A. MS. KEYES:** I think it would be more accurate  
3 to say the design inflow of 600 metres cubed per second  
4 as a portion of the PMF.

5 **Q.** And we've already talked about the fact that the  
6 operational plan for the reservoir is to close the  
7 gates when the reservoir is full, so there would have  
8 to be some sort of error in the operations that  
9 resulted in the gates remaining open for this  
10 additional 600 metres cubed per second to come into an  
11 already full reservoir; correct?

12 **A. MS. KEYES:** As operational error, could be a  
13 human error, an instrumentation error, or loss of  
14 power, then yes, correct.

15 **Q.** And then there would have to be a failure of the gates  
16 to close without any intervention for almost four days  
17 of inflow at 600 metres cubed per second; correct?

18 **A. MS. KEYES:** If the reservoir is empty, at  
19 600 metres cubed per second, it takes 36 hours for the  
20 reservoir to fill.

21 **Q.** So three days, not four days?

22 **A. MS. KEYES:** One and a half days, I believe.

23 **Q.** Oh, right, sorry. In any event, the point is, the  
24 reservoir is full, and the operating plan is that the  
25 gates will be closed.

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           And your scenario, which you say should be looked  
2           at, is the gates actually are open, the water continues  
3           to flow into the reservoir for, you say, 36 hours even  
4           though that's not the plan at all, and there would be  
5           no closure of the gates even though that would also be  
6           the plan?

7       **A. MS. KEYES:**                    **On day 4, I believe Mr. Menninger**  
8           **mentioned that at 160 metres cubed per second, the**  
9           **gates are opened, and then they're closed once the**  
10          **reservoir reaches its full service level.**

11       **Q.** Right. I'm not sure you and I are hearing each other,  
12       Ms. Keyes.

13           The reservoir -- you say that the, as I understand  
14           it, that the design of the emergency spillway ought to  
15           have been undertaken in terms of the routing analysis  
16           with the starting point that the reservoir's already  
17           full; right?

18       **A. MS. KEYES:**                    **That is correct.**

19       **Q.** Yeah. And the point is that's not at all how the  
20       reservoir is intended to be operated. You would agree  
21       with that?

22       **A. MS. KEYES:**                    **I can neither agree nor disagree.**  
23           **The operation is based on a set of criteria based on**  
24           **the flow within the Elbow River upstream of the**  
25           **diversion structure.**

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           The decision to open and close is based on flows,  
2           and then the decision to close is based on reaching the  
3           full service level.

4       Q.   And you understand that the gates would fail closed,  
5           and that they don't need power; it would be a manual  
6           thing?

7       A.   **MS. KEYES:**                **I believe there are manual release**  
8           **on the hoist brakes, yes.**

9       Q.   So in the final analysis, then, do I take it your  
10          recommendation, Ms. Keyes, is that when the director of  
11          dam safety is looking at this, he or she should at  
12          least consider whether or not Stantec ought to have  
13          undertaken its routing analysis for the design of the  
14          emergency spillway with the reservoir full; is that it?

15      A.   **MS. KEYES:**                **Can you please repeat the**  
16          **question?**

17      Q.   In the final analysis, Ms. Keyes, is it your  
18          recommendation that the director of dam safety, when he  
19          or she is having a look at this, that they ought to at  
20          least consider whether the routing analysis undertaken  
21          by Stantec should have started with a full reservoir;  
22          is that the bottom line?

23      A.   **MS. KEYES:**                **Yes.**

24      Q.   All right.

25      MR. FITCH:                        One moment, Mr. Chairman.

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 THE CHAIR: Okay, sorry, took a couple of  
2 seconds to find the mute button.

3 MR. FITCH: Sorry, Mr. Chair, I just had to  
4 consult with Mr. Wood and Mr. Menninger.

5 Mr. Austin, Ms. Keyes, those are all our  
6 questions. Thank you very much.

7 A. MR. AUSTIN: Okay.

8 MR. FITCH: So I'm going to, then, move to my  
9 old friend, Mr. Dowsett.

10 How are you this morning, sir? Mr. Dowsett?

11 A. MR. DOWSETT: I'm here, just about -- I'm just  
12 trying to find the right buttons to push.

13 THE CHAIR: There we are. Perfect, thank you.

14 A. MR. DOWSETT: I'm very well, sir. It's nice to  
15 see you.

16 Q. MR. FITCH: Good to say you too.

17 So just to begin with some points hopefully just  
18 to clarify a few things.

19 So you corrected your evidence this morning, and I  
20 just want to sort of see if I can quickly summarize  
21 where we're at.

22 You have now, through your testimony on Friday and  
23 your correction this morning essentially withdrawn the  
24 concerns that you had expressed in your report  
25 regarding the emergency management system for SR1; is

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           that fair?

2       **A. MR. DOWSETT:**           **Yes, that is.**

3       **Q.**   Okay, thank you.

4           So the next point I'd like to try and clarify is,  
5   you stated Friday, and this is at page 1338 of the  
6   transcript -- but I don't think we need to turn it up  
7   because I'm sure you will remember -- you said quote:  
8   (as read)

9           "First, I would like to say I am not a  
10          member of SCLG."

11       End of quote. Do you remember that?

12       **A. MR. DOWSETT:**           **Yes.**

13       **Q.**   Okay. So I can tell you, we were a little surprised to  
14   hear you say that.

15           And the reason is I'm going to ask the Zoom host  
16   to go to Exhibit 248, please, this should be Exhibit A  
17   to the written submissions of the SCLG, which is the  
18   membership list. So we'll just let that load up,  
19   Mr. Dowsett.

20           And I apologize, Mr. Chair, I don't think I  
21   notified the document manager that I would be referring  
22   to this.

23           So if we could just -- if we could just skim down  
24   a little bit farther, please. Okay, that's good.

25           So, Mr. Dowsett, we're looking -- I'm looking at

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 line 50 in this Excel spreadsheet, and I see your name.

2 Are you surprised to learn that SCLG thinks you're  
3 a member?

4 **A. MR. DOWSETT: Yes, I am.**

5 **Q.** Okay. Zoom host, can we go to Exhibit 247, please?

6 This should be the main submission or the group  
7 submission of SCLG. 247. And if we could turn to  
8 PDF page 11, please.

9 So, Mr. Dowsett, I'm looking at paragraph 36, and  
10 I think we can all now see it on the screen. So it  
11 states that: (as read)

12 "In addition to the technical report  
13 from AEL (that's Austin Engineering),  
14 some members of the SCLG with technical  
15 expertise on emergency response planning  
16 and emergency preparedness provided  
17 additional comments on these issues.  
18 See for example, the submissions of  
19 Ian Dowsett, which is attached as  
20 Appendix "I" to these submissions."

21 So, sir, I interpret this to mean that your lawyers  
22 thought that you were a member of the SCLG, but I guess  
23 that's not right, you're telling us?

24 **A. MR. DOWSETT: Yeah, that would be correct.**

25 **As I'd indicated, I think in previous testimony,**



## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 my wife is a very active member of the community and  
2 is -- takes on a lot of causes, and I was asked to  
3 attend an SCLG meeting to provide some advice. And I  
4 think you would be aware of this, I was looking for --  
5 it's been extremely difficult sometimes for intervenors  
6 to find supportive and appropriate counsel and  
7 technical support. And I had indicated to them that I  
8 had talked to -- on their behalf, I did phone a few  
9 lawyers that I knew and some other counsel -- yeah.

10 And -- and then Ms. Hunter asked me if I would  
11 review the design document, which I did, and I was  
12 quite surprised to find -- see that some of the -- it  
13 struck me right away that there was quite a discrepancy  
14 between the amount of water that would be diverted and  
15 the amount that would be coming downstream, and so I  
16 indicated that to her, and I did review some of the  
17 stuff for her.

18 So, having said that, I am surprised because I did  
19 prepare a report, only near the end of this proceeding,  
20 which I found a little bit thin in itself, but just to  
21 support their view.

22 And I certainly am not a member -- I'm not  
23 submitting this on behalf -- I'm submitting this on  
24 behalf of safety, not on behalf of SCLG.

25 Q. You prepared a report to support the view of the SCLG;

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 is that right --

2 A. MR. DOWSETT: It was not to support the view of  
3 the SCLG. My report was to make some points with  
4 regard to safety, and I believe that that's the nature  
5 of the report I submitted, sir, and if you want to --  
6 and the reason I'm on the first list is my wife signed  
7 me up.

8 Q. The truth comes out. All right. Fair enough, sir.

9 So Zoom host, can we go up say two pages, I'm  
10 looking for paragraph 11 of the SCLG submissions.  
11 Okay, that's good. So you have now -- no, no, there we  
12 go. Perfect. Thank you.

13 So, Mr. Dowsett, I think I now understand that  
14 you've said you are not a member of the SCLG.

15 So when I look at paragraph 11, this is the  
16 requested disposition advocated for by the SCLG, and  
17 that is that the Board deny AT's applications.

18 Is that your position, then, sir?

19 A. MR. DOWSETT: With respect to the materials that  
20 Ms. Hunter has provided and all of those -- the reasons  
21 that she has given, I think that's the view of the  
22 community.

23 In my view, I am just saying I -- I have no  
24 position. I have no -- I -- either way.

25 So I'm just -- my position, I want to ensure that

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 the fundamental principles of -- that we have applied  
2 safely over my life and so on are applied here.

3 Q. All right. Thank you.

4 So, sir, you've -- well, I was going to say you  
5 filed a CV, but, apparently, someone has filed a CV for  
6 you --

7 A. MR. DOWSETT: Well, I was asked to supply that  
8 in support of the materials.

9 Q. Sure.

10 A. MR. DOWSETT: Yeah.

11 Q. And Zoom host, we can take down the document. Thank  
12 you.

13 So we don't need to bring up your CV, but I think  
14 on Friday in your testimony, you indicated that you  
15 have worked extensively in safety, but you acknowledge  
16 you have no background in dam safety; correct?

17 A. MR. DOWSETT: That's correct.

18 Q. Yeah. Your background is in pipelines; correct?

19 A. MR. DOWSETT: Yeah.

20 Q. Yeah. And you worked -- as you said on Friday, you  
21 worked at the ERCB for 16 years; right?

22 A. MR. DOWSETT: That's correct.

23 Q. You became a consultant working at Conor Pacific and  
24 RWDI?

25 A. MR. DOWSETT: That's correct.

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 Q. And during that time, lawyers like Mr. Secord and I  
2 would retain you to carry out air dispersion modelling  
3 and to assess hazards and risks associated with  
4 uncontrolled releases from oil and gas infrastructure  
5 such as wells and pipelines; right?

6 A. MR. DOWSETT: Yes, that's correct.

7 And further -- I might add that, during that  
8 period, I was involved in numerous number of forensic  
9 reviews of accidents, and I think that's helpful in  
10 looking back at the kinds of data we need and timing of  
11 response, and that's -- those sorts of things, yes.

12 Q. And you have no expertise or experience in assessing  
13 the hazards of overland flooding, do you?

14 A. MR. DOWSETT: All I can say -- and my expertise  
15 is only what is published, and so I looked at the  
16 inundation maps prepared by AT in terms of converting  
17 those inundation maps to consequence, i.e., property  
18 damage or -- or loss of life, I would agree with you.

19 But, certainly, I think we can look at flood  
20 return rates and volumes and rates in the river and  
21 make some reasonable decisions. It's not rocket  
22 science.

23 Q. Okay. Now, one final point I'd like to clarify if I  
24 could, Mr. Dowsett.

25 Prior to your testimony Friday, your counsel

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           circulated a PowerPoint presentation, and while she was  
2           leading you through your direct evidence, she asked the  
3           document manager to pull it up. And you said, quote:  
4           (as read)

5                        "I don't believe I have one, so I would  
6                        like to make a statement. There is no  
7                        PowerPoint."

8           End of quote.

9           **A. MR. DOWSETT:**            **So --**

10          **Q.** Do you recall -- just let me ask -- do you recall  
11          making that statement?

12          **A. MR. DOWSETT:**            **Yes.**

13          **Q.** Yeah. So, in fact, of course, there was a PowerPoint  
14          as noted by your counsel. So I really am just curious,  
15          can you tell us, did you -- did you not write the  
16          PowerPoint presentation that had been circulated by  
17          your counsel or what was the issue there?

18          **A. MR. DOWSETT:**            **Sir, the materials I provided to**  
19          **counsel, they asked me to prepare a PowerPoint. I**  
20          **started working on it, sent in the draft, and that's**  
21          **where I thought it ended.**

22                        And I subsequently had said to them, please --  
23                        sent them an email saying that I don't think this is  
24                        the right approach, and I did not want that material  
25                        into evidence.

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 Q. Okay, thank you.

2 A. MR. DOWSETT: And further to that, sir, it's  
3 not as though we are -- this group and my discussions  
4 with them are -- are an orchestrated event. I mean,  
5 we're working independently at arm's length with no  
6 prep time and no ability to talk to one another on an  
7 input basis to talk about reports and making sure that  
8 our data all lines up.

9 So I think that it's only fair that we get a  
10 little latitude with respect to trying to getting stuff  
11 on the table that's meaningful.

12 Q. Okay. Mr. Dowsett, just turning now, we've -- you've  
13 said you no longer have concerns about the emergency  
14 management system part of your evidence --

15 A. MR. DOWSETT: Yes.

16 Q. So I just want to now explore with you the other part  
17 of your evidence very briefly, which is the hazard  
18 mapping.

19 And as I understand it, what you did is you looked  
20 at hazard mapping -- flood hazard mapping prepared by,  
21 I think, Golder Associates for the government of  
22 Alberta; is that right?

23 A. MR. DOWSETT: That's correct, yes.

24 Q. And you looked at that mapping, and you concluded that  
25 it shows a couple of things: Firstly, that in a 1 in

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 100-year flood, flows downstream of SR1, but upstream  
2 of the Glenmore Reservoir, would be equivalent, with  
3 SR1 in place, of approximately a 1 in 20-year flood.  
4 Do I have that right?

5 A. MR. DOWSETT: Not really, no.

6 Q. No? What did I get wrong?

7 A. MR. DOWSETT: So the approach that I took was to  
8 look at the upstream hydrographs and look at the peaks  
9 of those, and then look at the effect of the mitigation  
10 that you would achieve by diverting water into SR1, and  
11 look at the remaining flow that travelled downstream.

12 So the only floods, as the way I understand it, is  
13 that the return periods that we are most concerned with  
14 are those upstream of SR1. Those are the hydrographs  
15 we're dealing with.

16 And then what we want to do is look at, what is  
17 the reasonable level of water downstream.

18 So when we look at the downstream flows, we  
19 actually -- they're no longer return periods; they're  
20 just statements of the elevation of the water. The  
21 only return period of real concern to me is the one  
22 upstream.

23 So when we start looking at the levels downstream,  
24 how do we look at the inundation.

25 And that, sir, is -- so what I did is a three-step

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 process: Look upstream; model what happens in the  
2 middle with respect to flows, using a very simple  
3 approach, you know, rate times time is volume and look  
4 at the volumes that get diverted and the volumes that  
5 travel downstream; and then look at what happens at  
6 Glenmore and below Glenmore. And, you know, those  
7 things line up with what -- what Stantec has said.

8 It's just that I was concerned about the levels of  
9 water that pass SR1.

10 And when we look at a 1 in 100-year frequency  
11 upstream or a 1 in 200-year, which was the design  
12 frequency, we end up with floodwaters in that  
13 midsection which are equivalent, not in -- not in  
14 return periods, but in peak -- to a 1 in 20- and a 1 in  
15 50-year flood.

16 Then I simply took the AEP, and these -- so I had  
17 used the AEP return frequency and peak flood because  
18 the other -- because they have directly relatable  
19 inundation maps associated with them, and they -- these  
20 points and their peaks do not line up with the ones  
21 provided by Stantec.

22 Now, reasonably, they're close, but I went to the  
23 AEP ones because I was able to then look at the  
24 inundation maps. Does that make sense?

25 Q. Well, it was a very long answer, but I think I



## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 understand it, and -- and I thought I had used the word  
2 "equivalent." I wasn't suggesting that it was actual  
3 recurrence period.

4 But I think, in the midst of that answer, you did  
5 confirm that -- you had said in your report,  
6 essentially, that with SR1 in place in a 1 in 100-year  
7 flood, there will be inundation downstream of the --  
8 downstream of the dam but upstream of the Glenmore  
9 Reservoir equivalent to a 1 in 20-year flood. And in  
10 the case of a design flood, that is the 1 in 200,  
11 you're saying that when you looked at those hazard  
12 maps, what you saw is that they show that the flooding  
13 downstream of SR1 but upstream of the Glenmore  
14 Reservoir will be equivalent to a 1 in 50-year flood.  
15 That's all I was trying to have you confirm, and I  
16 think you have confirmed that; right?

17 **A. MR. DOWSETT:** Yes, I have, yeah.

18 **Q.** Okay. And I sent your counsel a couple of aids to  
19 cross-examination last night. Have you had a chance to  
20 look at them?

21 **A. MR. DOWSETT:** No, sir, I have not. No, no.

22 **Q.** You have not?

23 **A. MR. DOWSETT:** No.

24 **Q.** Did your counsel not provide them to you?

25 **A. MR. DOWSETT:** I have no idea. I -- you know, I

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           have some issues. I -- I do not -- I needed some  
2           sleep, and I got it.

3           Q. Fair enough. Well, let me just try a few questions on  
4           you without bringing up the aids to cross, and I'll  
5           just see if you agree.

6           MR. SECORD:                   Mr. Fitch, when did you send them  
7           to us yesterday --

8           COURT REPORTER:                I can't -- I can't hear Mr. --

9           THE CHAIR:                    Mr. Secord, we need you to speak  
10          up because we can't hear you very well and neither can  
11          the court reporter.

12          MR. SECORD:                 How does this sound? Can you hear  
13          me?

14          THE CHAIR:                 A little better, not much.

15          MR. SECORD:                 Can you hear me now?

16          THE CHAIR:                 Is it coming through your laptop  
17          or headphones, I'm not sure, Mr. Secord, but --

18          MR. SECORD:                 I'll get my tech person over  
19          shortly.

20                 But, Mr. Fitch, when did you send those aids to  
21          cross to us?

22          MR. FITCH:                 They were sent at around 5-ish  
23          yesterday afternoon. Maybe I did what Ms. Okoye did  
24          and somehow forgot to copy you; I don't think so, but.

25          MR. SECORD:                 I'm sure I forwarded them to

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 Mr. Dowsett. So if they came in after 5, he would  
2 have -- I probably got them off to him around  
3 6:00 p.m., but he may not have seen them. He was  
4 having Sunday dinner and --

5 MR. FITCH: Sure.

6 MR. SECORD: -- going to bed early.

7 MR. FITCH: Well, that's why I asked. Okay.

8 Q. So let me just -- let me just run a few things by you,  
9 Mr. Dowsett, and see what you have to say.

10 Would you agree that in Alberta, the provincial  
11 government defines the flood hazard area as being the  
12 area of land that will be flooded during a 1 in  
13 100-year flood; are you aware of that?

14 A. MR. DOWSETT: No, but it sounds reasonable to  
15 me.

16 Q. Okay. And are you aware of the various definitions of  
17 floodway and flood fringe?

18 A. MR. DOWSETT: Not at all, no.

19 Q. Are you aware that the government of Alberta basically  
20 discourages development in a 1 to 100-year flood hazard  
21 area?

22 A. MR. DOWSETT: I would certainly hope so, yes. I  
23 wasn't aware of it, but I would hope so.

24 Q. And are you aware that Rocky View County as indeed I  
25 think all municipal districts and counties in Alberta

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 have incorporated these concepts into their land use  
2 bylaw?

3 A. MR. DOWSETT: Other than the material that you  
4 had sent out, I don't know when I saw it, but I did see  
5 a Rocky View MD requirement, and -- and what the timing  
6 of that requirement was, I think you'd have to check  
7 with others.

8 Q. Would you agree with me that essentially under the  
9 Rocky View County land use bylaw, development within  
10 the floodway is generally prohibited?

11 A. MR. DOWSETT: I would say -- I would say that  
12 makes common sense, in the same way that, you know,  
13 development within a sour gas region, around a sour gas  
14 zone, and a certain level of safety, i.e., as defined  
15 by risk would be suggested that it would be prohibited.

16 Q. And are you aware that the Rocky View County bylaw  
17 basically says that if you want to develop within the  
18 flood fringe, which is the portion of the flood hazard  
19 area outside the floodway, so the water's not flowing  
20 so deep and so fast, that if you want to develop in the  
21 flood fringe, it may be permitted, but you have to take  
22 steps to essentially flood proof your development, are  
23 you aware of that?

24 A. MR. DOWSETT: Again, sir, I am not aware of  
25 that.

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 Q. So let me put the following proposition to you, sir,  
2 and see if you agree with this.

3 By reducing flows downstream of SR1 and upstream  
4 of Glenmore Reservoir in the design flood scenario, 1  
5 in 200 years, by reducing those flows to approximately  
6 1 in 50, SR1 has the effect of lessening flows and  
7 restricting them to the area within which you're not  
8 supposed to develop, would you agree with that?

9 A. MR. DOWSETT: As much as -- well, just run that  
10 by me one more time, please. I just want to make sure  
11 I understand.

12 Q. Sure. So we've agreed that one of the things you say  
13 in your report is that the effect of SR1 in the case of  
14 a design flood, or a 1 in 200-year flood, is that flows  
15 downstream of SR1 but upstream of Glenmore Reservoir  
16 will be equivalent to an approximate 1 in 50-year  
17 flood; right? We've agreed on that?

18 A. MR. DOWSETT: Yes, yes.

19 Q. Okay. So given that the Rocky View County land use  
20 bylaw essentially prohibits or certainly restricts  
21 development within the 1 and 100-year flood hazard  
22 area, do you agree with me that the effect of SR1 is to  
23 limit flow downstream of the dam and upstream of  
24 Glenmore Reservoir to those areas where you're  
25 basically not supposed to develop?

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 A. MR. DOWSETT: So, in response to that, I would  
2 say, yeah, that -- yes, I would agree. But I have no  
3 idea at all when those homes went in, just -- just one  
4 moment, sir.

5 Q. Sure.

6 A. MR. DOWSETT: Sir, I think the -- I'm being  
7 asked to caucus.

8 Q. Sorry, don't ask me how you do that?

9 A. MR. DOWSETT: I have no idea.

10 THE CHAIR: Mr. Secord, is there a request in,  
11 or Ms. Okoye?

12 MS. OKOYE: Yes, there's actually a meeting  
13 room for them. I'm not sure who is asking him for --  
14 to caucus, probably one of the panel members. Perhaps  
15 maybe he could be put into the room, if that's  
16 possible. I'm not sure how he can do that.

17 A. MR. DOWSETT: Well, I'm not sure either, but I  
18 would say, you know, just in terms -- I think maybe we  
19 just proceed here and just mention that while we would  
20 agree, I have no idea --

21 MR. SECORD: Yeah, Mr. Dowsett, there should be  
22 a button that shows up which says "Accept" on your  
23 screen. It should be accept to go into a meeting room.

24 A. MR. DOWSETT: I see nothing.

25 MR. FITCH: And I'm sure, Mr. Chairman, this

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 is obvious, but Mr. Dowsett, of course, is entitled to  
2 caucus with the other members of the witness panel but  
3 not with anyone else.

4 **A. MR. DOWSETT:** Yeah.

5 **Q. MR. FITCH:** Right.

6 **MS. OKOYE:** That's actually true; the meeting  
7 room is set up for just the witness panel members,  
8 not --

9 **MR. SECORD:** Mr. Chair, could we take a brief  
10 break so we can get Mr. Dowsett moved into the meeting  
11 room?

12 **THE CHAIR:** And it may be on your screen, it  
13 may not be a pop-up, but if you move your cursor and at  
14 the bottom where you have "Mute" and "Start Video" and  
15 "Participants," there's one of those buttons if it is  
16 set up on Mr. Dowsett's --

17 **A. MR. DOWSETT:** Oh, breakout room. Here we are.

18 **THE CHAIR:** Right, right. There you go.

19 **A. MR. DOWSETT:** Thank you, sir.

20 **THE CHAIR:** So you need -- just -- you need a  
21 couple minutes, Ms. Okoye?

22 **MS. OKOYE:** Yes, please.

23 **THE CHAIR:** Just take a couple minutes.

24 **MR. SECORD:** Click on that button, Mr. Dowsett.

25 Is my sound a bit better now, sir?

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1 Ms. DiPaolo, can you hear me better?

2 THE CHAIR: Yeah, it's not bad. Yes, thank  
3 you, Mr. Secord.

4 MR. SECORD: Yeah, I think I had my volume  
5 turned down.

6 THE CHAIR: So you may want to check. We  
7 didn't -- hopefully Mr. Dowsett knows how to return  
8 without cutting his Zoom off. There's two buttons  
9 there. One will get you out totally, and one will get  
10 you back to the main room.

11 MR. SECORD: I think this is a new venture for  
12 our panel. I don't think we've ever had a hearing  
13 where we've had to caucus, so.

14 THE CHAIR: Right. Right.

15 MR. SECORD: This is new, sir.

16 THE CHAIR: No, fair enough. Let's make it  
17 work.

18 Are you all good?

19 MR. KENNEDY: Mr. Chair, I see Mr. Dowsett is  
20 back in the hearing room.

21 THE CHAIR: Thank you, Mr. Kennedy.

22 Mr. Dowsett, it all worked perfect. So  
23 everybody's ready to go? Counsel's ready?

24 Q. MR. FITCH: Yes.

25 Go ahead, Mr. Dowsett.



## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1       A.   MR. DOWSETT:           Well, that was an interesting  
2       experience.

3                So where were we? Can you refresh me?

4       Q.   Well, you know, I had the answer to my question, so you  
5       were the one who wanted to caucus. You tell me where  
6       we are. I had -- I have no further questions for you.

7       A.   MR. DOWSETT:           Oh, well I -- I would just -- I  
8       would like to clarify a couple of issues with respect  
9       to the return periods.

10               The return periods that I gave you on the basis of  
11       diversion of 600 cubic metres per second, if the  
12       operator were to change those, these numbers would come  
13       up. And I think that it's clear to me whether Rocky  
14       View has -- whatever the timing of those -- of their  
15       requirements for flood control, which I think would be  
16       an extremely good idea going forward from my  
17       perspective, that I have no idea whether those flows  
18       exist.

19               The ones I'm concerned about are those directly  
20       below the foot of the dam that are below the emergency  
21       spillway, and I'm worried about those people and what  
22       they knew and what they understood the hazard was and  
23       what operational decisions may be taken by the operator  
24       that would increase the rates coming down this river  
25       and raising numbers even higher.

## SCLG TOPIC #3 PANEL

Cross-examined by Mr. Fitch

1           And I think -- and I think you and I and others  
2           have been of the opinion that, when it comes to  
3           individual rights, that those should be discussions  
4           that are had with landowners that tell them what the  
5           hazard really is and what potential changes in that  
6           hazard are and what the emergency planning measures  
7           would be, and give them an opportunity to look at  
8           options that they would agree to with respect to  
9           whether this is fair or unfair.

10           Having said that, sir, that's all -- that was the  
11           entirety of the basis of my report, and I hope that  
12           it's -- that I've cleared that up.

13           MR. FITCH:                   Thank you.

14           Mr. Chair, I believe I'm done with Mr. Dowsett and  
15           the Austin Engineering witnesses, and we're not  
16           cross-examining Mr. Klepacki or Mr. Fennell, if he's  
17           still on this panel, until the next topic session. So  
18           I think we are done.

19           I would ask, however, if you would grant me the  
20           indulgence of just a couple minutes to confer with our  
21           client.

22           THE CHAIR:                   Yes, please do.

23           MR. FITCH:                   Thank you.

24           Mr. Chairman.

25           THE CHAIR:                   Yes.

**SCLG TOPIC #3 PANEL****Cross-examined by Mr. Fitch**

1 MR. FITCH: I can confirm that that concludes  
2 Alberta Transportation's cross-examination of the SCLG  
3 witness panel in this topic session. Thank you very  
4 much to the witnesses.

5 THE CHAIR: Thank you. Thank you, panel  
6 members.

7 Mr. Fitch just to clarify, Mr. Fennell will be in  
8 Topic 4, the next topic area.

9 MR. FITCH: Correct.

10 THE CHAIR: You had questions for him in  
11 Topic 4, but were some of the questions from Topic 3  
12 actually being carried to him individually in Topic 4  
13 or not?

14 MR. FITCH: Yeah. So I -- the way -- I think  
15 where we left things was we -- I think I indicated  
16 Friday that we would be putting over to Topic Session 4  
17 our questions for -- is it Dr. -- Dr. Fennell. And  
18 actually over the weekend, my friend, Mr. Secord,  
19 circulated a revised form of presentation for  
20 Dr. Fennell which essentially combines his Topic 3 and  
21 Topic 4. So it's all now in Topic 4. That's my  
22 understanding. And the same with Mr. Klepacki or  
23 Dr. Klepacki.

24 THE CHAIR: Okay, thank you.

25 MR. FITCH: Yeah, thank you.

**SCLG TOPIC #3 PANEL****Cross-examined by Mr. Fitch**

1 THE CHAIR: So we'll move to Board staff and  
2 Panel questions for the panel on Topic 3.  
3 Mr. Kennedy?

4 MR. KENNEDY: I have no questions for  
5 Austin Engineering or Mr. Dowsett.

6 THE CHAIR: Ms. Vance?

7 MS. VANCE: I have no questions either.

8 THE CHAIR: Mr. Ceroici?

9 MR. CEROICI: And I have no questions either.

10 Thank you.

11 THE CHAIR: Dr. Heaney?

12 MR. HEANEY: I have no questions for these  
13 witnesses.

14 THE CHAIR: Ms. Roberts?

15 MS. ROBERTS: I have no questions either. Thank  
16 you.

17 THE CHAIR: And I have no questions. So thank  
18 you very much panel members. We can --

19 MS. OKOYE: Mr. Chair, I do have some  
20 redirect.

21 THE CHAIR: Oh, I'm sorry, I'm sorry.

22 MS. OKOYE: That's always a forgotten step.

23 THE CHAIR: Well, not always, but, you're  
24 right, I have done it a few times so thanks for the  
25 reminder.

## SCLG TOPIC #3 PANEL

Re-examined by Ms. Okoye

1 MS. OKOYE: No problem. My redirect will go  
2 to Mr. Dowsett.

3 **MS. OKOYE RE-EXAMINES THE PANEL:**

4 Q. So, Mr. Dowsett, you and Mr. Fitch were discussing the  
5 Rocky View County development bylaw. Do you recall  
6 that?

7 A. MR. DOWSETT: Yes, I do.

8 Q. Do you know when the development -- that Rocky View  
9 bylaw was created?

10 A. MR. DOWSETT: No, I have no idea. It's the --  
11 the first time I'd seen it was in an email that was  
12 attached, I don't even remember the date. But as soon  
13 as I saw it, I had -- I mean I -- I have -- I did not  
14 see that in the past.

15 Q. Okay. And you don't recall if that would have been  
16 January 2021?

17 A. MR. DOWSETT: No, I have no idea.

18 Q. Okay, so just a few things. Can you confirm that you  
19 do not work for the development planning department for  
20 the Rocky View County?

21 A. MR. DOWSETT: Yes, I confirm.

22 Q. And also --

23 A. MR. DOWSETT: Yes, I confirm.

24 Q. And also, you're not a development planner?

25 A. MR. DOWSETT: No, but I've -- I've subdivided my

## SCLG TOPIC #3 PANEL

Re-examined by Ms. Okoye

1 property, and I've gone through the horrible process,  
2 so...

3 Q. Okay, that's fine. And so your views that you had  
4 expressed regarding the land use bylaw were just your  
5 personal views and not based on Rocky View's  
6 interpretation of the bylaws; is that correct?

7 A. MR. DOWSETT: Which bylaw is that that you're  
8 speaking of?

9 Q. The one that you discussed with Mr. Fitch.

10 A. MR. DOWSETT: On the flood control?

11 Q. No, no, the Rocky View development -- yes, that he  
12 talked about the flood hazard areas and flooding  
13 areas --

14 A. MR. DOWSETT: No.

15 Q. So are those your personal views? They're not based on  
16 the Rocky View County's views?

17 A. MR. DOWSETT: I -- I mean, it's the first I've  
18 seen that particular piece of paper, and I believe  
19 that, going forward into the future, that if this is a  
20 new bylaw, then it seems to me that that would make  
21 sense on a go-forward basis. Retroactively, I have no  
22 idea whether that was the case.

23 I also think that when you look at this bylaw, you  
24 know, consideration -- I'm not sure if it has room for  
25 consideration of climate change, you know, it's sort of

## SCLG TOPIC #3 PANEL

Re-examined by Ms. Okoye

1 out of my area. But if -- if -- if these numbers that  
2 are using for flood now change in the future, that  
3 bylaw itself could be revised again.

4 But it could mean that people who are currently  
5 building following that guidance may not -- may be at  
6 risk later. But I think in general, I would support  
7 the idea that that bylaw should be there; it's just  
8 whether -- what the timing is on it and how it applies  
9 in this situation.

10 Q. Okay, thank you. That would be all, Mr. Chair.

11 Thank you, Mr. Dowsett.

12 THE CHAIR: Thank you, Ms. Okoye.

13 Okay. With that, we could move onto direct on  
14 Topic 3. Mr. Williams with Calalta. Mr. Williams?

15 I believe Ms. Friend may have received a note that  
16 he may not be providing direct. I just want to  
17 confirm, though.

18 Is Mr. Williams online?

19 MR. KENNEDY: Mr. Chair, I can advise that in  
20 canvassing the parties prior to the hearing, Calalta  
21 advised that they had no direct evidence for Topic 3).

22 THE CHAIR: Perfect. Thank you.

23 Mr. Wagner did indicate he may have direct.

24 Mr. Wagner, did you have direct on Topic 3?

25 MR. WAGNER: Morning, Mr. Chair. Yes, I do.

**S. WAGNER****Submissions by Mr. S. Wagner**

1           And I may I ask for the indulgence of the Panel, I  
2           would like to have a little bit longer. That is,  
3           probably about ten minutes.

4       THE CHAIR:                   That is not a problem, Mr. Wagner.  
5           Please proceed.

6       MR. WAGNER:                 Thank you. I'm going to turn off  
7           my video with that's okay with the Chair --

8       THE CHAIR:                   Yes --

9       MR. WAGNER:                 -- because I've got limited  
10          bandwidth?

11      THE CHAIR:                   Yeah, that's fine. I think it  
12          freezes anyway, Mr. Wagner.

13

14      **S. WAGNER** (Spokesperson), previously sworn

15      **A.**    Could I get the document manager to bring up  
16            Document 371? Should be a PowerPoint presentation.  
17            And can you move down to Slide Number 10, please? And  
18            go to the next slide, please.

19            The GoA refers to regulations and hunting already  
20            taking place within the SR1 as a solution to our safety  
21            concerns.

22            In my humble opinion, the GoA is not considering  
23            the seriousness of the situation, nor any of the unique  
24            issues associated with the placement of our house and  
25            access road.



## S. WAGNER

Submissions by Mr. S. Wagner

1           We built our house in 2000 and placed it at the  
2           geographic centre of our property. I can assure the  
3           NRCB, this would be one of the last places I would  
4           build a house knowing the SR1 location.

5           Our property is one of the closest rifle hunting  
6           zones to Calgary with elk herds that can be spotted  
7           from the highway, and we lose our current protections  
8           if SR1 is approved.

9           Unfettered hunting terrifies me. Hunting  
10          regulations allow for high-powered rifles to be  
11          discharged within 200-metre -- at 200 metres from a  
12          house, and as the chart states, bullets are lethal  
13          within kilometres.

14          Furthermore, regulations on how to point a rifle  
15          are not entirely helpful to our situation. Common  
16          sense and rifle safety states that rifles should not be  
17          pointed at our house, our yard, our driveway, or at  
18          individuals walking on the property. However, any  
19          hunter I have led onto our property to hunt elk or deer  
20          gets location training. We lose this ability under  
21          public access within SR1.

22          "Occupied Lands," which is a definition used in  
23          hunting regulations, provides additional protections  
24          for house owners on private property, but is not  
25          applicable to public lands which will be the GoA's

## S. WAGNER

Submissions by Mr. S. Wagner

1 designation for SR1.

2 As for protecting our safety, would you approach a  
3 complete stranger with rifle in hand to warn them of  
4 potential risks? I'm not quite that brave a person.

5 Oh, and public lands are on our front lawn.

6 Our access road to our house is within the legal  
7 discharge zone for high-powered rifles. We, or any  
8 visitor, or weekend walker out for a stroll, would need  
9 to depend on a hunter with a scope on prey to see a  
10 vehicle or walker which may be masked by 10 feet of  
11 willow. Walking, cattle ranching, or even mowing the  
12 lawn will be significantly affected. There's a logical  
13 assumption that something bad will occur.

14 I have no -- I find no regulation on the distance  
15 of bow hunting discharges. So bow hunting is allowed  
16 on our front lawn.

17 The unique nature of elk herds, proximity to  
18 Highway Number 22, proximity to Calgary, rifle hunting  
19 zone, private road within the rifle discharge zone,  
20 houses within metres of public lands, public hiking,  
21 and lack of monitoring, will increase the risk far  
22 above other locations within the province. I believe  
23 hunting and SR1 are not compatible.

24 I am no less concerned about fire control brought  
25 on by casual smoking in knee-high grass. Just can't

## S. WAGNER

Submissions by Mr. S. Wagner

1 get the thought of a barrel of the rifle in my mind.

2 Next slide, please. I'm sorry, I didn't see a  
3 slide change. Okay, thank you.

4 This was the bow hunting area with the  
5 regulations.

6 Can I get two slides down, please? One more?

7 So I can confirm that we've come to resolution  
8 with the GoA on remediation on the first Indigenous  
9 dig. This happened in the past three weeks.

10 However, all of the concerns that I've raised in  
11 my submission with regards to this dig are still valid.  
12 I believe that greater oversight over contractors would  
13 be beneficial.

14 While getting the Indigenous site reclamation  
15 organized, it came to my attention that we were never  
16 contacted by pipeline companies, nor utilities,  
17 re-staking underground assets and, furthermore, no  
18 residual flags exist near the site.

19 Since the dig, the one shown on the slide here, is  
20 very close to a nasty condensate pipeline, it is  
21 concerning. "Call before you dig" is normal procedure,  
22 and I would have expected this to be arranged by  
23 Stantec. I do hope the additional Indigenous study  
24 locations go better.

25 As for the causeway that I submitted in my

## S. WAGNER

Submissions by Mr. S. Wagner

1 submission, I wish I could say I'm an engineer, but I'm  
2 not. However, I have been an executive responsible for  
3 building large roofs and wind turbines.

4 The causeway looks like a large version of both to  
5 me. Over the years, I also have driven by numerous  
6 truck rollovers on Highway 22 near our property and at  
7 the causeway location.

8 To the GoA's credit, they've been improving the  
9 off ramp from Highway Number 1 to Number 22 just north  
10 of the causeway in an attempt to improve rollover  
11 issues.

12 The GoA did not respond to my comments on wind on  
13 the causeway, did not dismiss the issue, nor  
14 acknowledge such. I do believe that the causeway has a  
15 long-term potential wind problem, and hope that the GoA  
16 has a solution. We don't need more truck rollovers.

17 Lastly, after listening to a number of discussions  
18 over the last number of days, I was curious about  
19 riprap on the dam and the effects of wind and waves.

20 If I were a resident downstream of SR1, I  
21 certainly would sleep more soundly if there was riprap  
22 on at least the top portion of the SR1 dam.

23 I wrote this comment yesterday when the wind was  
24 howling and the wind warnings were 100 kilometres per  
25 hour.

**S. WAGNER****Submissions by Mr. S. Wagner**

1           Thank you, Panel, for your time. I'm available  
2           for cross.

3           THE CHAIR:                   Thank you, Mr. Wagner. I think we  
4           have some feedback going on -- is that corrected?  
5           Thank you.

6           Ms. DiPaolo, can you hear me okay?

7           Okay. Thank you.

8           MR. KENNEDY:                   Mr. Chair, I'm wondering if we  
9           might enter this PowerPoint as an exhibit. I don't  
10          think it's been entered previously.

11          MS. FRIEND:                   This is Laura. Actually, it has  
12          been. It's Number 371.

13          MR. KENNEDY:                Thank you.

14          THE CHAIR:                   371. Okay, thank you,  
15          Mr. Kennedy.

16          Ms. Louden or Mr. Rae?

17          MR. RAE:                     We have no questions, sir.

18          THE CHAIR:                   Thank you. Ms. Okoye or  
19          Mr. Secord, I would assume no questions?

20          MR. SECORD:                 No questions, sir. Thank you.

21          THE CHAIR:                   Thank you.

22                   City of Calgary? Ms. Senek? Or Ms. Munkittrick  
23           perhaps?

24          MS. SENEK:                   Sorry, Melissa Senek here. Just  
25          looking for my mute button.

**S. WAGNER****Cross-examined by Mr. Fitch**

1                   We don't have any questions. Thank you.

2       THE CHAIR:                   Thank you.

3                   And Mr. Cusano?

4       MR. CUSANO:                  No questions, sir. Thank you.

5       THE CHAIR:                  Mr. Fitch?

6       MR. FITCH:                  Thank you, Mr. Chair. Just a  
7       couple.

8       **MR. FITCH CROSS-EXAMINES THE WITNESS:**

9       Q. Good morning, Mr. Wagner.

10      A. **Good morning, Gavin.**

11      Q. Sir, do you understand that the rules that would apply  
12      to hunting in the project have not yet been prepared or  
13      finalized?

14      A. **I was not aware of that; however, what has been  
15      communicated to this point was that standard hunting  
16      regulations would apply, and we are also aware that  
17      they may even be slightly expanded.**

18      Q. Mr. Wagner, I take it, given the concerns you've  
19      expressed about hunting, that you would like to be  
20      included in any consultations on the rules that will  
21      apply to hunting in the project area when that  
22      consultation occurs?

23      A. **Absolutely. However, having said that, the only times  
24      that we've really had a serious discussion about this  
25      with the GoA are on a couple different occasions, but**

**S. WAGNER**

Cross-examined by Mr. Fitch

1 the primary ones were at the public events, and I have  
2 to say that they were not, I wouldn't say, accepted.

3 Q. Okay. And I think you've already alluded to this, but  
4 you would acknowledge that any hunting that ultimately  
5 does occur in the project area would have to comply  
6 with all existing laws and regulations?

7 A. As I've stated in my submission or my talk this  
8 morning, I recognize that; however, the unique  
9 circumstances of location and the increased access  
10 really increase the risk, Gavin.

11 Q. Okay. Mr. Chair, I think those are all my questions  
12 for Mr. Wagner.

13 Again, I'm just going to quickly consult with my  
14 client, if you give me one moment?

15 THE CHAIR: Yes.

16 MR. FITCH: Thank you.

17 Mr. Chairman, those are our questions for  
18 Mr. Wagner. Mr. Wagner, thank you again.

19 MR. WAGNER: Thank you, Gavin.

20 THE CHAIR: Mr. Wagner, thank you.

21 And Board staff, Mr. Kennedy, Ms. Vance, any  
22 questions? Mr. Kennedy?

23 MR. KENNEDY: Mr. Chair, I have no questions of  
24 Mr. Wagner.

25 MS. VANCE: Nor do I, sir. Thank you.

**S. WAGNER****Questioned by Ms. Roberts**

1 THE CHAIR: Thank you. Ms. Roberts?

2 MS. ROBERTS: Yes.

3 **MS. ROBERTS QUESTIONS THE WITNESS:**

4 Q. Mr. Wagner, just one question.

5 In addition to hunting, you several times have  
6 expressed fire as being a concern that you have, and  
7 particularly if this becomes -- if this is approved and  
8 if it becomes public land where the public can  
9 traverse, and you had commented, I believe, on, you  
10 know, somebody just flicking a cigarette butt, and so  
11 on, in the area.

12 Do you have any suggestions for -- if this is the  
13 case, if it's approved, if this becomes an area where  
14 the public can go, how that could possibly be dealt  
15 with?

16 A. My biggest concern was, with regards to fire department  
17 access the lands, it is my understanding, and I might  
18 be wrong, but fire departments in Bragg Creek have a  
19 policy of not going into the field, and that limits the  
20 ability of -- well, it increases the chance of a major  
21 fire because fires can be doused a lot quicker when  
22 they're smaller. So that's one. I've already made  
23 that suggestion to the GoA, and I believe they've taken  
24 that as an undertaking.

25 The second aspect, they have talked about grazing,



**S. WAGNER**

Questioned by Ms. Roberts

1           and I would highly recommend that grazing continue on  
2           the property.

3           The third aspect, I asked about cutting down the  
4           to potential bush and trees after a major flood. I'm  
5           not convinced that the GoA's comment about dead trees  
6           or them surviving a flood is -- is valid. So that  
7           would help with that situation, as well.

8           And, thirdly, I don't know how you stop weekend  
9           smokers. You know, you put up signs, you know, and --  
10          you know, the law is the law, but the reality of the  
11          situation is that most of the fires along the highways,  
12          my understanding, is that it's usually, you know,  
13          smokers throwing butts out the window, stuff like that,  
14          and just the weekend walkers. I don't know how to  
15          handle that, other than you put up signs "No Smoking."

16          Q. All right. Thank you.

17          A. Thank you, Ms. Roberts.

18          THE CHAIR:                   Mr. Ceroici?

19          MR. CEROICI:                 I have no questions for

20                 Mr. Wagner, thank you.

21          THE CHAIR:                   Dr. Heaney?

22          MR. HEANEY:                 I have no questions, thank you.

23          THE CHAIR:                   I have no questions of Mr. Wagner.

24                 Did you have any redirect?

25          MR. WAGNER:                 I do not, Mr. Chair.

**S. WAGNER**

Questioned by Ms. Roberts

1 THE CHAIR: Well, thank you, Mr. Wagner.

2 MR. WAGNER: Thank you.

3 THE CHAIR: Just before the break, I'd ask I  
4 guess Mr. Fitch with Transportation, do you have  
5 rebuttal evidence on this topic?

6 MR. FITCH: We do not.

7 THE CHAIR: You do not.

8 So this closes this topic area, then.

9 We'll take a break and then start in on Topic  
10 Area 4, a broad area of just "Water" with  
11 Alberta Transportation.

12 Mr. Fitch, your Panel's ready for direct?

13 MR. FITCH: They are. We will need a few  
14 minutes to get everything organized. So this is a  
15 perfect for us for morning break.

16 THE CHAIR: Perfect. I'm thinking 10:15, does  
17 that -- will that work for you to get organized?

18 MR. FITCH: That does. Thank you.

19 THE CHAIR: Thank you. So we'll break till  
20 10:15. Thank you, everyone.

21 (ADJOURNMENT)

22 THE CHAIR: I'll just confirm -- oh, sorry, I  
23 was just going to confirm with Mr. Fitch if the panel  
24 is ready and you're ready to begin.

25 MR. FITCH: The panel is ready, but I'm not

**S. WAGNER**

Questioned by Ms. Roberts

1 leading this panel; our colleague Mr. Barbero is.

2 THE CHAIR: Oh, okay, okay, Mr. Barbero,  
3 sorry. My apologies, and the floor is yours,  
4 Mr. Barbero.

5 MR. BARBERO: Mr. Chair, good morning, sir, NRCB  
6 Panel, counsel and staff.

7 As Mr. Fitch said, my name is Michael Barbero and,  
8 along with Mr. Kruhlak and Fitch, one of the lawyers  
9 acting for Alberta Transportation.

10 Sir, I'll be introducing Alberta Transportation's  
11 panel for Topic 4, water.

12 As with the prior panel, sir, I will have the  
13 witnesses sworn or affirmed. I'll introduce each  
14 witness and have them speak to their involvement. And  
15 following that, sir, Mr. Hebert and Mr. Brescia will  
16 deliver some opening remarks, after which the panel  
17 will be available for cross-examination.

18 Sir, I'd like to start, though, by having those  
19 members of what we have been referring to as the  
20 "common panel" just confirm on the record that they  
21 remain under oath from last week, sir, if that's an  
22 agreeable approach?

23 Sorry, I see you nodding your head, so I'll take  
24 it --

25 THE CHAIR: I was just running for my mute

**S. WAGNER**

Questioned by Ms. Roberts

1 button, sorry. Yes, please proceed.

2 MR. BARBERO: Very good, sir. Thank you.

3 Q. Mr. Hebert, sir, are you there?

4 A. MR. HEBERT: Yes, I am.

5 Q. Sir, can you please acknowledge that you are still  
6 under oath?

7 A. MR. HEBERT: Yes, I am.

8 Q. Thank you, sir.

9 Mr. Speller, can you please acknowledge that you  
10 are still under oath?

11 A. MR. SPELLER: Good morning. Yes, I am.

12 Q. Mr. Brescia, can you acknowledge that you are still  
13 under oath?

14 A. MR. BRESCIA: Yes, I am.

15 Q. Mr. Wood, can you acknowledge you are still under oath?

16 A. MR. WOOD: Yes, I am.

17 Q. Mr. Svenson, can you acknowledge that you are still  
18 under oath?

19 A. MR. SVENSON: Yes, I am.

20 Q. Thank you.

21 MR. BARBERO: I'd also like to note, Mr. Chair,  
22 that we've brought back Mr. Menninger, Mr. Back, and  
23 Dr. Luzi for this panel. While not members of the  
24 common panel, we are bringing them back given last  
25 week's discussion and agreement to move certain matters

**S. WAGNER**

Questioned by Ms. Roberts

1           pertaining to climate change into Topic 4.

2           So sir, at this time I would confirm with each of  
3           those witnesses that they also remain under oath,  
4           starting with Mr. Menninger.

5           Q. Mr. Menninger, sir, are you there?

6           A. **MR. MENNINGER:**           **I am.**

7           Q. Sir, can you acknowledge that you are still under oath?

8           A. **MR. MENNINGER:**           **Yes, I am.**

9           Q. Mr. Dan Back, sir, are you there?

10          A. **MR. BACK:**                   **I am.**

11          Q. Mr. Back, can you acknowledge that you are still under  
12          oath?

13          A. **MR. BACK:**                   **Yes.**

14          Q. Dr. Luzi, sir, are you still there?

15          A. **MR. LUZI:**                   **I am.**

16          Q. Sir, can you acknowledge that you are still under oath?

17          A. **MR. LUZI:**                   **Yes, I am.**

18          Q. And, Mr. Yoshisaka, can you acknowledge, sir, that you  
19          are still under oath?

20          A. **MR. YOSHISAKA:**           **Yes, I am.**

21          Q. Thank you, sir.

22                 With that, I would ask that Madam Court Reporter  
23                 please proceed to have the new witnesses sworn or  
24                 affirmed as per their preference.

25                 (DISCUSSION OFF THE RECORD)

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1

2 M. HEBERT, M. SVENSON, W. SPELLER, D. BRESCIA, M. WOOD,  
3 J. MENNINGER, D. BACK, D. LUZI, D. YOSHISAKA, D. JOBSON,  
4 L. AUCOIN, T. NOBLE (For Alberta Transportation),  
5 previously sworn/affirmed and sworn/affirmed

6 MR. BARBERO EXAMINES THE PANEL:

7 MR. BARBERO: Thank you, Madam Court Reporter.

8 Q. Mr. Jobson, sir, may I start with you, please?

9 A. MR. JOBSON: Yes.

10 Q. Sir, you can confirm that your CV has been filed as  
11 part of Exhibit 336 at PDF page 15; is that correct?

12 A. MR. JOBSON: Yes.

13 Q. And sir, you can confirm that you work at Matrix  
14 Solutions as a senior aquatic biologist?15 A. MR. JOBSON: I work at Matrix Solutions as a  
16 senior aquatic biologist from May 2019 to January 2021.  
17 I was a senior associate aquatic biologist at Stantec.  
18 From April 2016 to May 2019, I was an independent  
19 consultant.

20 Q. Thank you, sir.

21 MR. BARBERO: Madam Court Reporter, I had some  
22 audio trouble. I don't know if you did as well.

23 COURT REPORTER: Umm-hmm.

24 Q. MR. BARBERO: Mr. Jobson, sir, if you're able to  
25 move closer to your mic perhaps. Thank you.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1           Sir, what is your education or experience in the  
2           area of aquatic biology?

3       **A. MR. JOBSON:**           I received a bachelor of science  
4           in biology from the University of New Mexico in 1987  
5           and a master of science in biology from Wichita State  
6           University in 1999.

7           I am a registered professional biologist in  
8           Alberta and British Columbia. I have over 22 years  
9           experience working as an aquatic biologist in Canada  
10          and the United States working on variously sized  
11          aquatic environmental projects for assessment,  
12          monitoring, and regulatory purposes.

13          I have served in many different project roles,  
14          including technical lead, component manager, and  
15          qualified aquatic environmental specialist.

16          My technical background includes water quality and  
17          fishery science, and my experience includes aquatic  
18          effects assessments, investigating how changes in water  
19          quality and habitat impact by aquatic environments such  
20          as lakes, rivers, streams, and wetlands.

21          I have worked on more than 20 large and small  
22          environmental impact assessments, including water  
23          resource projects. This includes environmental  
24          assessment, mitigation planning, and regulatory support  
25          for flood protection and mitigation projects.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 Q. Thank you, sir. And with regards to this application,  
2 what has your role or involvement in preparing reports  
3 or responses been to date?

4 A. MR. JOBSON: I was the water quality discipline  
5 lead for the application. I prepared information  
6 responses and updated assessments where new information  
7 became available.

8 Q. Thank you, sir.  
9 Ms. AuCoin, are you there?

10 A. MS. AUCOIN: Yes, I am here.

11 Q. Good morning.

12 A. MS. AUCOIN: Morning.

13 Q. Can you confirm for me that your CV has been filed as  
14 part of Exhibit 336 at PDF page 48?

15 A. MS. AUCOIN: Yes, confirmed.

16 Q. Can you confirm for me that you work at Stantec as a  
17 fisheries biologist?

18 A. MS. AUCOIN: Yes, I do.

19 Q. And, ma'am, what is your education and relative  
20 experience?

21 A. MS. AUCOIN: I completed a bachelor of science  
22 with honours in biology in 2008 and a master of science  
23 in biology in 2011. Both degrees were obtained from  
24 Dalhousie University.

25 I have 12 years of experience as a fisheries



## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 biologist. My employment history includes 10 years of  
2 consulting and two years as a research assistant.

3 In my time as a consultant, I've primarily worked  
4 as a fisheries biologist and regulatory specialist on  
5 river engineering projects.

6 I have experience with fish habitat assessments,  
7 fish habitat offsetting, and the development of  
8 mitigation plans for construction in rivers.

9 Q. Thank you. And with regards to this application, what  
10 has your role been, and have you been involved in the  
11 preparation of any report or responses to information  
12 requests?

13 A. MS. AUCOIN: Yes, I am the fisheries lead for  
14 the environmental impact assessment for this project.  
15 I have been involved in fieldwork, the preparation of  
16 reports, monitoring plans and responses to SIRs.

17 I've collaborated with the engineering team and  
18 other technical experts for our evaluations and  
19 reports, and I have presented some of our monitoring  
20 plans to Indigenous groups.

21 Q. Thank you. Ms. AuCoin.

22 Ms. Noble, are you there?

23 A. MS. NOBLE: Yes, I am.

24 Q. Good morning. I don't see you. Oh, there you are.

25 Good morning.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1           Can you confirm that your CV has been filed as  
2           Exhibit 336, page 84 in this proceeding?

3       **A. MS. NOBLE:**           **Yes, I can.**

4       **Q.** And, ma'am, can you confirm that you work at Stantec as  
5           a senior principal and senior risk assessment  
6           specialist?

7       **A. MS. NOBLE:**           **Yes.**

8       **Q.** And can you please describe your relevant education and  
9           experience in this field?

10      **A. MS. NOBLE:**           **I completed a bachelor of science**  
11           **in engineering from the University of New Brunswick in**  
12           **1994, as well as a masters of engineering at the**  
13           **University New Brunswick in 2004.**

14           **Since 1997, my professional experience has been**  
15           **primarily in the fields of human health and ecological**  
16           **risk assessment and water resources; assessed a wide**  
17           **range of contaminants at sites across Canada as well as**  
18           **the United States. And I've supported human health**  
19           **risk assessment components of multiple and**  
20           **environmental impact assessments since 2003.**

21      **Q.** Thank you. And with regards to this application, what  
22           has your role been, and have you had any involvement in  
23           the preparation of reports or responses to information  
24           requests?

25      **A. MS. NOBLE:**           **Yes. I have been involved in the**

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 health assessment since 2014, providing senior  
2 technical support and quality review at both the human  
3 health risk assessment and the public health sections  
4 of the EIS.

5 I've been responsible for authoring human  
6 health-related supplemental information request  
7 responses, as well as the hearing submissions.

8 Q. Thank you, ma'am.

9 MR. BARBERO: Mr. Chair, at this time, I would  
10 invite Mr. Hebert and Mr. Brescia to provide an opening  
11 statement with respect to Topic 4, water. I can advise  
12 that this statement has been provided in advance to all  
13 counsel and the Board and is Exhibit 374.

14 Mr. Hebert, sir.

15 A. MR. HEBERT: Thank you, Mr. Barbero.

16 Good morning, Mr. Chairman, members of the Board,  
17 members of other parties, and members of the public  
18 joining us today on YouTube.

19 Alberta Transportation, through its assessment of  
20 the environmental effects of the SR1 project and  
21 through consultation with various Indigenous groups,  
22 local landowners, and regulators, is keenly aware of  
23 the concerns raised with regards to potential impacts  
24 to water and related disciplines as a result of the  
25 project.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1           On behalf of Transportation, I have personally  
2 heard from and spoken with many Indigenous groups and  
3 landowners who have voiced concerns about whether the  
4 project may impact fish at aquatic habitat, water  
5 quality on local wells or alter water quantity at  
6 naturally occurring springs and other sources.

7           As will be discussed by Mr. Brescia in a moment,  
8 Transportation's analysis and detailed consideration of  
9 the issues associated with water quality and quantity,  
10 fish and aquatic habitat has culminated in  
11 Transportation having confidence that the project's  
12 impacts can be monitored for and, as needed, mitigated.

13           Since the next two topics focus on environmental  
14 impacts and mitigation, it is important to outline the  
15 approach taken by Transportation in the assessment of  
16 SR1.

17           The environmental assessment process addresses  
18 both project-related and cumulative environmental  
19 effects and follows a standardized framework for each  
20 valued component. That process involves a number of  
21 steps: First, scoping the assessment; second,  
22 characterizing existing conditions including the  
23 influence of past and current activities; third,  
24 assessment of residual project effects including the  
25 consideration of potential effects pathways in

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 applicable mitigation measures; fourth, assessment of  
2 cumulative effects; fifth, determination of  
3 significance; and, finally, identification of  
4 monitoring programs.

5 In addition to the above, Transportation's  
6 environmental assessment process includes engagement  
7 with stakeholders and Indigenous groups to inform the  
8 development of mitigation and monitoring plans. This  
9 includes a commitment to a community liaison to ensure  
10 that impacts felt by the community can be raised and  
11 dealt with by Transportation or Environment and Parks  
12 through the life of the project.

13 Specifically, Transportation has committed to  
14 water quality monitoring in the form of a draft surface  
15 water monitoring plan and groundwater monitoring plan.

16 Transportation is currently in the process of  
17 obtaining further approvals from Fisheries and Oceans  
18 Canada for potential impacts to fish and aquatic  
19 habitat, which will include offsetting and monitoring  
20 activities.

21 Further, Transportation has developed a draft fish  
22 rescue and fish health monitoring and mitigation  
23 program.

24 It is expected that additional engagement with  
25 Indigenous groups, regulators, landowners, and other

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 stakeholders will serve to further refine and clarify  
2 the scope and processes envisioned by these monitoring  
3 plans. To this end, we note that Transportation  
4 responded to the concerns identified most recently by  
5 various interveners in this proceeding.

6 Our consideration in responses are found in the  
7 reply submission and appended technical memoranda.

8 I would now like to invite David Brescia from  
9 Stantec to provide additional comment.

10 A. MR. BRESCIA: Good morning, Mr. Chairman.

11 As you know, my name is Dave Brescia. I'm an  
12 environmental and regulatory advisor with Stantec, and  
13 I have been actively involved with this project on  
14 behalf of Alberta Transportation since 2016.

15 As noted by Mr. Hebert, Alberta Transportation is  
16 keenly aware of the importance of understanding and  
17 addressing any impacts to water associated with the  
18 project, as water concerns may have implications for  
19 fish, local Indigenous groups, local residents, and  
20 downstream users such as the city of Calgary.

21 Consequently, at the direction of Alberta  
22 Transportation, Stantec undertook a comprehensive  
23 consideration of all aspects of project-related water  
24 concerns. These considerations started with the  
25 preparation of the EIA and then carried forward

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 throughout the regulatory process and engagement  
2 phases. It is work that continues.

3 As can be seen from a review of this material,  
4 multiple subject matter experts were engaged to  
5 investigate all aspects of the project interaction with  
6 water. Specifically, analysis was undertaken for the  
7 following disciplines:

8 Hydrogeology, or the movement, quantity and  
9 quality of water in the subsurface.

10 Hydrology, the movement of water at the surface,  
11 including quantity, geomorphology and sediment  
12 transport.

13 Surface water quality, the consideration of the  
14 water's quality during diversion into the reservoir,  
15 storage, and subsequent release.

16 And fish and fish habitat, the consideration of  
17 the implication of the project on fish species in the  
18 project area and further, including consideration of  
19 impacts to the habitat used by fish.

20 These reviews and related conclusions are found in  
21 the respective sections of the environmental impact  
22 assessment and supplemental information requests.  
23 However, it's worth briefly touching on each at this  
24 time.

25 Hydrogeology implications of the project involved

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 examining the potential changes to groundwater quality  
2 ad quantity that may be associated with the project.  
3 Through the use of an extensive borehole drilling and  
4 well-testing program, data was obtained and a numerical  
5 model created to predict the implications of both dry  
6 and flood operations and other factors on groundwater  
7 levels, flow regime, and water quality. The models  
8 showed that any effects on groundwater would be rare  
9 and reversible on release of water from the reservoir,  
10 and would not extend beyond the project development  
11 area at any magnitude that would be material.

12 Similarly, consideration of hydrological effects  
13 was undertaken primarily through examination of impacts  
14 to the hydrological regime, changes in suspended  
15 sediment transport, and changes in channel  
16 geomorphology. Changes to the hydrological regime are  
17 non-existent when the project is not in operation, and  
18 the flow rates and flow volume in the Elbow River will  
19 not be significantly impacted by the project. As the  
20 project is designed to mitigate flooding downstream,  
21 there will be reduced flow rate and volume downstream  
22 when the project is in operation. Suspended sediment  
23 transport will be impacted during diversion with  
24 sediment being removed -- being moved into the  
25 reservoir and deposited. As a result of the reduced



## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 flow during operations, there will be some minor  
2 changes to the Elbow River channel between the outlet  
3 and the Glenmore Reservoir over the long term.

4 Surface water quality was assessed for changes to  
5 various parameters, including temperature, oxygen,  
6 total suspended sediment, or TSS. One of these -- of  
7 these, primary consideration is TSS. Operation of the  
8 project will occur at a time when TSS in the  
9 Elbow River is already high owing to the flood event.  
10 The project would not change or alter this fact.

11 Turning to issues of potential impacts on fish and  
12 fish habitat, Stantec, on behalf of Alberta  
13 Transportation, has completed extensive fish and fish  
14 habitat surveys within the Elbow River to support the  
15 aquatic ecology components of the EIA. Field work was  
16 undertaken in 2016, with additional surveys in 2019 and  
17 2020. These surveys provide a robust basis to support  
18 both the EIA, and to inform monitoring on offsetting  
19 plans.

20 Surveys covered approximately 70 kilometres of the  
21 river and use advanced methods of estimating habitat  
22 change such as a bedload model and a habitat  
23 suitability model. In addition, REDD surveys -- and  
24 that's R-E-D-D -- and a population survey were  
25 completed to characterize fish community, and to inform

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 the effects assessment and future monitoring efforts.  
2 Alberta Transportation's data collection and analysis  
3 exceeds the efforts typically undertaken for EIAs.  
4 Alberta Transportation's field data will also serve as  
5 a comprehensive tool for future monitoring.

6 With respect to the project design, the design of  
7 SR1 has several unique benefits for the aquatic  
8 environment relative to a typical on-stream structure.  
9 The off-stream design limits interaction with the  
10 aquatic environment to the extent possible by having a  
11 small in-stream footprint. Additionally, project's  
12 fish package design features mimic natural features of  
13 the Elbow River and are considered superior to a  
14 classic fishway. The off-stream design avoids the  
15 development of a lacustrine or lake habitat, which  
16 could substantially change the Elbow River fish  
17 community over time. In years that the project does  
18 not operate, there will be negligible effect on the  
19 Elbow River fish community.

20 Effects to the aquatic environment are limited to  
21 flood operation, primarily the risk of fish entrainment  
22 into the reservoir. Alberta Transportation undertook a  
23 robust assessment of aquatic ecology, including an  
24 informed evaluation of entrainment risk. While there  
25 is some uncertainty in predicting the nature of fish

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 behaviour in a flood, and the risk of entrainment  
2 during diversion, Alberta Transportation has undertaken  
3 extensive efforts, using the best available science, to  
4 characterize the risk to fish during flood operations.

5 Even though residual effects to fish are predicted  
6 to be not sufficient, Alberta Transportation is  
7 committed to monitoring effects to fish during flood  
8 operation and will offset the potential loss of  
9 productivity as per the requirements of the federal  
10 *Fisheries Act*.

11 Alberta Transportation acknowledges that during  
12 flood operations, there is potential for the project to  
13 interact with bull trout and its critical habitat. The  
14 upper reaches of the Elbow River are considered  
15 important habitat to bull trout, a species that  
16 requires complex riverine habitat. The project  
17 location in the downstream extents of the Elbow River  
18 provides the benefit of limiting interaction with bull  
19 trout to the extent possible. The field studies  
20 conducted for the project demonstrate that bull trout  
21 are predominantly located in areas that are upstream of  
22 the project. Alberta Transportation's population  
23 fieldwork in August included 186 bull trout captures in  
24 the Elbow River, the majority of which were located  
25 near the confluence with McLean Creek, Allen Bill Day

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 Use Area, and Paddy's Flat. These findings align with  
2 the findings of other scientific studies on bull trout  
3 abundance and distribution in the Elbow River.  
4 Residual effects to bull trout and its critical habitat  
5 are predicted to be not significant, based on their  
6 distribution in the upper reaches of the Elbow River,  
7 and the infrequency of project operations.

8 Alberta Transportation is committed to offsetting  
9 residual effects to bull trout and its critical habitat  
10 that cannot be mitigated and is consulting with  
11 Fisheries and Oceans Canada to develop an offset plan  
12 that meets the conditions of both the *Species At Risk*  
13 *Act* and the *Fisheries Act*.

14 In summary, the team members responsible for  
15 hydrogeology, hydrology, surface water quality and fish  
16 have each consider the project's associated impacts in  
17 great detail and are confident that the impacts are  
18 well understood, temporary, or can be monitored.

19 Further, there have been a number of statements  
20 suggesting that Alberta Transportation is simply  
21 relying on future monitoring to mitigate the effects of  
22 SR1. In fact, where adverse effects have been  
23 predicted in the EIA, Alberta Transportation has  
24 identified specific measures to mitigate those effects.  
25 Draft monitoring programs have been developed for

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 several valued components to verify the effectiveness  
2 of planned mitigation measures, and to allow for  
3 continued through through adaptive management.  
4 Monitoring programs are an important tool to reduce  
5 uncertainty in outcomes. In addition, the development  
6 of these plans is also a requirement of both the terms  
7 of reference and the CEAA EIS Guidelines for the  
8 project.

9 In relation to the concerns raised by the  
10 Stoney Nakoda Nations on these issues, a review of the  
11 SR1 EIA was prepared by Stoney's consultants, PGL, and  
12 it's subconsultant, Boreal Water Resources Ltd.,  
13 touching upon two specific topics: Hydrology and  
14 aquatic ecology, and to provide comments regarding the  
15 scientific and technical sufficiency of the assessment.

16 Stantec carefully reviewed the submissions  
17 prepared by Stoney Consultation and PGL, and provided a  
18 detailed response, which is included as part of  
19 Alberta Transportation's reply submission. Our  
20 responses to Stoney Consultation and PGL are included  
21 in Exhibit 324, at Appendices K and L respectively.

22 As a general statement, PGL's review seems to not  
23 have considered material filed by Alberta  
24 Transportation in multiple rounds of federal and  
25 provincial information requests subsequent to the

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 submission of the EIS in 2018. Further, Alberta  
2 Transportation has fully responded to the questions and  
3 concerns that Stoney Consultation and PGL have raised  
4 through the course of the environmental assessment  
5 process for SR1, and disagrees with PGL's conclusion  
6 that the potential residual adverse effects of the  
7 project on hydrology and aquatic ecology have been  
8 underestimated.

9 I will now invite Mr. Hebert to make further  
10 comment.

11 A. MR. HEBERT: Thank you, Mr. Brescia.

12 Mr. Chairman, in closing, Transportation wishes to  
13 acknowledge the concerns raised in relation to this  
14 very important issue.

15 Transportation is committed to constructed --  
16 constructing and operating the project in a manner that  
17 minimizes impacts to water, to conduct robust and  
18 effective monitoring, and when necessary, using well  
19 established and proven mitigation measures.

20 Specifically, Transportation has committed to an  
21 extensive and long-term monitoring program of both  
22 surface water and groundwater. This robust monitoring  
23 program will cover multiple disciplines. Details of  
24 these programs are contained in the drafts for each of  
25 the surface water monitoring plan; the groundwater

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Examined by Mr. Barbero

1 monitoring plan; and the fish rescue and fish health  
2 and monitoring and mitigation program.

3 Transportation's commitments to these measures is  
4 not limited to project construction, but rather is a  
5 commitment for the entirety of the project's  
6 operational lifespan.

7 Alberta Transportation is confident that through  
8 the rigorous EIA process, including responding to  
9 supplemental information requests at both the  
10 provincial and federal level, along with engagement and  
11 consideration of matters raised by Indigenous groups,  
12 local residents, stakeholders and their respective  
13 experts, we have a solid of understanding of the  
14 implications of the project on water. Furthermore, the  
15 monitoring regime will act as a verification of these  
16 conclusions and will guide implementation of mitigation  
17 measures when and if needed.

18 Thank you, Mr. Chairman.

19 MR. BARBERO: Mr. Hebert, Mr. Brescia, thank you  
20 both.

21 Mr. Chair, sir, I see that I'm quickly approaching  
22 the end of my time. There was one final matter.

23 I would like to invite Mr. Yoshisaka to speak to  
24 one correction that he has in relation to Exhibit 157.

25 Mr. Yoshisaka.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1       A.   MR. YOSHISAKA:            Good morning, Mr. Chairman,  
2           members of the Board. In my review of the filed  
3           materials this weekend, I did note the occurrence of a  
4           minor errata to one of the figures that were presented  
5           in Exhibit 157, specifically at page 9. The figure  
6           here relates to some modelling results, and the error  
7           is limited to the legend.

8                        So it is a minor correction to the legend to  
9           address some of the labelling that's within that  
10          legend, and we do have a corrected version of that  
11          figure that we are ready to submit into evidence to  
12          correct the record.

13       MR. BARBERO:                Thank you, Mr. Yoshisaka.

14                       Mr. Chair, I will submit that we will provide a  
15          copy of the revised page 9 if that is agreeable, sir?

16       THE CHAIR:                    Yes, please do.

17       MR. BARBERO:                Thank you, Mr. Chair.

18                        Sir, that concludes the direct evidence of  
19          Alberta Transportation on Topic 4. This Panel is now  
20          available for cross-examination.

21       THE CHAIR:                    Thank you, Mr. Barbero.

22                        I'm assuming, Mr. Cusano, you have no cross here?

23       MR. CUSANO:                   That's correct, sir. Thank you.

24       THE CHAIR:                    Thank you.

25                        And Ms. Senek?



## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1 MS. SENEK: Nothing for the City, thank you.

2 THE CHAIR: Thank you.

3 Mr. Rae, Stoney Nakoda.

4 MR. RAE: Yes, sir. I do have a couple of  
5 questions.

6 THE CHAIR: Thank you, please proceed.

7 **MR. RAE CROSS-EXAMINES THE PANEL:**

8 Q. Mr. Hebert, last week, Mr. Frigo from the City of  
9 Calgary stated that he meets weekly with  
10 Alberta Environment and other water managers and  
11 license holders on the Bow River. He also mentioned  
12 that the City works with both the downstream and  
13 upstream municipalities.

14 Given that those meetings, I believe, are  
15 organized and chaired by Alberta Environment, does  
16 Alberta Transportation know the reason why  
17 Stoney Nakoda representatives have not been included in  
18 those meetings?

19 A. MR. HEBERT: Mr. Chairman, I do not.

20 Q. Would you undertake to ascertain via Alberta  
21 Environment on what basis the Stoney Nakoda have not  
22 been invited to participate in those meetings?

23 MR. BARBERO: Mr. Chair, it's Michael Barbero  
24 here, Alberta Transportation. I'm not quite sure that  
25 I understand what Mr. Rae is asking us to do. If he's

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1 asking us to go and ask why another government  
2 department is not meeting with the Stoney Nakoda, I  
3 don't know if that's an appropriate undertaking.

4 MR. RAE: Mr. Chairman, quite frankly, that  
5 is exactly what I'm asking.

6 MR. BARBERO: Well, sir, with all due respect,  
7 I'm not sure that that's something we can really do.  
8 So I don't believe Alberta Transportation is prepared  
9 to give that undertaking, sir, unless there's some  
10 other reason or rationale that you can help me  
11 understand.

12 MR. RAE: Mr. Chairman, earlier Alberta  
13 Transportation advised the Board that any commitments  
14 that it makes would not be binding on  
15 Alberta Environment, but if I understand the evidence  
16 correctly, Alberta Transportation also said that were  
17 any of those -- any of those commitments made into  
18 conditions, then those would be binding on  
19 Alberta Environment.

20 Perhaps I will ask my follow-up question, and that  
21 can make it clear to the panel where I'm going with  
22 this undertaking. And my follow-up question is simply:  
23 Will the Stoney Nakoda be included in similar weekly  
24 meetings that Alberta Environment were advised as  
25 promised for the management of the SR1 project on the

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1 Elbow River, were it to be constructed.

2 A. MR. HEBERT: So, Mr. Chairman, certainly as  
3 part of the operations of SR1, Environment and Parks  
4 anticipates that it would -- it would engage with  
5 impacted stakeholders. The exact details of the  
6 necessity, nature, scope of that engagement is not --  
7 is not confirmed at this time, but I would expect that  
8 environment at an operational phase would engage with  
9 Indigenous groups on appropriate topics relating to the  
10 project's operations.

11 Q. Mr. Hebert, is it, therefore, acceptable to Alberta  
12 Transportation were a condition to that effect be added  
13 to any SR1 project approval; that is, a condition  
14 mandating that the Stoney Nakoda be part of these  
15 Alberta Environment meetings?

16 A. MR. HEBERT: Mr. Chairman, subject to the  
17 advice of counsel, we'll undertake that item. We'll  
18 take that item as an undertaking.

19 UNDERTAKING - TO ADD A CONDITION  
20 MANDATING THAT THE STONEY NAKODA BE  
21 PART OF THE ALBERTA ENVIRONMENT  
22 MEETINGS FOR THE MANAGEMENT OF THE SR1  
23 PROJECT ON THE ELBOW RIVER, WERE IT TO  
24 BE CONSTRUCTED

25 Q. MR. RAE: Now, Mr. Hebert, last week we also

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1 had a discussion, both with yourself and your panel, as  
2 well as the panel from the City of Calgary, in regard  
3 to the 2016 Alberta -- TransAlta Utilities agreement  
4 concerning water management of the Ghost Reservoir.

5 Pursuant to an undertaking, the City of Calgary  
6 subsequently advised us that it does not have a copy of  
7 that 2016 agreement to provide to the Stoney Nakoda,  
8 nor presumably to this Board -- to the Natural  
9 Resources Conservation Board.

10 Will Alberta Transportation provide a copy of this  
11 agreement to the Stoney Nakoda?

12 **A. MR. HEBERT:** Mr. Chairman, the agreement in  
13 question is under the authority of a different  
14 government department, and we would not be in a  
15 position to provide a copy of that agreement.

16 **UNDERTAKING - TO PROVIDE THE 2016**  
17 **TRANSALTA UTILITIES AGREEMENT**  
18 **CONCERNING WATER MANAGEMENT OF THE**  
19 **GHOST RESERVOIR TO THE STONEY NAKODA -**  
20 **REFUSED**

21 **Q. MR. RAE:** And just so I'm clear on your  
22 answer, Mr. Hebert, why is Alberta Transportation not  
23 able to provide a copy of that agreement?

24 **A. MR. HEBERT:** Mr. Chairman, the agreement is  
25 under the authority of Alberta Environment and Parks.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1           **We would not have a copy of such agreement.**

2           **Q.** You do not have a copy of the agreement -- you have not  
3           had access to that agreement; is that your evidence?

4           **A. MR. HEBERT:**           **Mr. Chairman, as far as my role in**  
5           **advancing the SR1 project, I have not had access or had**  
6           **need to access that agreement.**

7           **Q.** So is it your evidence that you're not aware of the  
8           arrangements that TransAlta Utilities uses in operating  
9           the Ghost Reservoir?

10          **A. MR. HEBERT:**           **Mr. Chairman, I believe it's a**  
11          **matter of public record that Alberta Environment**  
12          **entered into an agreement with TransAlta as an operator**  
13          **of the -- the water management projects in the Bow**  
14          **River relating to flood mitigation. I don't think**  
15          **that's a secret, and I'm aware of that.**

16                   **But, as far as an agreement is concerned, Alberta**  
17          **Transportation does not have a copy, nor have I had**  
18          **need to obtain a copy as part of the administration of**  
19          **advancing the SR1 project.**

20          **Q.** Well, you say the terms of the agreement are a matter  
21          of public record, and yet you're saying you don't --  
22          haven't seen the agreement, and you don't know what's  
23          in it. So how do you know what arrangements TransAlta  
24          Utilities and Alberta Environment have made in regard  
25          to the flow through the Ghost Reservoir?

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1       A.   MR. HEBERT:               Mr. Chairman, I said that the  
2       agreement is a matter -- an agreement between  
3       environment and TransAlta is known to the public; I  
4       didn't say that the terms are known to the public, so I  
5       think that's an important clarification.

6       Q.   Does Alberta Transportation not think it relevant to  
7       the SR1 project that it knows the details of the  
8       agreement, not just what's been publically released?

9       A.   MR. HEBERT:               Well, Mr. Chairman, Alberta  
10      Transportation has the mandate to advance the SR1  
11      project through its development and regulatory phases.

12               The -- the broader responsibility for the  
13      administration of water projects and need necessity of  
14      different water projects falls under the administration  
15      of Environment and Parks.

16               Certainly we understand the role that the -- the  
17      agreement between Environment and TransAlta play within  
18      the broader scope of flood management projects, but I  
19      personally, and on behalf of Transportation, do not see  
20      the connection between the application we have in front  
21      of this Board today and the agreement or flood  
22      mitigation -- sorry, the agreement in place to manage  
23      water levels on the Bow River with TransAlta Utilities.

24      MR. RAE:                    Mr. Chairman, if I might, both  
25      Alberta Transportation and the City of Calgary have

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1 provided a great deal of evidence in the past week in  
2 regard to the SR1 project and how it will reduce flood  
3 flows on the Bow River downstream of the Elbow River  
4 confluence. Flows out of the Ghost Reservoir into the  
5 Bow River, therefore, are directly relevant to these  
6 purported benefits of the SR1 project on Bow River  
7 flows downstream of the confluence.

8 So I think the terms of how the Ghost Reservoir's  
9 management and the water release levels out of the  
10 Ghost Reservoir are highly relevant to the purported  
11 benefits of the SR1 project.

12 And, Mr. Chair, maybe I could short-circuit where  
13 we're going here and simply represent to the Board that  
14 it's the Stoney Nakoda position that this Board has  
15 within its power to compel disclosure of this type of  
16 agreement. And we've heard evidence in the past week  
17 of a number of, I will label them secret agreements,  
18 because I believe that's what they are. We've heard  
19 evidence of a number of secret agreements entered into  
20 by various departments of the government of Alberta  
21 that directly relate to the SR1 project, both its  
22 planning, its construction and its purported benefits.

23 We would, therefore, ask that this Board, the  
24 Natural Resources Conservation Board, consider  
25 compelling Alberta Transportation to so disclose those

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Rae

1           agreements. And I'll leave it at that and not pursue  
2           further the queries in regard to the undertaking that I  
3           understand has been refused by Alberta Transportation.

4       MR. KRUHLAK:                   Mr. Chairman, it's Ron Kruhlak. I  
5           wonder if I might briefly respond.

6       THE CHAIR:                    Yes, please go ahead.

7       MR. KRUHLAK:                   Mr. Chairman, I think Mr. -- my  
8           friend, Mr. Rae, is well aware that it's not uncommon  
9           in the nature of advancing projects and dealing with  
10          different parties' interest to enter into arrangements  
11          that have confidentiality provisions, and which I  
12          assume his own client embarks on on a regular basis.

13                 Mr. Hebert has explained the nature of those  
14                 arrangements, and we would maintain that it is  
15                 inappropriate and probably irrelevant to make the  
16                 request and have the request fulfilled as he's  
17                 requested it in this matter.

18       THE CHAIR:                    Mr. Rae?

19       MR. RAE:                      Mr. Chairman, I'd simply say that  
20           the proponent here is a public body; it's the  
21           government of Alberta, it's Alberta Transportation, a  
22           department of the government of Alberta. And those  
23           confidentiality norms that my friend Mr. Kruhlak is  
24           referring to simply don't apply to the government of  
25           Alberta. This is a public body, it should be



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Cross-examined by Mr. Rae

1 disclosing -- if it even has the power in the first  
2 place, it should be disclosing these secret agreements.

3 THE CHAIR: Mr. Rae --

4 Sorry, go ahead, Mr. Kruhlak.

5 MR. KRUHLAK: I was just going to say,  
6 Mr. Chairman, that these are not secret agreements;  
7 they're various agreements, as there are with  
8 landowners with respect to commercial arrangements and  
9 other parties. They are not -- we would not be  
10 producing them. It's -- we're not able to produce  
11 them, having regard to the nature of the agreements.

12 And I guess -- and I was obliged to respond, we  
13 were sitting quietly during Mr. Rae's questioning with  
14 respect to third-party arrangements with TransAlta  
15 Utilities and others with respect to the Bow River, and  
16 we would continue to maintain, Mr. Chairman, that those  
17 inquiries are not relevant for the nature of the  
18 project that is before this Board, which is the SR1  
19 project.

20 I appreciate Mr. Rae's concerns about calculating  
21 benefits and costs, but that -- that -- that inquiry  
22 can go a long way. And we would, again, submit that  
23 it's not relevant to the issues which this Board has to  
24 contend with, and that's whether this project is in the  
25 public interest.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 THE CHAIR: Mr. Rae, you've asked the Board to  
2 weigh in on that. We will caucus on your request that  
3 the Board ask that information. I would suggest that  
4 we could probably do that later -- I don't think it's  
5 urgently needed right now, but we will do that and get  
6 back to the hearing with an answer to your request for  
7 the Board.

8 MR. RAE: Thank you, Mr. Chair.  
9 Those are all my questions I have for this panel.

10 THE CHAIR: Okay, thank you, Mr. Rae.  
11 Mr. Secord or Ms. Okoye? I'm not sure who's  
12 leading this section.

13 MS. OKOYE: That would be Mr. Secord.

14 THE CHAIR: Okay, Mr. Secord?

15 **MR. SECORD CROSS-EXAMINES THE PANEL:**

16 MR. SECORD: Thank you, Mr. Chair.

17 Q. My first series of questions will be on climate change.  
18 Can you tell me, Mr. Hebert, who the panel will be  
19 responding to those questions?

20 A. MR. HEBERT: Just one moment, Mr. Secord.

21 Mr. Secord, there's at least one or two  
22 individuals on the panel that are in a position to  
23 respond on the topic of climate change. So if it's  
24 okay with you, we can proceed with asking the questions  
25 and I will direct traffic appropriately.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. And who are they?

2 A. MR. HEBERT: It would be Mr. Wood and Dr. Luzi  
3 are the individuals.

4 Q. And Dr. Luzi has been put forward as an expert in  
5 hydrogeology; correct?

6 A. MR. LUZI: That is incorrect.

7 COURT REPORTER: Sorry, who was that?

8 A. MR. LUZI: Sorry, Mr. Chair, it's David Luzi  
9 speaking for AT. I'm an expert in hydrology and  
10 geomorphology.

11 Q. MR. SECORD: Yeah, I had written down that you  
12 were the lead for hydrology, so how is that incorrect,  
13 what I just said?

14 A. MR. LUZI: Mr. Chair, you said  
15 "hydrogeology."

16 Q. Okay. I meant to say lead for hydrology. I misspoke.  
17 So you're -- so I have you -- that's what I wrote down.  
18 So you're the lead for hydrology, and are you also a  
19 climatologist?

20 A. MR. LUZI: I'm not, sir.

21 Q. And, Mr. Wood, you've been in all of the panels so far.  
22 What are you the lead on?

23 A. MR. WOOD: I've supported the delivery of the  
24 project and some of the technical aspects around  
25 hydrology and in preparing some of the responses

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 related to climate change.

2 Q. And are you a climatologist?

3 A. MR. WOOD: No, I am not.

4 Q. Now, Alberta Transportation has designed the SR1 to  
5 address a 1 in 200-year flood. The usual design in  
6 Canada for flood mitigation is 1 in 100 years. So this  
7 appears conservative; correct?

8 A. MR. WOOD: Mr. Chairman, I'd just like to  
9 make a brief clarification. Alberta Transportation has  
10 designed the SR1 project to the 2013 flood or  
11 equivalent. It just so happens to be a 200-year event  
12 based on some of the current estimates.

13 Q. Now, in Saskatchewan, it uses a design criteria of a 1  
14 in 500-year event. So if the SR1 was being proposed in  
15 our neighbouring province, then this project would be  
16 underdesigned.

17 Can you tell me why AT didn't use a more  
18 conservative design flood for SR1?

19 A. MR. WOOD: Mr. Chairman, again just a  
20 clarification. Saskatchewan does use a 500-year flood  
21 in their hazard identification program. In neither  
22 province does it stipulate exactly to what service  
23 level you need to build infrastructure.

24 Q. Now, the project design flood is predicated on the 2013  
25 event that occurred in the Calgary region. This was

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 roughly a 1 in 200-year flood. The SR1 design does not  
2 accommodate anticipated changes to the hydro climate of  
3 the area and the likely occurrence of larger flood  
4 based on global climate model or GCM outputs. So how  
5 will this achieve the intended goal?

6 **A. MR. WOOD:** Mr. Chairman, again, a  
7 clarification. The project does consider floods larger  
8 than the 2013 event. In fact, we used GCM models, and  
9 their impact on IDF curves to check whether the factor  
10 safety applied to the maximum diversion rate of the  
11 diversion structure was adequate.

12 **Q.** And which GCM outputs did you look at?

13 **A. MR. WOOD:** I believe that is addressed in the  
14 CEEA conformity review Round 1, Part 3, dated  
15 August 21st, 2019. And as for the GCMs, what we did  
16 use was the RCP 8.5 as it relates to the changes to the  
17 IDF curves.

18 **Q.** Now, do you agree that the risk of rate on snow events  
19 is projected to increase in the future due to the  
20 shortening winter season?

21 **A. MR. LUZI:** Mr. Chair, Dave Luzi speaking.  
22 The -- we do not fully agree with that statement, as  
23 the future predictions for climate change have  
24 different effects depending where you are in the basin.

25 **Q.** So what don't you agree with that statement, what part

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 of it? You say you don't fully agree?

2 A. MR. LUZI: You may not necessarily have  
3 increased rain on snow events as a result of climate  
4 change as you may not have snow in some portions of the  
5 basin.

6 Q. But my question was do you agree that the risk of rate  
7 on snow events is projected to increase in the future  
8 due to the shortening winter season?

9 A. MR. LUZI: Again, I think it depends on the  
10 robustness of the models. And as we know, and as the  
11 City of Calgary also testified, that the predictions of  
12 climate change have evolved as our understanding of the  
13 physical processes involved change were improved.

14 Q. So is the risk of rain on snow event projected to  
15 decrease in the future, Dr. Luzi?

16 A. MR. LUZI: No, I did not say that, sir. I  
17 believe I said that there is uncertainty for that  
18 prediction.

19 Q. So there is a risk, then, that it may increase in the  
20 future?

21 A. MR. LUZI: Correct, you could say that.

22 Q. Do you agree that this is anticipated to result in a  
23 much larger flood than the 2013 event in the future?

24 A. MR. LUZI: Mr. Chair, Dave Luzi speaking  
25 again. No, I would not. Again it depends where in the

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 basin you are -- are assessing that effect.

2 Q. And where in the basin if you were assessing that  
3 effect would it result in much larger floods than the  
4 2013 event?

5 A. MR. LUZI: Again, Mr. Chair, Dave Luzi  
6 speaking again. I think, again, the uncertainty of how  
7 climate change will affect differences in the front  
8 ranges and in the headwaters of the rivers that feed  
9 into the City of Calgary, those impacts have shown to  
10 be varied with potentially more flooding occurring up  
11 in locations around the Banff area, for example. But  
12 by the time you reach Calgary, the actual instantaneous  
13 peaks are not expected to be any different under  
14 climate change.

15 Q. Now, the design configuration for SR1 is influenced by  
16 the conditions experienced in the Elbow River catchment  
17 area in 2013; correct?

18 A. MR. WOOD: Mr. Chairman, this is Matt Wood.  
19 That is correct.

20 Q. And how is this considered reasonable when other  
21 options like MC1 can mitigate much bigger floods?

22 A. MR. WOOD: Mr. Chairman, as we stated  
23 around -- on Topic Day 1, MC1 does not necessarily  
24 mitigate bigger floods. Maybe -- maybe perhaps if I  
25 could ask if Mr. Secord rephrases the question?

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. The question was the design configuration for SR1 is  
2 influenced by the conditions experienced in the  
3 Elbow River catchment area in 2013. And you agreed  
4 with that. And my question was how is this considered  
5 reasonable when other options like MC1 can mitigate  
6 much bigger floods?

7 A. MR. WOOD: Mr. Chairman, if I may point out,  
8 MC1 did have the same design basis as SR1 as reducing  
9 flows downstream of Glenmore to 170. But I think, more  
10 importantly, is that SR1 is designed to mitigate  
11 flooding larger than that, which occurred in 2013,  
12 because of the factors of safety applied to the design.

13 Q. Now, I guess this is -- these questions I'll put out  
14 there, and I guess one or other of you will deal with  
15 them, or, Mr. Hebert, you'll direct them to somebody  
16 else.

17 Do you agree that the paleo records indicate that  
18 there have been several extended wet periods in the  
19 past that would have influenced flood potential?

20 A. MR. LUZI: I guess I could take this. This  
21 is Dave Luzi, Mr. Chair.

22 The -- I believe Mr. Secord, can I ask a point of  
23 clarification? Are you referring to the evidence  
24 presented in the tree ring data?

25 Q. Yes.



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1       A.   MR. LUZI:                    Dave Luzi again. I would just  
2       like to clarify that the tree ring data is an  
3       interesting source of historic hydro climatic  
4       information and is useful when describing, you know,  
5       periods of wet and periods of dry in the observable  
6       tree ring record.

7                But as the -- in the evidence presented, if you  
8       look at the papers that were referred to, those papers  
9       acknowledge that, that that information is really more  
10      for transient and does not necessarily reflect peak  
11      flows or how the rivers respond.

12               And also the authors of some of those papers  
13      pointed out that the tree ring information does not  
14      seem to correlate really well with mountainous  
15      environments, which is the bulk of flows in the  
16      Elbow River.

17      Q.   But Dr. Luzi, that wasn't my question. My question was  
18      do you agree that paleo records indicate that there  
19      have been several extended wet periods in the past that  
20      would have influenced flood potential?

21      A.   MR. LUZI:                    This is Dave Luzi again,  
22      Mr. Chair. I do agree that the paleo records seem to  
23      show extended wet periods and dry periods. But, again,  
24      I would like to clarify that that does not translate  
25      necessarily into the peak flows.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. And how has this paleo record information been used by  
2 AT and Stantec?

3 A. MR. WOOD: Mr. Chairman, this is Matt Wood.  
4 If I may. That information has not been used. Again,  
5 SR1 was designed to the flood of record. And I believe  
6 on previous days, I've referred to that being the  
7 hydrometric records, the measured data on the river  
8 during that specific flood event.

9 Q. And why weren't the paleo records used or considered by  
10 AT or Stantec?

11 A. MR. WOOD: Mr. Chair, it's Matt Wood again.  
12 If I may. And as Mr. Luzi pointed out, those records  
13 don't necessarily correlate to event-based metrics. So  
14 when we're looking for a specific flow to design SR1  
15 to, that type of information which is being referenced  
16 does not provide us with that.

17 And so, you know, as is common practice, we look  
18 to the hydrometric records kept by the federal  
19 government, Water Survey Canada, and use those as part  
20 of the design basis.

21 Q. Do you agree that paleo records also indicate the  
22 occurrence of extended drought conditions, yet there  
23 has been no assessment by AT or Stantec of how drought  
24 might increase the risk to Springbank residents from  
25 windblown dust originating from sediment accumulated in

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Cross-examined by Mr. Secord

1 the SR1 reservoir. Why has this been ignored by AT?

2 A. MR. WOOD: Mr. Chair, this may be a question  
3 best for the air quality data, but while there may be  
4 periods of drought in that record, I think you'll find  
5 that the assessments done as part of that response to  
6 the questions around air quality were quite  
7 conservative.

8 Q. So do I understand, then, that the climate change  
9 questions aren't totally reserved for Topic Blocks 3  
10 and 4, that you're also expecting climate change  
11 questions to be addressed by the panel of  
12 Topic Block 5? And maybe, Mr. Barbero, can you confirm  
13 that or -- one of your colleagues?

14 I just want to make sure that I've got the right  
15 people to answer my questions now and I don't want to  
16 get to Panel 5 and then find out oh, sorry, you should  
17 have asked that question in Topic Block 4.

18 A. MR. HEBERT: Mr. Chairman, if I may, Wayne  
19 Speller is prepared to provide a response.

20 A. MR. SPELLER: Mr. Chair, it's Wayne Speller.

21 So Mr. Secord, our discussions on sediment  
22 management and air quality, our witnesses for that are  
23 focused on Topic Day 5. So if you do have questions  
24 related to that, that might be a better time to pose  
25 them. We'll have the right people in the room to

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1 answer them for you.

2 Q. MR. SECORD: And will that include AT's failure  
3 to assess how drought might increase the risk to  
4 Springbank residents? And I'm thinking now, looking at  
5 the -- looking at the paleo records' extended periods  
6 of drought, you're going to say I'm going to get  
7 answers to those questions in Topic Block 5 on the  
8 climate change aspect?

9 MR. BARBERO: Well, Mr. Secord, I don't think --

10 COURT REPORTER: Sorry, who's speaking?

11 MR. BARBERO: Michael Barbero, Alberta  
12 Transportation.

13 And I guess I'm getting a little confused, sir, at  
14 what you're asking, and it's not for this panel to  
15 answer that question. And as you rightly say, it's  
16 probably for you and I and the Chair to discuss, but if  
17 you have questions about climate change, we're here to  
18 talk about climate change today. If you have questions  
19 about air quality, we're here on Topic Day 5 to talk  
20 about air quality. I'm not sure that I'm understanding  
21 the distinction that you might be making, sir.

22 MR. SECORD: Okay, so let's try this again.

23 Q. MR. SECORD: Do you agree that the paleo  
24 records also indicate the occurrence of extended  
25 drought conditions, yet there has been no assessment by

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 AT of how drought might increase the risk to the  
2 Springbank residents from windblown dust originating  
3 from sediment accumulated in the SR1 reservoir?

4 **A. MR. WOOD:** Mr. Chairman, this is Matt Wood  
5 here. If such extended periods of drought occurred,  
6 then it's assumed that SR1 may not be operating.

7 And so I'm not too sure what the concern is in  
8 that regard.

9 **Q.** So, Mr. Wood, assuming that SR1 has operated and has  
10 sediment accumulated on the floor of the reservoir,  
11 have -- has AT assessed how extended drought conditions  
12 might increase the risk to Springbank residents from  
13 windblown dust as a result of climate change?

14 **A. MR. WOOD:** Mr. Chair, as stated earlier, I  
15 believe that's best put to the folks who are looking at  
16 air quality risks.

17 **Q.** Is it possible that in the future during mega drought  
18 conditions, the City of Calgary may want to use SR1 for  
19 water storage to mitigate the City's desperate need for  
20 water?

21 **A. MR. WOOD:** Mr. Chair, it's Matt Wood here.  
22 There are currently no plans to provide permanent pool  
23 water storage in SR1, and I don't believe Mr. Frigo had  
24 requested that, based on his testimony in previous  
25 days.

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Cross-examined by Mr. Secord

1 Q. So you can confirm that this is not the intended  
2 purpose of the structure because water is to be drained  
3 within 40 or so days after a flood event; correct?

4 A. MR. WOOD: Mr. Chair, it's Matt Wood again.  
5 The water is to be drained following a flood event,  
6 yes. And how will the Springbank residents be assured  
7 that this structure will not be used for longer term  
8 storage of water in the future?

9 A. MR. HEBERT: Mr. Chairman, it's Matt Hebert.  
10 We've not put forward an application to operate  
11 the structure for water storage. There'd be no --  
12 without citing the specific authorities. But I think  
13 in brief, Alberta Transportation and  
14 Alberta Environment won't have the authority to operate  
15 the structure for storage purposes. That would be the  
16 assurance provided.

17 Q. Do you agree that extended droughts may result in  
18 enhanced ground cracking from desiccation of the  
19 exposed soils in response to a lowering of the water  
20 table?

21 A. MR. YOSHISAKA: Mr. Chairman, it's Dan Yoshisaka  
22 speaking.

23 MR. SECORD: Sorry, who?

24 A. MR. YOSHISAKA: It's Dan Yoshisaka speaking.

25 Q. Sorry, I didn't see anybody popping up on the screen.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Good morning.

2 A. MR. YOSHISAKA: Good morning, Mr. Secord.

3 There is some potential for, you know, desiccation  
4 cracking as a result of drying out of those upper  
5 sediments; however, under our current understanding of  
6 the groundwater conditions in the area is that the  
7 water levels are quite near surface, and as such, the  
8 potential for those cracks that develop is quite  
9 limited to the upper metre or two of material.

10 Q. And are you speaking now in circumstances of extended  
11 droughts in a climate change scenario?

12 A. MR. YOSHISAKA: No, I'm not. I'm speaking in  
13 terms of the baseline conditions as they have been  
14 observed currently.

15 Q. So my question was do you agree that extended droughts  
16 may result in enhanced ground cracking on the  
17 desiccation of the exposed soils in response to a  
18 lowering of the local water table?

19 A. MR. YOSHISAKA: There is a potential for that  
20 to -- to happen as a result of lowering of the  
21 groundwater table.

22 Q. Do you agree that this will compromise the glacial clay  
23 layer acting as a seal on the base of the SR1  
24 reservoir?

25 A. MR. YOSHISAKA: Mr. Chairman, no, I would not

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 agree with that -- that statement.

2 The water levels in the area are controlled by a  
3 number of different factors, one of which is the  
4 topographic drivers in the area which tend to focus  
5 flow towards the areas underlying the reservoir.

6 So with that in mind, no, we don't anticipate that  
7 the glacial till materials which underlie the reservoir  
8 would be able to completely desiccate.

9 Q. And is does your answer factor in extended droughts  
10 like we've seen in the paleo records?

11 A. MR. YOSHISAKA: Our answer would be based upon our  
12 understanding of the mechanisms that control  
13 groundwater movement and groundwater flow patterns in  
14 the area.

15 It's important to note that there is a fair bit of  
16 topographic relief in this area. So what ends up  
17 happening, due to the relief, is that the flow  
18 directions are, you know, continuously driven down into  
19 the lower lying areas, including the reservoir area.  
20 And with that in mind, we -- we, you know, understand  
21 that those areas will be saturated and remain hydrated,  
22 and thus the potential for desiccation cracking is  
23 reduced.

24 A. MR. BACK: This is Dan Back. If I could  
25 interject a little bit here. I'm not a climate



## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           **scientist.**

2           Q.   Mr. Back, you're not on. But I think the court  
3           reporter can't see you.

4           THE CHAIR:                   Thank you.

5           A.   **MR. BACK:**               **Sorry, I'm not a climate**  
6           **scientist, but I am a geotechnical engineer. And I can**  
7           **say the moisture in the soil doesn't necessarily follow**  
8           **the specific groundwater level, particularly in the**  
9           **clay soil; it pulls the moisture up quite a lot.**

10                   I couldn't speak to what might happen in a huge  
11           mega drought than what has happened in the past. But  
12           in geologic time, our experience with clay soils is  
13           that we see desiccation down to a depth of no more than  
14           about 2 metres. And below that level, deeper  
15           groundwater will feed water into the soil by capillary  
16           action, and we have a minimum impact deeper than that  
17           in terms of fracturing or cracking of the soils below.

18                   Within our design, we generally considered a depth  
19           of about 2 metres for both freeze/thaw and desiccation  
20           in the design of the SR1 storage dam.

21           Q.   So Mr. Yoshisaka, do you agree that enhanced leakage  
22           from the base of the SR1 structure may occur as a  
23           result of this enhanced ground cracking from an  
24           extended drought like we've seen in the paleo records  
25           in the past?

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1       **A. MR. YOSHISAKA:**           Mr. Chairman, members of the  
2       Panel, as Mr. Back has pointed out, the process of  
3       drying out very fine grained materials such as clays  
4       is -- is limited.

5               There is, you know, a lot of surface tension  
6       within those materials due to their, you know, tiny  
7       mineral grain sizes tend to retain water within them,  
8       even though there may not be a refresh source of water  
9       percolating down through them.

10              And, you know, with that in mind, I would also  
11      like to point out to the Board that our modelling does  
12      provide some provision for reduced hydraulic  
13      conductivities within those upper few metres underneath  
14      the reservoir to account for things like this.

15      **Q.** So Mr. Yoshisaka, then, how do you explain the presence  
16      of fractures down to 10 metres or more in depth  
17      under SR1?

18      **A. MR. BACK:**               This is Dan Back. We did not  
19      encounter any fractures in our investigation of the  
20      soils at the SR1 reservoir embankment location.

21      **Q.** So you're saying there are no fractures beneath the SR1  
22      reservoir?

23      **A. MR. BACK:**               I can say in the boreholes that we  
24      advanced, we did not observe evidence of fractures. I  
25      cannot say emphatically that there could be none within

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 the reservoir.

2 We advanced a lot of boreholes under the  
3 embankment and within the reservoir and did not see any  
4 evidence of it.

5 Q. And who on the panel was involved in the development of  
6 the numerical groundwater model?

7 A. MR. YOSHISAKA: That would be myself.

8 Q. Can you advise how the potential for enhanced leakage  
9 from the base of the SR1 structure was accommodated in  
10 the groundwater model? I think you mentioned something  
11 about K values a moment ago.

12 A. MR. YOSHISAKA: That's correct, Mr. Secord. Our  
13 model is based upon a geologic model of the area that  
14 was developed based on over 2,000 borehole records  
15 within the regional assessment area.

16 So it's a robust geologic model that was derived  
17 based on regional information, as well as local  
18 project-specific information for boreholes that we  
19 drilled within the project development area.

20 So this geologic model identifies the presence,  
21 distribution, thickness of the underlying clay  
22 materials, and there are actually two different clay  
23 units underlying this reservoir area that both have  
24 very low permeabilities associated with them.

25 Now, within the model, within the upper layer of

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 the models, so this is the first layer underlying the  
2 reservoir area. We did discount some of the hydraulic  
3 conductivity values, so we actually assigned them to be  
4 higher, more permeable than what we actually measured  
5 in the field, and this was done to be conservative in  
6 our approach and again account for some of that  
7 potential.

8 Q. Now, with respect to enhanced leakage from the base of  
9 the SR1 structure occurring as a result of enhanced  
10 ground cracking driven by climate change, can you  
11 advise, how has this been assessed, accommodated in any  
12 risk assessments conducted using the model?

13 And I don't know, would that be Ms. Noble dealing  
14 with the risk assessment aspects? Or does that stay  
15 with you, Mr. Yoshisaka, as the manipulator of the  
16 model?

17 A. MR. YOSHISAKA: I believe Ms. Noble's involvement  
18 of risk assessment is more pertaining to human health.  
19 So yes, I could speak to the model.

20 Again, Mr. Chairman, I'd like to point out that,  
21 you know, the model is very conservative in the way  
22 that it's been constructed. Again, some of these low  
23 permeability units, of which there are two, we have  
24 assigned values in there that were up to two orders of  
25 magnitude higher, meaning higher permeability than

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 what's observed in the field.

2 Further to that, we also embarked on a bit of an  
3 exploratory sensitivity analysis as we would term it.  
4 And within that simulation result, we actually turned  
5 up permeability values within the till by three orders  
6 of magnitude, so increased them by a thousandfold.

7 And again, I would caution you to understand that  
8 the context of those results is to, you know, provide  
9 an end member in examining a what-if scenario. So what  
10 if the permeability values within those tills were  
11 again up to a thousand times higher than what we  
12 measured in the field, what would the outcome be.

13 And with that simulation in mind as well, we  
14 understand that the effects, even under those  
15 conditions, would still be relatively localized. They  
16 do extend further out than what we carry in our project  
17 case; however, we do have an understanding of what  
18 enhanced permeability within those tills could mean, in  
19 terms of characterizing those effects.

20 Q. Is there a possibility that the borehole drilling  
21 missed fractures intervals given that the fractures may  
22 be vertical?

23 A. MR. BACK: This is Dan Back.

24 I could say that obviously if the refracture's in  
25 locations that we didn't drill is a possibly that we

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           might have missed them, but given the very substantial  
2           number of boreholes that were advanced through the clay  
3           soils at the project site, it seems unlikely that they  
4           would be extensive and pervasive, and we would not have  
5           encountered them.

6        **A. MR. YOSHISAKA:**           Mr. Chairman, I'd like to add to  
7           that response, as well. I believe it's actually within  
8           the evidence of SCLG's experts that there is the  
9           presence of swelling clays in these areas. And given  
10          that the clays and tills underlying this area are  
11          permanently saturated, the presence of those clays, you  
12          know, should a fracture happen -- happen to form will  
13          anneal those fractures. That swelling action will tend  
14          to close off those fractures and, you know, close them  
15          off such that the bulk matrix hydraulic conductivity is  
16          maintained.

17        **Q.** Can you confirm, Mr. Yoshisaka, that you didn't  
18          increase the K value for the clay in the model, and why  
19          was that?

20        **A. MR. YOSHISAKA:**           So the hydraulic conductivity  
21          values for those upper clays were already assigned  
22          higher values than what we measured. So we didn't, in  
23          addition within that sensitivity run, increase them  
24          further because they were already set at conservative  
25          values.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. Would you agree, Mr. Yoshisaka, that swelling clays  
2 would dry under a lower water table driven by climate  
3 change?

4 A. MR. YOSHISAKA: Again, there is some potential for  
5 that; however, within those sensitivity runs, you know,  
6 we did assign values that were up to a thousand times  
7 more permeable within the reservoir area.

8 So, you know, the net effect of fractures that  
9 could arise from desiccation would be captured well  
10 within that range that we established.

11 Q. So staying on the theme of climate change, I now see  
12 that I have an array of aspiring climatologists, but  
13 probably back to Mr. Wood and -- and to Dr. Luzi, do  
14 you agree that climate change projections are for a  
15 more flashy run-off period in the future, i.e. higher  
16 peak flows over a shorter duration and over a longer  
17 flow period?

18 A. MR. LUZI: Sorry, Mr. Chair, it's Dave Luzi  
19 speaking. I can speak to that, Mr. Secord.

20 I would disagree with that statement as I  
21 previously indicated that some climate forecasts are  
22 showing that the Elbow River stages of the city of  
23 Calgary, the peak flows will not be increased under  
24 climate -- peak flows are not anticipated to be  
25 increased at the city of Calgary and the Elbow River

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 under climate change conditions.

2 Q. And which climate change projections are you referring  
3 to now?

4 A. MR. LUZI: This to be an ensemble of  
5 projections and some of the work, recent work by  
6 Dr. Pomeroy and his team with the University of  
7 Saskatchewan.

8 Q. So you're saying that looking into the future, the  
9 projections are for a less flashy run-off period in the  
10 future, i.e. lower peak flows over a higher duration  
11 and a shorter low flow period; you're saying that what  
12 you've looked at is the reverse?

13 A. MR. LUZI: No. I indicated that the models  
14 are predicting that the actual peak flow in -- at the  
15 city of Calgary by the time that floodway make its way  
16 to the city of Calgary is not expected to increase.

17 Q. So I take it, then -- sorry, go ahead. I don't want to  
18 cut you off.

19 A. MR. LUZI: It was going to say it was kind of  
20 what I was indicating earlier that the physical  
21 processes, you know, the work that that team has done  
22 in their monitoring in the Rocky Mountains shown that  
23 there's this separation between the front ranges and  
24 the headwater catchments, that the discrepancy between  
25 those balances out by the time it heads to Calgary.



## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. So then I take it you can confirm this statement is  
2 correct: A more flashy run-off period in the future,  
3 i.e. higher peak flows over a shorter duration and a  
4 longer low flow period has not been accommodated in the  
5 peak flow analysis to ensure that SR1 can achieve its  
6 intended goal of flood mitigation?

7 A. MR. WOOD: Mr. Chairman, it's Matt Wood here.  
8 I would disagree with that statement.

9 We did look at the potential for higher peak  
10 flows. Again, I explained that earlier using the  
11 University of Western Ontario's IDFCC Tool, we looked  
12 at climate-impacted event-based precipitation, and  
13 using the most conservative estimates in that tool set.

14 So while we can discuss the potentials of whether  
15 it's bigger flood's getting bigger or smaller floods  
16 more frequently, you know, this was looked at in design  
17 as far as taking a sort of a bookend approach. Again,  
18 we looked at RCP 5 and checked our factors of safety  
19 accordingly.

20 Q. And Mr. Yoshisaka, am I correct, then, that you did not  
21 model the groundwater under climate change, and if so,  
22 why?

23 A. MR. YOSHISAKA: Mr. Secord, we -- we constructed  
24 the model based on conditions during the 2013 flood.

25 Q. Is the -- in terms of looking at the global models, is

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 the general agreement in all of the models that you've  
2 looked at, Mr. Wood, the peak flows will be lower?

3 A. MR. WOOD: Mr. Chairman, I may ask Dave Luzi  
4 to elaborate. But what I believe they're suggesting is  
5 that flooding will be more frequent. Flood peaks may  
6 increase, but on the extreme end, the very extreme  
7 events like those that occurred with 2013, right now,  
8 there's not the evidence to suggest that those type of  
9 events will become more severe, more frequent.

10 Perhaps Dave could elaborate.

11 A. MR. LUZI: It's Dave Luzi speaking again.

12 I think, as Matt indicated, there is -- like I  
13 didn't disagree with your previous statement that there  
14 will be more flashy hydrographs. I disagreed with the  
15 component that was relating that flashiness to higher  
16 or increased peak flows.

17 I think as the modelling and as we develop more  
18 sophisticated physical models of the hydrological  
19 processes that drive flow events with the Elbow River  
20 and Bow River basins, they found that these scenarios  
21 are showing that, you know, the front ranges may have  
22 less snow volumes, so the ground snow event may  
23 decrease so you get just rain on dry ground. And that  
24 would offset the potential rain and snow events in head  
25 the ranges, the headwater areas of these basins.

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Cross-examined by Mr. Secord

1 Q. Do you agree that it is true that tree rings only  
2 provide an indication of what the annual moisture  
3 conditions were like back in time?

4 A. MR. LUZI: Yes, I think they're developing  
5 the sophistication of those things to look at stream  
6 flow. But even in the Sauchyn et al. paper that was  
7 referenced in Dr. Fennell's, that that was -- that only  
8 accounted for about 37 to 44 percent I believe of the  
9 variability seen in the stream flow data.

10 So there is a lot of uncertainty that's  
11 unaccounted for.

12 Q. Do you agree, Dr. Luzi, that floods have a greater  
13 chance of occurring during extended wet periods versus  
14 extended dry periods?

15 A. MR. LUZI: No, depending on the areas that  
16 I've looked at where I've specifically looked at that  
17 relationship, it's not necessarily strong.

18 Q. Now, you mentioned the Sauchyn and Ilich paper, that's  
19 S-A-U-C-H-Y-N, and Ilich I-L-L-I-C-H (verbatim). Do  
20 you agree that the reconstructed record of flow on the  
21 South Saskatchewan River as presented by Sauchyn and  
22 Ilich, and that's referred to in PDF 18 of  
23 Dr. Fennell's report, Exhibit 261, we don't need to  
24 pull it up unless you want to have it, Dr. Luzi.

25 So do you agree that the reconstructed record of

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 flow on the South Saskatchewan River as presented by  
2 Sauchyn and Ilich provides an assessment of what flow  
3 conditions would have been like back in time?

4 **A. MR. LUZI:** Not necessarily. As I indicated  
5 that they don't even mention that in their paper.

6 They're looking at, you know, and kind of a water  
7 annual yield on an annual basis, and that's I think  
8 where you get the wet and dry cycles from.

9 But -- and overall, that's like at the South  
10 Saskatchewan which is, you know, much further  
11 downstream than the river we're talking about  
12 currently.

13 **Q.** Right. And you can confirm that although this is not  
14 specific to the Elbow River, do you agree that it does  
15 indicate that there were wet periods when excess flow  
16 was occurring in southern Alberta during wetter periods  
17 in the climate?

18 **A. MR. LUZI:** Excess flow, really I'm not sure  
19 if you can say that. Again, it depends on how that  
20 precipitation is distributed over on an annual basis.

21 **Q.** Given that the Elbow is a tributary of the South  
22 Saskatchewan River, do you agree that it is reasonable  
23 to assume that the risk for flooding for the  
24 Elbow River during wetter climatic periods would be  
25 higher?

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1       A.   MR. LUZI:                    Again, sorry, it's David Luzi  
2       speaking again, Mr. Chair, apologize. Again, as I --  
3       as I said previously, that the paper itself admits that  
4       it doesn't behave well in the headwater areas such as  
5       the Elbow River, that even though there are variants in  
6       the relationship between tree ring wet and dry periods  
7       and stream flow was -- was, you know, in that less than  
8       50 percent, that uncertainty is even greater in snow  
9       processed dominated areas like the Elbow River  
10      watershed.

11     A.   MR. WOOD:                And, Mr. Chairman, if I may  
12      supplement Mr. Luzi's comments.

13                This lack of correlation between the south  
14      Saskatchewan and its tributary, the Elbow River, is  
15      evident. Document manager, you don't need to bring it  
16      up, but in Exhibit 173, page 28 of the PDF, we see the  
17      historic flood series for the Elbow River showing  
18      events that occurred.

19                And I would draw the Board's attention to the  
20      event in 1932, which was a very major flood; in fact,  
21      it nearly damaged the cofferdams at Glenmore while it  
22      was under construction. That event is not reflected in  
23      these tree ring records on the south Saskatchewan. So,  
24      you know, it's pretty indicative that things can happen  
25      on the Elbow River that aren't happening on the South

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 Saskatchewan. And, conversely, things the South  
2 Saskatchewan happening that are not happening on the  
3 Elbow River.

4 Q. Now, Stantec notes in Footnote 31 of Exhibit 325, which  
5 I think is your response submissions -- and I don't  
6 know that you wanted to -- need to turn it up, but if  
7 you want to, you can.

8 Stantec notes in Footnote 31 of Exhibit 325 that  
9 tree rings are indicative of annual changes in moisture  
10 conditions but are not reflective as specific flood  
11 events.

12 Do you agree that there is no paleo technique  
13 available to determine the characteristics of past  
14 floods, so this is the best way to gauge what  
15 conditions would have been like leading to past floods?

16 A. MR. LUZI: Mr. Chair, Dave Luzi speaking  
17 again. I think that the tree ring method -- and if you  
18 look at the literature, the literature that Dr. Fennell  
19 referenced in his thing is that these are good  
20 indicators of hydroclimatic variability.

21 Understanding the processes that drive stream flow  
22 or peak flows and relating that to tree-ring data in,  
23 you know, watersheds such as the Elbow River, I think,  
24 is difficult. And I'm not sure that you can  
25 extrapolate a tree that grows well or has really robust

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1 years to activity within -- within a river.

2 Q. But you agree there is no paleo technique available to  
3 determine the characteristics of past floods?

4 A. MR. LUZI: There are some techniques  
5 available because we have been able to reconstruct  
6 potential flow pathways with some of the old glacial  
7 outwash channels, but that's not getting you -- that's  
8 getting you a pretty loose approximation of a potential  
9 peak flow.

10 Q. Do you believe, then, it is reasonable to use this  
11 tree-ring information to better understand what past  
12 conditions may have been like in order to understand if  
13 SR1 will achieve its goal of flood mitigation?

14 A. MR. LUZI: Sorry, Mr. Chair, I lost  
15 connectivity there for a second. Could you please  
16 repeat that, Mr. Secord?

17 Q. Sure. So do you agree that it is reasonable to use  
18 this tree-ring information to better understand what  
19 past conditions may have been like in order to  
20 understand if SR1 will achieve its goal of flood  
21 mitigation?

22 A. MR. WOOD: Mr. Chairman, it's Matt Wood here.  
23 Maybe I'll take this opportunity to remind the Board  
24 that SR1's flood mitigation goal is to mitigate the  
25 damages from the 2013 event. While there may be

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1 techniques to extent the paleo climate record, and  
2 there may have been wet periods prior to our  
3 hydrometric record, it is -- it is industry practice to  
4 use the recorded hydrometric data when trying to  
5 quantify things like peak flow rates from a given  
6 event, which are later used in the design of structures  
7 that require very specific peak flow rates for their  
8 design.

9 Q. Now, you note in paragraph 112 of Exhibit 325 the  
10 response submissions that Stantec has assessed  
11 event-based precipitation to assess the impact of  
12 climate change on intensity, duration, and frequency  
13 IDF curves, and has come to the conclusion that there  
14 is a potential 12 percent increase in the potential for  
15 a 1 in 200-year flood to occur.

16 What does that mean?

17 A. MR. WOOD: Mr. Chairman, it means -- it means  
18 just exactly that, and it's the exercise that I  
19 explained earlier where we used a commonly accepted  
20 tool that has intensity, duration frequency curves  
21 modified for climate change in it. We took the results  
22 of that assessment, ran it through the hydrologic model  
23 that was built for the Elbow River as part of the PMF  
24 study and quantified the effect that those rainfall  
25 events, those climate change-effected rainfall events,



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1 would have on event-based flows on the Elbow River.  
2 And the result was that the 200-year flood may increase  
3 by 2050 by 12 percent.

4 Q. And what does that mean, "may increase by 2050 by  
5 12 percent?"

6 A. MR. WOOD: Mr. Chair, it means that these are  
7 projections made using very conservative assumptions,  
8 specifically the use of the RCP8.5. And looking out to  
9 2050, again, that RCP8.5 means no reduction in current  
10 emissions. It's sort of that status quo.

11 As I believe I pointed out in the response  
12 regarding this, many governments have gone to undertake  
13 measures to reduce emissions, and so it's questionable  
14 whether RCP8.5 is valid. But in the design of SR1 and  
15 the assessment that we described here, it is  
16 conservative.

17 Q. You note in paragraph 112 of Exhibit 325, Stantec's  
18 response submissions, that Stantec has also included a  
19 25 percent increase in the maximum diversion rate of  
20 SR1 as a safety factor; correct?

21 A. MR. WOOD: Mr. Chairman, this is Matt Wood.  
22 That is correct.

23 Q. Considering the fact that documented flows in the  
24 Bow River back in the 1890s have shown greater than  
25 25 percent increases over the 2013 flood, do you agree

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Cross-examined by Mr. Secord

1           that it is reasonable to assume that the Elbow River  
2           could have experienced greater than 25 percent flows  
3           above the 1 in 200-year flood?

4       **A. MR. WOOD:**                    Mr. Chairman, this is Matt Wood.  
5       **I would in fact disagree.**

6           We have to refer on the Bow River that that river  
7           didn't quite see the same return period as the Elbow  
8           did in that event. The Bow River I believe was  
9           estimated at being I've seen estimates between a 40 and  
10          a 70-year event.

11          So to compare percentages to those historic events  
12          on the Bow and then apply that same percentage to the  
13          Elbow, I don't believe it to be valid, and I think it's  
14          indicative of how the 2013 event occurred. We had a  
15          greater than a 200-year event on the Elbow when the  
16          Bow, while it was a very large flood in the record, did  
17          not see that level of return period.

18          And so it would have had a greater relative  
19          difference to those historic events that Mr. Secord  
20          speaks of.

21       **Q.** Aren't we trying to design to peak flow to protect  
22        people and property?

23       **A. MR. WOOD:**                    Mr. Chairman, Alberta  
24        Transportation's SR1 project is designed to mitigate  
25        flood damages to property and infrastructure.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. And isn't understanding variability a very big part of  
2 the design, Mr. Wood?

3 A. MR. WOOD: Absolutely, Mr. Chair. It's  
4 indicative that variability is something that we  
5 consider all through the engineering design process.  
6 And as I mentioned earlier, 25 percent, that's a  
7 25 percent increase on the diversion capacity that  
8 would have been necessary to meet the 2013 flood goal  
9 was added for that very reason, for variability.

10 Q. And you referenced the average of 12 percent from the  
11 climate change models. Can you tell me, was Stantec  
12 using the ensemble of the average of 12 percent? You  
13 know how these climate change models will give you the  
14 average, and then it'll give the 95th percentile, for  
15 instance. Can you tell me, was this the ensemble of  
16 the average at 12 percent?

17 A. MR. WOOD: Mr. Chairman, this is Matt Wood.  
18 I'm not entirely clear on the question. Perhaps I can  
19 aim to respond and perhaps Mr. Secord could clarify.

20 But the estimate use RCP 8.5; some of the  
21 ensembles he may be referring to is the different  
22 selections of GCMs and emissions factors.

23 There is another realm of confidence estimates in  
24 this discussion, and that is how it relates to flood  
25 frequency and the confidence within those estimates.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           Those estimates were done based on the median of the  
2           primary confidence curve within those estimates.

3           Q. Now, this is a reference to Exhibit 327, PDF page 48,  
4           where Stantec indicates there's a low correlation  
5           between snowpack size and flood peaks in the  
6           Elbow River. Do you agree that the fact that the snow  
7           packs during flood events tend to be above normal does  
8           indicate that they are an influencer on those flood  
9           events?

10          A. MR. WOOD:                    Mr. Chairman, this is Matt Wood.  
11          I wouldn't disagree that snowpack influences flood  
12          events.

13                 In response to some of the questions around  
14                 snowpack, we prepared some graphs showing the  
15                 snow-water equivalent in the snowpack for every given  
16                 year and correlated it with years that had flood  
17                 events.

18                 And to even my surprise, the -- the correlation is  
19                 not that direct. It seemed to be that some of the  
20                 years with the largest snowpacks resulted in some of  
21                 the smallest floods, whereas the years with the largest  
22                 floods didn't necessarily have the largest snowpack.  
23                 In fact, many of those were around the median -- I  
24                 believe 2013 I believe was the 63rd percentile  
25                 snowpack, not the largest in record, not even close.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. So basically --

2 THE CHAIR: Mr. Secord, maybe listen to this  
3 question, get it answered. And then just thinking  
4 about a lunch break, so we would likely be pretty close  
5 to noon anyway, and we could break till 1.

6 But please proceed, let's get this question in.

7 MR. SECORD: I was hoping to beat you to the  
8 punch, sir.

9 THE CHAIR: Oh, I see.

10 MR. SECORD: I was going to finish this one off  
11 and suggest we do that.

12 Q. So I think you noted --

13 THE CHAIR: You're cutting in and out,  
14 Mr. Secord.

15 MR. SECORD: Sure. How am I, better, better  
16 now?

17 Q. Okay, so you mentioned the rain-on-snow event that  
18 occurred in 2013; the snowpack then was an influencer  
19 on that event. You said it was a 65th percentile in  
20 terms of snowpack size; did I hear you right, Mr. Wood?

21 A. MR. WOOD: Mr. Chair, subject to check, I  
22 believe it was the 63rd. I don't have the reference in  
23 front of me, but it's in that exhibit.

24 Q. And so do you agree that above-normal snowpacks  
25 increase the risk of floods on the Elbow River and that

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           when combined with a rain event like 2013 which  
2           occurred as common upslope condition, this could lead  
3           to higher magnitude Elbow River floods beyond the 1 in  
4           200-year event?

5       **A. MR. WOOD:**                   **Mr. Chairman, we can theorize**  
6       **that.**

7           **Again, I had said that snowmelt is a driver, and**  
8           **rain on snow is an important consideration on the**  
9           **hydrology of the Elbow River. However, in the 2013**  
10          **flood, the run-off, the estimates of snowmelt**  
11          **contribution to run-off are around 10 percent, and**  
12          **90 percent of that fell as rain.**

13          **While it is a risk, we have to remember that this**  
14          **doesn't necessarily revolve around that 200-year event.**  
15          **While we could see more rain-on-snow events, those**  
16          **could result in 10-year floods, 20-year floods, and**  
17          **perhaps more frequently, indicating the necessity for a**  
18          **project like SR1.**

19       **MR. SECORD:**                   **Mr. Chair...**

20       **THE CHAIR:**                   **Mr. Secord, that a reasonable**  
21       **break in questioning?**

22       **MR. SECORD:**                   **It is.**

23       **THE CHAIR:**                   **And we can pick this up after**  
24       **lunch?**

25       **MR. SECORD:**                   **Thank you.**

ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 THE CHAIR: So let's return at 1:00 everyone,  
2 thank you.

3 (PROCEEDINGS ADJOURNED AT 11:59 A.M.)

4 \_\_\_\_\_

5 PROCEEDINGS ADJOURNED TO 1:00 P.M.

6 \_\_\_\_\_

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## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Volume 6

2 March 29, 2021

3 P.M. Session

4

5 (PROCEEDINGS RECOMMENCED AT 1:00 P.M.)

6 THE CHAIR: Okay. Mr. Barbero, your panel is  
7 ready?

8 MR. BARBERO: Mr. Chair, I believe everyone is  
9 there, yes, sir.

10 THE CHAIR: Okay. Great. Mr. Secord, you're  
11 ready to continue?

12 MR. SECORD: Thank you.

13

14 M. HEBERT, M. SVENSON, W. SPELLER, D. BRESCIA, M. WOOD,  
15 J. MENNINGER, D. BACK, D. LUZI, D. YOSHISAKA, D. JOBSON,  
16 L. AUCOIN, T. NOBLE (For Alberta Transportation),  
17 previously sworn/affirmed, affirmed

18 MR. SECORD CROSS-EXAMINES THE PANEL:

19 Q. So Stantec indicates that the five largest floods did  
20 occur during times of above normal snowpack. Stantec  
21 also went on to show that some of the smaller floods, 1  
22 in 2 and 1 in 5-year events, occurred when the  
23 snowpacks were above the 75th percentile, and I think  
24 Mr. Wood we chatted about that earlier, and I think the  
25 reference there is to your response submissions,



## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Exhibit 327, PDF page 9; correct?

2 A. MR. WOOD: Correct. Specifically, page 48,  
3 49, would show the graphs.

4 Q. Do you agree that, regardless of this data  
5 manipulation, it does show that floods did occur when  
6 snowpacks were above normal?

7 A. MR. WOOD: Mr. Chair, I wouldn't necessarily  
8 disagree with that.

9 Q. And, obviously, one needs the right conditions to  
10 produce a flood, but would you agree that elevated snow  
11 accumulation will exacerbate the flood risk?

12 A. MR. WOOD: Mr. Chair, I would agree with  
13 that.

14 Q. And if we experience the right conditions in the future  
15 with an above-normal snowpack and heavy rainfall, could  
16 we get a greater than 1 in 200-year event?

17 A. MR. WOOD: Mr. Chair, I think that's  
18 speculative. I suspect you could -- I may add, and as  
19 Mr. Luzi had pointed out, there is some evidence to  
20 suggest that snowpack, at least its spatial  
21 distribution within the watershed and at lower  
22 elevations, may decline due to climate change.

23 Q. Could we possibly get a 1 in 500 event?

24 A. MR. WOOD: Again, Mr. Chair, it's Matt Wood.  
25 I cannot predict the future.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Q. Well, isn't that what we're trying to look at with  
2 climate change, worst-case scenarios?

3 A. MR. WOOD: Mr. Chair, I believe what we're  
4 doing is speculating and making estimates, and as it  
5 relates to the design of SR1, we do a sort of a bookend  
6 approach to those estimates. As I mentioned, we took  
7 our CPA.5, we did a very robust assessment method, one  
8 that is endorsed in the province of British Columbia,  
9 and showed that the factors of safety that were applied  
10 to the design were sufficient.

11 Q. Could we even get a 1 in 1,000 flood?

12 A. MR. WOOD: Mr. Chairman, I cannot foresee the  
13 future.

14 Q. Now, would you agree that there is a discrepancy  
15 between the percentile values calculated by Stantec for  
16 the snow water equivalent exceedances and those  
17 calculated using data for the Elbow Summit snow station  
18 obtained from Alberta Environment and Parks - Alberta  
19 Basins website. Which station did Stantec use to  
20 calculate the statistics?

21 A. MR. WOOD: Mr. Chairman, I believe this was  
22 the Elbow River -- Elbow Ranger lookout station.

23 Q. And where is that shown in the filed materials?

24 A. MR. WOOD: Mr. Chair, I'm not sure. I'm just  
25 trying to recall what's in there. I don't believe we

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           stated the exact station. I simply put here  
2           Elbow River.

3           Q. Why wasn't the Elbow Summit station used?

4           A. MR. WOOD:                   Mr. Chair, I believe, whichever  
5           station records snow water equivalent, perhaps it was  
6           the Elbow Summit station. Perhaps -- starting to  
7           think, I don't think the Elbow Ranger station records  
8           snow water equivalent. So I suspect it was the Elbow  
9           Summit station, subject to check.

10          Q. Would you undertake to check and advise me what station  
11          Stantec used to calculate the statistics?

12          A. MR. HEBERT:               Mr. Chairman, we expect we'll be  
13          able to confirm that at the appropriate time.

14                    **UNDERTAKING - TO CHECK AND ADVISE WHAT**  
15                    **STATION STANTEC USED TO CALCULATE THE**  
16                    **PERCENTILE VALUES CALCULATED FOR THE**  
17                    **SNOW WATER EQUIVALENT EXCEEDANCES AND**  
18                    **THOSE CALCULATED USING DATA FOR THE**  
19                    **ELBOW SUMMIT SNOW STATION OBTAINED FROM**  
20                    **ALBERTA ENVIRONMENT AND PARKS - ALBERTA**  
21                    **BASINS WEBSITE STATISTICS**

22          Q. MR. SECORD:               Stantec indicates that it is not  
23          appropriate to assume that precipitation falling  
24          earlier in the season will create more runoff.

25                    Do you agree that this assumption has not been

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 made by Dr. Fennell?

2 **A. MR. LUZI:** Mr. Chairman, it's Dave Luzi. I  
3 can respond to that. I don't think we've said anywhere  
4 that increased precipitation will not lead to increased  
5 runoff, just to clarify.

6 **Q.** If we could turn up Exhibit 261, PDF page 20.

7 Now, do you agree that what has been presented in  
8 Dr. Fennell's submission is the projected increase of  
9 up to 30 percent or more precipitation?

10 **A. MR. WOOD:** Mr. Chairman, I believe that's  
11 what's stated here, but I should point out that these  
12 are mean precipitations.

13 **Q.** Do you agree that how that precipitation falls will  
14 dictate the risk of flooding, including the magnitude?

15 **A. MR. WOOD:** I wouldn't disagree.

16 **Q.** And do you agree that the risk of a flood greater than  
17 a 1 in 200 event would be higher under a wetter future  
18 scenario?

19 **A. MR. WOOD:** Mr. Chairman, I believe that is  
20 speculative.

21 **Q.** Do you agree that when considering peak flows and  
22 assessing return periods, it is clear that there is a  
23 shift in the frequency of high-flow events during  
24 wetter periods?

25 **A. MR. LUZI:** This is David Luzi. I can address

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           that. I don't think we've agreed to that either,  
2           Mr. Secord.

3           Q. Why don't you agree with that, Dr. Luzi?

4           A. **MR. LUZI:**                We have not seen the evidence to  
5           support that. Like, you're talking higher frequency  
6           like low-return interval events.

7           Q. Basically, a shift in the frequency of high-flow events  
8           during wetter periods.

9           A. **MR. LUZI:**                I'm not clear that the current  
10          record supports that, sir.

11          Q. So if we could turn to Exhibit 261, PDF page 23.

12                 So the example that has been provided in  
13          Dr. Fennell's submission indicates that a 1 in 100-year  
14          event shifts to a 1 in 60-year event or so when the  
15          data from winter phases of the climate are assessed  
16          separately from the entire period of the flow record.

17                 You followed what Dr. Fennell presented in that  
18          regard, Dr. Luzi?

19          A. **MR. LUZI:**                Mr. Chair, this is Dr. Luzi  
20          speaking again. I followed what he did. I'm not  
21          entirely clear if it's appropriate for analyzing peak  
22          flow events.

23          Q. Would you agree it also shows that a 1 in 200-year  
24          event shifts to a 1 in 100-year event, and a 1 in  
25          500-year event shifts to about a 1 in 230-year event?

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1       A.   MR. LUZI:                   Based on looking in his graph, I  
2            think that's what it says, but I do not agree that  
3            that's what it means.

4        Q.   And why don't you agree that that's what it means,  
5            Dr. Luzi?

6        A.   MR. LUZI:                   Because I think understanding  
7            flood frequencies on peak flow events is a lot more  
8            complicated than delineated between characterized wet  
9            and dry periods.

10            Like, when you analyze floods, you need to look at  
11            the underlying processes that causes those floods. So  
12            knowing whether it's rain on snow or rain or snowmelt,  
13            those are the ways you're supposed to look at it and  
14            differentiate between those floods, not on whether it's  
15            wet or dry.

16        A.   MR. WOOD:                   If I may supplement Mr. Luzi's  
17            answer. We also have to consider the temporal  
18            distribution of that event and also the spacial  
19            distribution event.

20            The Rockies and the Elbow River watershed  
21            specifically are highly influenced by the way the storm  
22            pattern comes in, and this doesn't account for those  
23            sorts of things.

24        Q.   Well, when you look at the flood risk probabilities,  
25            these all increase during wetter periods; correct?

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1       A.   MR. WOOD:                   Mr. Chairman, risk is the product  
2       of consequences and probabilities.

3                You know, what we've talked about today is  
4       potentially more floods, potentially less severe than  
5       the 2013 flood but more frequent. That doesn't  
6       necessarily mean that the risk profile changes here.  
7       It's just a little different.

8       Q.   And if the expectation is for a wetter by up to  
9       30 percent climate, do you agree, then, that one can  
10      assume that the flood risk will increase?

11               For example, do you agree that the shift in  
12      frequency of a 1 in 200 to a 1 in 100 event increases  
13      the risk from 22 percent to 40 percent over a 50-year  
14      period?

15      A.   MR. WOOD:                   Mr. Chairman, I'm not entirely  
16      familiar with the assessment done here by Mr. Fennell.  
17      I recognize he separated it into wet and dry periods,  
18      but, like I mentioned earlier, we have accounted for  
19      considerably larger floods than the 2013 event with the  
20      25 percent factor of safety, and have shown that, even  
21      with conservative estimates, event-based precipitation  
22      and event-based runoff may change, and we have  
23      presented a scenario where it increases by 12 percent,  
24      and that falls within the factor of safety.

25      Q.   You said you're not familiar with the work that

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 Dr. Fennell did, Mr. Wood. Who wrote the response to  
2 Dr. Fennell's report in Exhibit 327?

3 **A. MR. LUZI:** It's Dr. Luzi speaking. We  
4 both -- Matt and I both worked on that response  
5 together and we're familiar to the extent of what he  
6 did. We just may differ on the conclusions and the  
7 projections into the future.

8 As I've indicated, more recent work with more  
9 robust climate modelling have shown that they don't  
10 expect that this increase in precipitation necessitates  
11 or translates into increased peak flows.

12 **Q.** Similarly, do you agree that a shift in a 1 in 500  
13 event to a 1 in 230 event increases the risk from 10 to  
14 20 percent in that same 50-year period?

15 **A. MR. WOOD:** Mr. Chairman, I'm going to  
16 politely ask that Mr. Secord repeat the question. I  
17 was not following.

18 **Q.** Sure. So I asked you, for example, do you agree that a  
19 shift in the frequency of a 1 in 200 to a 1 in 100  
20 event increases the risk from 22 to 40 percent over a  
21 50-year period?

22 The second part was, similarly, do you agree that  
23 a shift in a 1 in 500 event to a 1 in 230 event  
24 increases the risk from 10 to 20 percent in that same  
25 50-year period?



## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           So those were the two questions. And then as a  
2 follow-up to that, was any of this considered in the  
3 design of SR1 by AT and, if not, why not?

4       **A. MR. WOOD:**           **Mr. Chairman, I would disagree**  
5       **that there's a direct correlation and risk as such.**  
6       **You cannot just quantify flows, flow magnitude as a**  
7       **direct correlation to risk.**

8           As I mentioned earlier, a risk involves a  
9 multiplier of consequences. And, as I mentioned  
10 earlier, climate change and potential effects using  
11 industry standard methods for assessing this, for  
12 engineering design, were utilized and showed that the  
13 factors of safety applied to the structure exceeded  
14 those estimates by nearly double.

15       **Q.** Now, the design of SR1 does not appear to my clients to  
16 successfully mitigate a flood in excess of a 1 in  
17 200-year event, yet there's a good chance that higher  
18 magnitude floods will occur in response to greater  
19 precipitation, warmer conditions, and an increased  
20 chance of rain-on-snow events.

21           Why was this design limitation overlooked when  
22 there are other better options to address bigger flood  
23 events like MC1?

24       **A. MR. WOOD:**           **Mr. Chairman, as I mentioned**  
25       **before, such things were not overlooked, specifically**

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           the effects of climate change. And like I said  
2           earlier, MC1 has the exact same design basis as SR1.

3           Q. If we could turn up Exhibit 173, PDF 539.

4                     And this is in the paragraph below Table 11. 539?

5           THE CHAIR:                     Mr. Secord, there's 480 pages in  
6           this exhibit. Do you have the right one?

7           MR. SECORD:                     I must not have the right one, let  
8           me just check. Either I have the wrong one, or the  
9           document host has the wrong one.

10          THE CHAIR:                     Right, Ms. Taylor, we are on 173;  
11          that's correct? Okay.

12          MR. BARBERO:                     Mr. Secord, it's Michael Barbero  
13          here, sir. What document are you looking for?

14          MR. SECORD:                     Well, I'm just pulling up my  
15          version of -- my version of Exhibit 173 has 644 pages,  
16          and it is the September 25, 2020, Appendix B hydrology  
17          report. So I don't know what --

18          THE CHAIR:                     I think Ms. Taylor is going to go  
19          the web and just download it again, just make sure we  
20          have -- maybe it was truncated or something.

21          MR. BARBERO:                     Mr. Secord, sir, again, it's  
22          Mike Barbero here. I can confirm, sir, that on our  
23          records, Exhibit 173 is Appendix B.

24          MR. SECORD:                     Yes, that's what I have in my  
25          records, Mr. Barbero. I'm not sure what the Zoom host

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 had up.

2 THE CHAIR: There we go. It could be  
3 technology at work, folks. Looks like this is working.  
4 And Table 11, here we go. Mr. Secord.

5 MR. SECORD: Yes, I'm just pulling down a bunch  
6 of documents off my screen, sir.

7 THE CHAIR: Just wanted to make sure I didn't  
8 lose you.

9 MR. SECORD: So I can get to my question.

10 Q. So it is stated in Exhibit 173 Stantec's September 2020  
11 hydrology report, Appendix B, PDF page 539. And the  
12 paragraph below Table 11 that: (as read)

13 "Therefore, snowmelt was not  
14 incorporated in the 2013 model  
15 calibration effort."

16 Given that snowmelt is a notable factor in increasing  
17 flood risk, particularly during rain-on-snow events, why  
18 was this not incorporated by Stantec?

19 A. MR. WOOD: Mr. Chairman, if I may bring the  
20 Board's attention to the last sentence of that  
21 paragraph, it says: (as read)

22 "Furthermore, snowmelt for the PMF model  
23 was calculated external from the HEC-HMS  
24 (that's the hydrologic model) and  
25 entered as a baseflow hydrograph. No

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 calibration of snowmelt process were  
2 required."

3 And if I may, perhaps Mr. Menninger can explain some of  
4 the detail around that calibration.

5 Q. That was my next question, Mr. Wood.

6 So the first question is it states that:  
7 (as read)

8 "Furthermore, snowmelt for the PMF  
9 model was calculated external from  
10 the --"

11 Sorry. It says: (as read)

12 "Therefore, snowmelt was not  
13 incorporated in the 2013 model  
14 calibration effort."

15 So, given that snowmelt is a notable factor in  
16 increasing flood risk, particularly during rain-on-snow  
17 events, why was this not incorporated by Stantec?

18 A. MR. MENNINGER: Mr. Chairman, this is  
19 John Menninger. I can respond to that.

20 For the specific reasons is that this model has  
21 specific purpose, Mr. Chairman. We utilize this HEC --  
22 this hydrologic model to simulate the probable maximum  
23 flood.

24 In order to simulate the probable maximum flood we  
25 utilize a rainfall, derived run-off model, coupled with

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 snowmelt calculations that were then added as a  
2 baseflow to the model. We did that in the calibration,  
3 as mentioned, and as Matt indicated in the second parts  
4 of the paragraph. And then we also incorporated it  
5 within the probable maximum flood calculations.

6 Q. So it goes on to say at PDF page 539: (as read)

7 "Furthermore, snowmelt for the PMF model  
8 was calculated external from the HEC-HMS  
9 and entered as a baseflow hydrograph.  
10 No calibration of snowmelt processes was  
11 required."

12 Why was this decision made to process the information  
13 this way, and what effect did this have on the model  
14 results?

15 A. MR. MENNINGER: Sure, I'd be happy to answer that,  
16 Mr. Chairman. This is John Menninger again.

17 So the options that you have here are to attempt  
18 to simulate snowmelt within a basin during a probable  
19 maximum flood, or alternatively, as we did, we utilized  
20 the historic snowmelt records and applied a  
21 conservative snowmelt process to the model.

22 When I mentioned incorporating the snowmelt  
23 processes, in order to simulate those within the  
24 probable maximum flood situation, we would have to be  
25 making a range of speculative assumptions: Air

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 temperature -- let's see here -- solar radiation, wind  
2 speeds, and other elements that contribute to snowmelt  
3 during a rain fall event.

4 It was a much more reliable and repeatable process  
5 from our perspective in order to estimate the run-off  
6 based off of historical snowmelt records and then apply  
7 that in conjunction with the probable maximum  
8 precipitation to produce the probable maximum flood.

9 Q. How does adding snowmelt as a base flow component  
10 change the peak flow characteristics?

11 A. MR. MENNINGER: It depends on how you add the  
12 baseflow.

13 So we added it in a -- we added it basically in  
14 addition to the rainfall run-off as calculated.

15 Q. If we could turn to PDF page 546, document manager, of  
16 Exhibit 173. The statement is made in the first  
17 paragraph that, and I quote: (as read)

18 "Calibration of the HEC-HMS model had  
19 limited success, which was due to the  
20 uncertainty of the hydrometric data at  
21 the Bragg Creek and Sarcee Bridge  
22 gauging stations. The partial aerial  
23 coverage and non-uniformity of rainfall  
24 used in the calibration also played a  
25 role in the calibration process."

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 Can you explain why calibration of the HEC-HMS model had  
2 limited success due to the uncertainty of the  
3 hydrometric data at Bragg Creek and Sarcee Bridge  
4 gauging stations? Can you explain that?

5 **A. MR. MENNINGER:** I will attempt to. This is  
6 John Menninger again.

7 I think we stated the reasons. We do present  
8 transparently in that report the comparison of the  
9 gauge stations to the -- to the calculated flow rates  
10 within it. I think we -- you can view on PDF pages  
11 540, 541, 543, and 544 the comparison of the model  
12 runoff to the calculated gauge data.

13 The -- it is a model; I will just state that as  
14 well. Models have a purpose and a use. We were  
15 satisfied that the model was calibrated sufficiently to  
16 replicate the runoff processes of the Elbow River basin  
17 for use of calculation of a probable maximum flood.

18 **Q.** Now, this same sentence reads: (as read)

19 "The partial areal coverage of rainfall  
20 used in calibration also played a role  
21 in the calibration process."

22 Can you explain what is meant by partial areal coverage  
23 of the rainfall used and what role did it play in the  
24 calibration process? I'm not sure that I understand  
25 what you're getting at here.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1           So there's two parts, it seems to me, discussed the  
2 partial areal coverage of rainfall and the  
3 non-conformity of rainfall.

4           So I just wanted to look at the partial areal  
5 coverage first and what role did it play in the  
6 calibration process, if you could explain that.

7   **A. MR. MENNINGER:**           **Sure. So the intent of that**  
8 **statement and the model has limitations. So you set up**  
9 **a model based off of a series of catchment areas that**  
10 **you apply uniform characteristics towards. Those**  
11 **basins or watersheds, if you will, would then in the**  
12 **future be applied design rainfall elements.**

13           The 2013 flood had a spacial distribution  
14 associated with it of rainfall that was applied to  
15 those watersheds.

16           It was a real storm that had a variable coverage,  
17 non-uniformity of rainfall, so some basins received  
18 more rain than others. The next flood that's a  
19 200-year flood may have a different pattern and effect.

20           So what we're stating here simply is that we  
21 calibrated it to the data we had and applied it and  
22 then measured the success at two locations. So if  
23 rainfall falls slightly differently, it may produce  
24 potentially different results.

25           However, we did make educated adjustments to the



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1 model and assign parameters based off of physical  
2 processes that were uniformly based across our model.

3 So, again, as I said, this model has a use and a  
4 purpose, and we feel that it was well suited for the  
5 calculation of probable maximum flow.

6 Q. So what is meant by "partial areal coverage"?

7 A. MR. MENNINGER: Just all I'm saying is that the  
8 rain was -- fell in different locations at different  
9 rates. That's all.

10 Q. So that doesn't go back to the fact that you only had  
11 hydrometric data from two gauging stations?

12 A. MR. MENNINGER: That sentence could have  
13 potentially been better constructed. This was six  
14 years ago. I will -- I don't believe -- I don't  
15 believe that it's referring to those two stations.

16 Q. Okay. And -- and then the -- it says: (as read)  
17 "The non-uniformity of rainfall used in  
18 calibration also played a role in the  
19 calibration process."

20 Can you explain the non-conformity [verbatim] of  
21 rainfall used? Or maybe you already have. Maybe the  
22 two of them are together, I don't know.

23 A. MR. MENNINGER: "Non-uniformity," I think, is a  
24 term that we use, and that is stating that we're --

25 Q. I'm sorry, I should have said -- yeah, it is

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1 non-uniformity -- it's not non-conformity. It is  
2 non-uniformity; right?

3 A. MR. MENNINGER: That's correct.

4 Q. Yeah, okay. Good.

5 A. MR. MENNINGER: So, again, this is John Menninger  
6 speaking. What we're saying there, non-uniformity of  
7 rainfall is simply that the -- a individual watershed  
8 element of our model may have not received a constant  
9 rainfall across that entire sub-basin in that it was in  
10 itself spatially distributed across that area  
11 differently than a uniform-applied average. That is  
12 all.

13 Q. So then do I understand, then that the partial areal  
14 coverage and non-uniformity of rainfall used was  
15 another reason why the calibration of the model had  
16 limited success?

17 A. MR. MENNINGER: I believe that's what we stated in  
18 the report.

19 Q. It just doesn't read that way. It just it says that:  
20 (as read)

21 "The partial areal coverage and  
22 non-uniformity of rainfall used in  
23 calibration also played a role in the  
24 calibration process."

25 And I guess what I was wondering is what role did that

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1 play and, you know, are you saying that that role  
2 resulted in some negative -- basically was a negative in  
3 the sense of resulting in the calibration of the HEC-HMS  
4 model having limited success?

5 I'm just trying to understand -- whoever wrote  
6 this, what they were trying to say. It's just not clear  
7 to me.

8 **A. MR. MENNINGER:** Yeah, I -- again, perhaps with an  
9 editorial touch, the sentence could be better crafted.

10 All it is simply saying is that models have  
11 limitations and that the calibration was based off of a  
12 highly varied rainfall pattern within the watershed --  
13 or the 2013 event had a varied rainfall in the  
14 watershed and that we had specific areas assigned to  
15 our sub-basins, and that's the basis of it.

16 So all we're saying is that -- the somewhat --  
17 that may have contributed slightly to some of the  
18 calibration.

19 **Q.** Who was involved in calibrating the model within  
20 Stantec, or did you farm that out?

21 **A. MR. MENNINGER:** I oversaw the calibration of it  
22 with a team of engineers that worked on the project.

23 **Q.** And were these all within the Stantec organization?

24 **A. MR. MENNINGER:** Let's see here. The -- we  
25 worked -- so on -- primarily. So the probable maximum

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1 precipitation was performed by a subconsultant that is  
2 a meteorologist; the probable -- the snowmelt runoff  
3 elements, we worked with a contractor on that element  
4 of the snowmelt; but the -- primarily the rainfall  
5 runoff components were performed in the model that was  
6 done by Stantec employees.

7 Q. Do you agree that the statement made on PDF page 546 of  
8 Exhibit 173 in relation to the calibration of the model  
9 having limited success casts some doubt on the  
10 appropriateness of the model to project flood flows?

11 A. MR. MENNINGER: Can you repeat your question?

12 Q. Do you agree that the statement on page 546 of  
13 Exhibit 173, in particular that the calibration of the  
14 HEC-HMS model had limited success, that that casts  
15 doubt on the appropriateness of the model to project  
16 flood flows?

17 A. MR. MENNINGER: No, I don't believe it does. I  
18 believe the statement that said calibration was  
19 successful and adequately establishing the sub basin  
20 rainfall loss parameters in refining the channel  
21 routing parameters and then developing reasonable base  
22 flow simulation methodology provides our statement on  
23 the work.

24 As I said, it is a model. Models attempt to  
25 simplify complex physical processes, and are used,

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1           then, to project potential alternate scenarios to  
2           replicate those processes. We feel like it was  
3           adequately established and built in order to perform  
4           those functions as needed for the design.

5       Q.   So then you're saying that the NRCB and my clients can  
6           have faith in the model, even though Stantec writes  
7           that calibration of the model had limited success?

8       A.   MR. MENNINGER:           Yes, I believe so. And we've  
9           documented the -- the results of the model and have  
10          demonstrated that calibration.

11                The projected results of that rainfall runoff  
12           model fit well with the standards for probable maximum  
13           flood quantity for many other projects developed across  
14           Alberta in comparison of the peak flow to the drainage  
15           area. And so we do feel that this model is adequate  
16           and appropriate for its use in that function.

17       Q.   But you could be wrong?

18       A.   MR. MENNINGER:           There is variability in the  
19           system, Mr. Secord. It is a model.

20       A.   MR. WOOD:                Mr. Chairman, if I may go back to  
21           an earlier statement -- this is Matt Wood -- an earlier  
22           statement I made about snowmelt.

23                While it is an important part of hydrological  
24           processes in most northern climate basins, and while  
25           snowmelt played a role of 12 percent of the total

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1 runoff volume -- not peak, but runoff volume during the  
2 2013 event, I do want to circle back on Exhibit 327,  
3 page 49, which shows that some of the largest snow  
4 packs in the basin produced the smallest flows. In  
5 fact, I'm looking at it here. I've seen two-year  
6 flood, five-year flood, and that seems to repeat across  
7 the board.

8 So while I'm not suggesting that it's not  
9 important, I think the emphasis on snowmelt may be a  
10 little bit misguided in the context of what we're  
11 talking about here.

12 Q. It was stated in Dr. Fennell's submission, Exhibit 261,  
13 PDF page 22, that -- and I don't know whether you want  
14 to turn this up, document host. It should be  
15 preloaded, yeah. 22.

16 He writes: (as read)

17 "Future IDF curves show a wide range of  
18 increased intensities, especially for  
19 storms of short durations less than one  
20 hour. Conversely, future IDF curves are  
21 expected to shift upward because of  
22 increased air temperature and  
23 precipitable water which are projected  
24 to be about 2.9 degrees Celsius and  
25 29 percent in average by 2071 to 2100

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1                   respectively."

2                   Now, much of the work on flooding has been done on past  
3                   events. How have future expectations been incorporated  
4                   into the hydrologic modelling to understand the  
5                   likelihood of greater floods in the future?

6       **A. MR. WOOD:**                   **Mr. Chairman, this is Matt Wood**  
7                   **here. I believe I mentioned this several times today**  
8                   **that we used intensity duration frequency curves, as**  
9                   **discussed here by Fennell, in the hydrologic model to**  
10                  **estimate the potential impacts to flood frequency.**

11                  Perhaps I can pass it over to Dave Luzi to provide  
12                  a few more details with respect to what we're looking  
13                  at here.

14       **A. MR. LUZI:**                   **Mr. Chairman, this is Dave Luzi**  
15                  **speaking. I took a look at the reference where the**  
16                  **graphs are coming from and the papers. Although they**  
17                  **describe general kind of assumptions on climate change**  
18                  **and the effects on stream flows, we have discussed**  
19                  **earlier today, and mentioned a bunch of times, that**  
20                  **there is more relevant research specific to our area**  
21                  **that shows that we're not expected to see increase in**  
22                  **peak flows experienced in Calgary from the Elbow River.**

23                  Again, like, climate change has variable effects  
24                  all over the world, and it's difficult to generalize  
25                  those effects to specific regions where hydrologic

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1 processes may differ.

2 Q. But from a worst-case scenario, wouldn't it be worth  
3 while attempting to do that, Dr. Luzi?

4 A. MR. WOOD: Mr. Chairman, it's Matt Wood. As  
5 I mentioned, what we were looking at when we did our  
6 modelling exercise, using IDF curves was a worst-case  
7 scenario. The scenario considered RCP8.5 out to 2050.  
8 That assumes no reduction in emissions from current  
9 practice.

10 Q. Yeah, but you used a -- you used an ensemble average of  
11 the climate model. You came up with 12 percent. You  
12 didn't look at the 95th percentile number, did you,  
13 Mr. Wood? So how is that a worst-case scenario?

14 A. MR. WOOD: Mr. Chairman, I'm not entirely  
15 sure of the question being asked, but I would add that  
16 it resulted in 12 percent increase, and the factor of  
17 safety for diversion rate is 25 percent. That's over  
18 double.

19 Q. Exhibit 345, the Calgary Water Security Report,  
20 indicates that droughts pose one of the greatest risks  
21 to the security of the City's water supply. And, as  
22 stated in the report on PDF page 22: (as read)

23 "Climate change is likely to make  
24 extreme weather, including severe  
25 drought, more common."



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1 It then goes on to say: (as read)

2 "The risk of drought occurrence in the  
3 summer or early fall, in particular,  
4 when demand tends to peak, is likely to  
5 increase."

6 Now, Stantec states on PDF page 50 of Exhibit 327 --  
7 this is in your Appendix G, and maybe we want to turn  
8 that up, document host? This is PDF page 50.

9 Stantec writes: (as read)

10 "SR1 improves water security at Glenmore  
11 in any given year. It does this by  
12 allowing the City of Calgary to allocate  
13 more of the available storage in the  
14 reservoir to water supply in the spring.  
15 This means that the City will no longer  
16 need to draw down the Glenmore Reservoir  
17 to lower levels that they have been  
18 operating at in the spring and at risk  
19 that the flows don't materialize to fill  
20 it back up for supply."

21 Now, would you agree this logic is hard to follow  
22 because during an extreme and extended drought period,  
23 which has been noted in the tree-ring records, river  
24 flows will result in low water delivery to the  
25 Glenmore Reservoir anyway, so there will be no need to

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1 drop the level; correct?

2 A. MR. WOOD: Mr. Chairman, this is Matt Wood.

3 I would completely disagree with this characterization.

4 In a drought scenario, I would argue that it would  
5 be in the City's best interest to save every drop that  
6 they can in the reservoir and not lower it in  
7 anticipation of flood season. So, therefore, the water  
8 that comes in at snowmelt, they can hang onto it and  
9 not have to discharge it to lower the reservoir.

10 Q. And at the same time, the SR1 will not be put into  
11 operation as there will be no flood to mitigate.

12 So can you please clarify the logic behind the  
13 statement that SR1 will improve water security?

14 A. MR. WOOD: Mr. Chairman, it's Matt Wood. I  
15 believe I've said this a few times, and this was echoed  
16 by Mr. Frigo from the City of Calgary, SR1 allows the  
17 City to operate within a more predictable range prior  
18 to flood season. They only need to allocate 10,000 dam  
19 cubes of active storage, no more, as is currently the  
20 case.

21 And as I also stated earlier -- I believe I stated  
22 earlier, that SR1 does reduce the risk of flood damage  
23 at Glenmore. By mitigating flood risk on the  
24 Elbow River, it mitigates risk to that structure, and  
25 hence, a risk to the City's water supply.

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1 Q. Now, the SR1 will contain water accumulated from  
2 snowmelt and rainfall events as well as major flood  
3 events. Do you agree that the water will likely  
4 contain nutrients entrained from the landscape, for  
5 example, animal wastes and will warm during the spring  
6 to fall seasons?

7 A. MR. WOOD: Mr. Chairman, it's Matt Wood.  
8 Perhaps Mr. Darrell Jobson would be best to answer that  
9 question.

10 A. MR. HEBERT: Mr. Chairman, sorry, Dave Brescia  
11 will take this question.

12 A. MR. BRESCIA: Thanks, Mr. Chairman. I'll start  
13 here and I'll get Mr. Jobson to supplement. This is  
14 Mr. Brescia.

15 So during a flood situation, the river would  
16 contain sediment which would have nutrients associated  
17 with it which would be carried down to the  
18 Glenmore Reservoir.

19 Q. And is there a risk of algal blooms including  
20 cyanobacteria?

21 A. MR. BRESCIA: One moment, Mr. Chair.

22 UNIDENTIFIED SPEAKER: Darrell, you're on mute.

23 A. MR. BRESCIA: So, Mr. Chairman, what I would  
24 state is that with the SR1 project in place, sediment  
25 would be transported into the reservoir, deposited in

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1 the reservoir, and that would deposit, in association  
2 with that, a proportion -- a large proportion of the  
3 nutrients that would have been carried down to Glenmore  
4 had it not been in place.

5 Q. And would you agree that, once dried up, the  
6 cyanobacteria will remain on the fine particles at the  
7 base of the reservoir?

8 A. MR. JOBSON: Mr. Chairman, this is  
9 Darrell Jobson. I'd like to respond to that.

10 Cyanobacteria are not expected to be in the  
11 reservoir. It takes a few seasons for cyanobacteria to  
12 perfect conditions to stage for cyanobacteria to occur.  
13 We do not expect them to cause a bloom...

14 Q. I'm sorry, you kind of drifted out there.

15 COURT REPORTER: "We do not expect them to cause a  
16 bloom..."

17 Q. MR. SECORD: Mr. Jobson, you're -- you cut off.

18 A. MR. JOBSON: Okay. Sorry.

19 Q. We didn't get the whole -- I don't think we got all of  
20 your response.

21 A. MR. JOBSON: Can you hear me?

22 Q. Yeah.

23 A. MR. JOBSON: Okay. So what I was saying is  
24 that cyanobacteria are not expected to be an issue in  
25 the reservoir. Cyanobacteria are an issue in more

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1 permanent reservoirs and lakes. It takes a few seasons  
2 for the stage to be set for cyanobacteria to bloom and  
3 be a problem. We do not expect that to occur in SR1  
4 over the short time that water will be in the  
5 reservoir.

6 Q. Yeah, you don't expect it to occur, but is it possible  
7 that it could occur?

8 A. MR. JOBSON: The probability is highly  
9 unlikely.

10 Q. Okay. So cyanobacteria is not expected, but did you  
11 look at it?

12 A. MR. JOBSON: We assessed it.

13 Q. You did assess it. And where is the assessment of  
14 cyanobacteria in the record?

15 A. MR. JOBSON: It is in Exhibit 93, IR303.

16 Q. And specifically with respect to SR1?

17 A. MR. JOBSON: Yes.

18 Q. Okay. Now, projections are that the trend of global  
19 warming continues -- that as the trend of global  
20 warming continues, the risk of wildfires will increase.  
21 We've certainly seen that in western Canada over the  
22 last number of years. This will be exacerbated by  
23 insect infestations and associated tree-kills.

24 Do you agree that once an area is burned, runoff  
25 coefficients change due to lack of vegetation and the

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1 creation of hydrophobic soils which leads to higher  
2 water yield and less soil retention?

3 Mr. Jobson, you're on mute.

4 THE CHAIR: Yes, muted there. Still muted.

5 A. MR. JOBSON: I'm sorry, Mr. Chairman. My space  
6 bar seems to be in reverse here.

7 Sorry, Mr. Secord. Can you please repeat the  
8 question?

9 Q. MR. SECORD: Sure. We were talking about  
10 wildfires increasing as a result of global -- of  
11 climate change. This is exacerbated by insect  
12 infestations and associated tree kills.

13 Do you agree that once an area is burned, runoff  
14 coefficients change due to the lack of vegetation and  
15 the creation of hydrophobic soils which leads to higher  
16 water yield and less soil retention?

17 A. MR. WOOD: Mr. Chairman, this is Matt Wood.  
18 All those things that Mr. Secord is suggesting are  
19 possible with changes in a watershed. It can the  
20 change hydrology.

21 Q. Now, most of the upper watershed of the Elbow River is  
22 forested and subject to fire risk, yet it does not  
23 appear this has been assessed for its implication to  
24 flood flows, associated water quality, impacts to  
25 Calgary 's water supplies, and the suitability of SR1

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1 to successfully mitigate a flood event larger than  
2 2013. Why was this aspect not considered?

3 A. MR. WOOD: Mr. Chairman, I'll repeat again  
4 that SR1 can accommodate floods larger than 2013 using  
5 that 25 percent extra diversion capacity and 10 percent  
6 volume.

7 I would also like to reiterate that the purpose of  
8 SR1 is to not mitigate water quality issues within the  
9 basin.

10 Q. So I guess my question was most of the upper watershed  
11 of the Elbow River is forested and is subject to fire  
12 risk. Why was this aspect not considered?

13 A. MR. WOOD: Mr. Chairman, wildfire is  
14 controlled I think to the best of that authority's  
15 ability within the basin. While it is a risk, this is  
16 the kind of thing that factors of safety are utilized  
17 for.

18 Q. Okay. If we could shift gears now to hydrogeology  
19 groundwater modelling?

20 THE CHAIR: Mr. Secord.

21 MR. SECORD: Yes.

22 THE CHAIR: Sorry to interrupt. If you're  
23 going to get another exhibit, then please do request.

24 If not and if you don't need this one --

25 MR. SECORD: I don't.

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1 THE CHAIR: -- just let the document manager  
2 know. And it's not really for our benefit; it's on the  
3 YouTube side, if we're not using a document,  
4 essentially they see mostly a document up maybe that  
5 nobody is referring to.

6 So it's just to make it a little bit more of a  
7 better experience for YouTube users, but your call.  
8 Thank you.

9 MR. SECORD: Sure, no. Please take the  
10 document down. Thank you. And it's better for me  
11 because I can see who's speaking better as well, so...

12 THE CHAIR: True enough.

13 MR. SECORD: And I can see someone's lips  
14 moving when they're not being heard, so that also  
15 helps.

16 Q. MR. SECORD: So we're shifting to hydrogeology,  
17 groundwater modelling, water quality, and chemistry,  
18 geochemistry.

19 Stantec calls into question the cross-section that  
20 Dr. Fennell used in his submission, Exhibit 261, PDF  
21 page 5. Maybe we should pull that up, sorry, with my  
22 apologies to the YouTube viewers. And, unfortunately,  
23 we will be looking at quite a few exhibits in this  
24 section of my cross-examination.

25 THE CHAIR: All good, Mr. Secord.



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1 Q. MR. SECORD: So Stantec calls into question the  
2 cross-section that Dr. Fennell used in his submission,  
3 Exhibit 261, PDF page 5, showing the presence of sand  
4 and gravel deposits in the surficial sediments and  
5 underlying glacial deposits.

6 Stantec went on to say in Exhibit 327, PDF page  
7 44, top paragraph that they are: (as read)

8 "Not present in the study area. This  
9 has been confirmed through the drilling  
10 of more than 150 project-specific  
11 boreholes within the PDA."

12 So if we can, you can confirm that's what was written in  
13 Exhibit 327, PDF page 44, or do we need to pull that up?

14 A. MR. YOSHISAKA: No, I can confirm that that's what  
15 is said in that Exhibit. I would like to point  
16 out -- sorry, Mr. Chairman, this is Dan Yoshisaka  
17 speaking. I would like to actually discuss this  
18 cross-section B-B, B-B prime that is shown here in the  
19 exhibit.

20 Q. Can we enlarge that a little bit?

21 A. MR. YOSHISAKA: Actually, that would be helpful,  
22 thank you.

23 Q. And all we need is the cross-section, Zoom host, so you  
24 can probably get it up to 150 maybe.

25 A. MR. YOSHISAKA: I think that's great, yeah.

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1 Q. Maybe one more, one more, that's beautiful. So you're  
2 talking about B on the left-hand access and B prime on  
3 the right?

4 A. MR. YOSHISAKA: That's correct, yes.

5 So what is noted here in this cross-section in  
6 regard to units that are perhaps more permeable, two  
7 units are identified here in the cross-section: One is  
8 a surficial gravel denoted Gg, and this is the small  
9 red blob that's right at the ground surface. The  
10 second of which denoted Cs is the Calgary formation  
11 fluvial channel sand.

12 So I will note that in this section, that channel  
13 sand is located within the lacustrine unit, so it is a  
14 sub-unit of the lacustrine clay unit. And, again, that  
15 fluvial channel gravel, as noted on the section, is  
16 located right at ground surface.

17 So as we move to our response to this  
18 cross-section, yes, I can confirm that these two units  
19 are not present within the PDA.

20 Q. So, let's turn, document host, to Exhibit 327, PDF  
21 page 44. And it states on that page that the presence  
22 of sand and gravel deposits are not present in the  
23 study area; correct?

24 A. MR. YOSHISAKA: Mr. Chairman, if I could actually  
25 scroll down a few pages to page 51, I believe. And

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           this hopefully will help illustrate the location of  
2           cross-section B-B prime is shown on this figure.

3           So this figure adopts the mapping that was  
4           referenced in SCLG's evidence and simply overlays that  
5           over our maps of the project area. So it's a  
6           reproduction of that reference, geo-referenced in space  
7           relative to the project area.

8           What we can see here in this figure is that  
9           cross-section B-B is actually not situated within the  
10          PDA; it is situated east of the PDA by several miles.  
11          And, again, we confirm that the two permeable units  
12          identified on cross-section B-B are not present within  
13          the PDA.

14          Q. Okay. Document host, could you turn up Exhibit 159,  
15          PDF page 195.

16                 If you could scroll down just below to the heading  
17          10.3.6.2 and maybe bump it up to 150 for us. Thank  
18          you. Beautiful.

19                 Now, I'm going to put it to you, Mr. Yoshisaka,  
20          that the statement by AT, Stantec in Exhibit 327, PDF  
21          page 44 that sand and gravel deposits are not present  
22          in the study area conflicts with the statement made by  
23          Stantec in Exhibit 159, PDF page 195, where they say  
24          just below the heading Section 10.3.6.2: (as read)

25                 "The Unnamed Creek is an undersized

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 river valley in-filled with fluvial  
2 materials (sands and gravels) overlain  
3 by glacial till."

4 Can you explain the discrepancy that appears to  
5 contradict what Stantec wrote in Exhibit 327?

6 **A. MR. BACK:** This is Dan Back. I guess I can  
7 speak fairly clearly to we uncovered in our  
8 exploration. I think the difference here is this is  
9 probably a different formation than we were speaking  
10 about in that exhibit.

11 There is a gravel/cobble layer below the surface,  
12 it's not on the surface in a limited area immediately  
13 along Unnamed Creek. It is not a sand layer. It isn't  
14 consistent with those described previously in the  
15 exhibit, but it is a fluvial deposit consisting of  
16 gravel and cobble with minor sands along the  
17 Unnamed Creek.

18 **Q.** Document host, could you turn up Exhibit 178, PDF page  
19 16, the third bullet on that page.

20 **A. MR. YOSHISAKA:** And, Mr. Chairman, I would like to  
21 add to Mr. Back's comments. The --

22 **THE COURT REPORTER:** Who's speaking, please? Who's  
23 speaking?

24 **A. MR. YOSHISAKA:** Sorry, this is Dan Yoshisaka  
25 speaking again. I would like to add to Mr. Back's

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1           comments here.

2           The sand that's identified here and that is being  
3 spoken to here is a different sand unit than those  
4 identified in the Moran cross-section that Dr. Fennell  
5 presented.

6           So there is no stratigraphic equivalence between  
7 this sand unit and the two that are identified in that  
8 cross-section.

9           Again, the surficial gravel unit is located in  
10 that cross-section directly at ground surface. Second,  
11 the fluvial channel sand identified in that  
12 cross-section is a sub-unit of the lacustrine unit.

13           So this sand unit that has been identified in both  
14 of our studies, both the hydrogeologic side and the  
15 geotechnical side is a different sand unit. It is  
16 below the till unit and directly above bedrock.

17           So again, there is no stratigraphic equivalence  
18 between the sand units presented in the cross-section  
19 with the ones we're speaking to here.

20 Q.   So are you familiar with Exhibit 178?

21 MR. BARBERO:                           Mr. Secord, is there  
22 something specific in the exhibit.

23 Q.   I'm talking to Mr. Yoshisaka. Are you familiar with  
24 Exhibit 178? This is the -- I'm just getting my copy  
25 to load up so I can magnify it. This is the Stantec

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1 Volume 4 of 4, Springbank Off-Stream Storage Project  
2 Preliminary Geotechnical Assessment Report Volume 4 of  
3 4, dated December 8, 2020.

4 **A. MR. YOSHISAKA:** Mr. Chairman, yes, I'm familiar  
5 with portions of this document; not all of it pertains  
6 to my area of expertise. But for those areas that do  
7 overlap, yes, I'm familiar with it.

8 **Q.** And starting at page PDF 10 there's a heading "2.1,  
9 Soil Classifications." And I'm just trying to give you  
10 a little background.

11 And then at PDF page 16, so it's under that same  
12 heading. So if you could turn to PDF page 16, and if  
13 we could go to the third bullet, and if you could bump  
14 it up to about 200 so we can see it.

15 The third bullet says: (as read)  
16 "Alluvial sand and gravel soils were  
17 encountered in the low-lying area of the  
18 Unnamed Creek near Station 23, plus 200  
19 of the storage dam."

20 So is this the same -- the same discussion of sands and  
21 gravels that we looked at in Exhibit 159, PDF page 195?

22 **A. MR. BACK:** This is Dan Back. As one of the  
23 authors of this document, I can confirm that this is  
24 the formation that we were just speaking of in the  
25 Unnamed Creek, not the one that's in the Fennell

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 exhibit.

2 Q. Now, how has the presence of sands and gravels beneath  
3 the SR1 footprint in the Unnamed Creek valley been  
4 assessed for piping risk of water beneath the reservoir  
5 and the potential for reduction in geotechnical  
6 stability when the contention from Stantec is that  
7 these sands and gravels do not exist?

8 A. MR. YOSHISAKA: Mr. Chairman, I would just like to  
9 correct Mr. Secord in that we have in fact identified  
10 these sands and do acknowledge their existence.

11 What we are saying is that these sand are not the  
12 same sands that are identified in Dr. Fennell's  
13 cross-section. These sands again are below the till  
14 units; these are not sands within the overlying  
15 lacustrine unit. So there is, again, no stratigraphic  
16 equivalence between those two sands.

17 I'll invite Mr. Back to comment on how these sands  
18 were addressed in the design of the dam.

19 A. MR. BACK: Yes, this is Dan Back. We looked  
20 fairly extensively at the potential for seepage through  
21 this unit in the time when the dam is retaining the  
22 pool. A number of different seepages through the  
23 analyses were performed, and a specific system was  
24 developed to control all the seepage that might pass  
25 through this unit when there's water in the reservoir.

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1           That should all be documented in the Preliminary Design  
2           Report in the geotechnical section.

3           Q. Document host, you can take down this exhibit. Thank  
4           you.

5                       Now, what is a numerical groundwater flow model?

6           A. MR. YOSHISAKA:           A numerical groundwater flow  
7           model is a mathematical description of the physical  
8           processes that govern groundwater flow in the  
9           subsurface.

10          Q. And who was responsible for setting up the model for  
11          this application?

12          A. MR. YOSHISAKA:           I did oversee preparation of the  
13          model and it was conducted primarily by our numerical  
14          modelling team.

15          Q. And can you confirm that the numerical groundwater flow  
16          model was constructed with seven layers to align with  
17          the various types of glacial and bedrock deposits?

18          A. MR. YOSHISAKA:           I, Mr. Chairman, would like to  
19          back up a little bit here in terms of our work flows in  
20          developing the numerical model.

21                       The step preceding numeric modelling involved  
22          geologic modelling. So there's two steps to this work  
23          flow. The first is understanding the hydrogeologic  
24          framework of the study area, and that geologic  
25          modelling was conducted in a separate software suite



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1 from the numerical modelling exercise.

2 Once complete within the geologic modelling, the  
3 output files from there were essentially handed off to  
4 the numerical modelling environment under which the  
5 numerical modelling of groundwater flow through those  
6 systems then proceeded.

7 So, in any case, you know, the geologic model  
8 which was developed, indeed, was based on thousands of  
9 borehole records across the regional assessment area,  
10 including the more than 150 borehole records which we  
11 installed as part of our field programs. And the  
12 geology interpretation that's derived in that model is  
13 based on multiple sources of information and is,  
14 indeed, reflective of the local geology.

15 So by taking the outputs from the geologic model  
16 and putting them directly into the numerical model, we  
17 know that the underlying structure, as was interpreted,  
18 remains intact within the numerical model as well.

19 Q. And how thick is each layer in the model? How thick is  
20 each of the seven layers?

21 A. MR. YOSHISAKA: They are all of variable  
22 thicknesses, again honouring the geologic  
23 interpretation derived in our geologic model.

24 Q. Are the thicknesses of the various layers based on  
25 actual field measurements or just estimated?

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1       A.   MR. YOSHISAKA:           Mr. Chairman, if I could please  
2       direct you to --

3       Q.   I'm going to be taking you to Exhibit 110, PDF page 113  
4       in a minute because that shows the first layer of  
5       the -- Layer 1.

6       A.   MR. YOSHISAKA:           Actually, Mr. Chairman, if I could  
7       first bring your attention to Exhibit 110, page 27,  
8       please.

9               And, document manager, if you could please pull  
10       that up for us. And you will need to zoom out a little  
11       bit, please.

12              So what we are looking at here is a figure that  
13       depicts the regional assessment area that the -- both  
14       the geologic model and the numerical groundwater flow  
15       model both represent.

16              The dots that you see here, of which there's more  
17       than 2,000 across this area, are the locations where we  
18       yielded some geologic information that was then used to  
19       conduct our interpretation and inform the  
20       three-dimensional conceptual site model which is our  
21       geologic model of the area.

22              Now, if we could actually flip now to, within the  
23       same exhibit, page 27, please. My mistake, page 18,  
24       please.

25              So now this figure zooms in a little bit more. So

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 this is now focused in solely around the PDA, and this  
2 figure is now only depicting those holes that Stantec  
3 put in between our geotechnical and hydrogeologic field  
4 programs.

5 Again, you can see there's a very high degree of  
6 density around project infrastructure. So we have a  
7 very good handle on what the geology looks like, as  
8 well as, you know, boreholes distributed across the  
9 entire reservoir area and beyond as well. So we are  
10 very confident with the degree of coverage that we have  
11 in that we're well informed to conduct our geologic  
12 interpretations and, in turn, have -- yes, we have  
13 direct measurements of thicknesses of various units,  
14 their distribution and how those thicknesses vary over  
15 space.

16 Q. All right. And if we could turn up PDF page 113. And  
17 if we could put the Figure 4.5 in the middle and then  
18 maybe bump it up as much as you can, keeping the --  
19 maybe one more so we can read the -- yeah, that's  
20 great, thank you.

21 Now, would you agree that much of the footprint of  
22 SR1 is underlain by lacustrine clay which has been  
23 given a K value of 5.1 times 10 to the minus 6 metres  
24 per second?

25 A. MR. YOSHISAKA: That is true for areas in the

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 reservoir area.

2 I would also note that there is a secondary low  
3 permeability layer underlying those lacustrine clays  
4 and then those would be the glacial tills as well.

5 So there's not only one layer; there's actually  
6 two low permeability layers under the reservoir area.

7 Q. In fact, it's been given a K value of 5.1 times 10 to  
8 the minus 6 metres per second in the X-Y direction and  
9 5.1 times 10 to the minus 7 metres per second in the  
10 vertical direction. And that's shown in  
11 Table E-1 -- sorry, that's shown on Table E.1-2,  
12 Exhibit 110, PDF page 473. If we could turn there. Do  
13 I have that right?

14 A. MR. YOSHISAKA: Mr. Chairman, yes, that's correct.

15 I would also like to point out that these are  
16 calibrated figures. So these are figures based on --  
17 which are constrained initially by our field  
18 measurements that we observed in the field and as well  
19 as observations during calibration.

20 So these are the values that we settled on.  
21 Again, they were selected to be quite conservative.  
22 And by conservative, in this case, I mean more  
23 permeable than what we anticipate based on our field  
24 measurements. By way of example, the clay unit here,  
25 the first row in this table, you can see connectivity

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1 values in the orders of 10 to the minus 6s.

2 And, again, based on our field measurements, those  
3 values were, you know, more in the 10 to the minus 8s.  
4 Mr. Back's reports even values in the 10 to the minus  
5 10 range. So the way we did parameterize this unit  
6 within the model is highly conservative.

7 Q. So if we could go back, document host, to PDF page 113.  
8 Perfect. Your sizing is excellent.

9 So, conversely, the model there, as provided in  
10 Exhibit 110 starting at PDF page 113, show the area  
11 where clay exists as having a K value of 7.2 times 10  
12 to the minus 8 metres per second.

13 Do you agree that this is a notable inconsistency  
14 and will definitely reduce the water level effects and  
15 amount of leakage through the base of the reservoir  
16 when filled with water, and what is the explanation for  
17 this discrepancy?

18 A. MR. YOSHISAKA: Mr. Chairman, I'm not sure that I  
19 quite follow Mr. Secord. I don't understand the nature  
20 of the discrepancy that he's pointing out here.

21 Q. Right. Well, on this figure, 4-5, it shows the area  
22 where the clay exists as having a K value of 7.2 times  
23 10 to the minus 8 metres per second; correct?

24 A. MR. YOSHISAKA: So, Mr. Secord, you are referring  
25 here to the areas in purple which, indeed, have that

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 value.

2 The area of the reservoir is actually the area in  
3 the more cyan colour there.

4 Q. I'm sorry, I'm obviously colour linguistically  
5 challenged. What colour are you referring to?

6 A. MR. YOSHISAKA: The light blue with a bit of green  
7 colour there, which is actually assigned at the higher  
8 hydraulic conductivity value, as was noted in the table  
9 we previously referred to as 10 to the minus 6.

10 Q. Okay. So this -- the first layer of the model that we  
11 see here in Figure 4-5, is that the project development  
12 area?

13 A. MR. YOSHISAKA: So the project development area  
14 is -- yes, it is within this model domain area.

15 The reservoir area is underlain by the lacustrine  
16 clays which are shown in this figure north of the  
17 Elbow River. The Elbow River, being the red feature  
18 running through the domain here, is shown as the  
19 lighter blue colour which, indeed, is assigned a value  
20 of 10 to the minus 6.

21 Q. So where in Figure 4-5 is the project area? What  
22 portion of this model there will cover the project  
23 area?

24 A. MR. YOSHISAKA: Mr. Chairman, if you could bear  
25 with me here. I'm just going to find a better map that

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1           perhaps better represents those areas to make it a  
2           little more clearer. If you could just bear with me  
3           for a minute.

4       MR. SECORD:                    Mr. Chairman, could we take about  
5           a two-minute break? Is that agreeable?

6       THE CHAIR:                    Well, we're going to break around  
7           3:00. Is this for a need to caucus or...

8       MR. SECORD:                    No, no, I don't need to caucus,  
9           sir. That's okay. I can wait until 3. That's fine.

10           I was going to say if he was going to take a  
11           couple of minutes, I would step away from my computer,  
12           but -- I might do that anyway if that's okay.

13           Are you ready, Mr. Yoshisaka?

14       A.   MR. YOSHISAKA:           Yes. I think so. If we could,  
15           please, refer to CEEA Conformity IR, Number 317. And  
16           I'm afraid this doesn't have an exhibit number. But  
17           page 47 of that document, I believe.

18       MS. FRIEND:                   Hello, this is Laura. If you  
19           could repeat the exhibit number, please.

20       A.   MR. YOSHISAKA:           I don't believe there is an  
21           exhibit number for this particular document. It's the  
22           CEEA Conformity IR responses, and it would be the  
23           response to Question Number 3-17.

24       MS. FRIEND:                   We won't be able to find it  
25           without an exhibit number. Like...

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1 THE CHAIR: Well, or I mean if we had the date  
2 and title, we could probably get it and it could be  
3 entered perhaps as an exhibit. But we could find it  
4 that way, otherwise there are thousands of documents on  
5 the website. So our document manager person needs to  
6 zero in a little bit closer than that.

7 Is there a date? Did you get it off the web?

8 A. MR. YOSHISAKA: It would be CEEA Package 3, dated  
9 August 31st, 2018.

10 THE CHAIR: Tell you what. What might be  
11 better is, Mr. Secord, if there are some other  
12 questions you could continue on with for now. If not,  
13 then we're maybe in a bit of a bind unless -- if that's  
14 the only way to explain this, Mr. Yoshisaka, but  
15 otherwise we could get that after the break because  
16 then he could email it to our document manager and we  
17 could get it that way.

18 MR. SECORD: I can keep going, Mr. Chair.

19 THE CHAIR: Thank you.

20 Q. MR. SECORD: So we looked at Exhibit 110, PDF  
21 page 473, if we could turn that back up, please?

22 And we looked at the first -- the first  
23 hydrostratigraphic unit, the clay, and you --you know,  
24 we noted that the hydraulic conductivity is 5.1 times  
25 10 to the minus 6 metres per second, and then for



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1 something called the till north, it was 7.2 times 10 to  
2 the minus 8 metres per second.

3 Can you tell me what is the till north?

4 **A. MR. YOSHISAKA:** The till north in this figure  
5 refers to certain zones of tills, as are defined within  
6 the numerical model. So till north specifically refers  
7 to tills north of Elbow River, again, which were  
8 parameterized with a value of 10 to the minus 8.

9 Again, Mr. Chairman, members of the Panel, I will  
10 point out that the value of 10 to the minus 8 is, in  
11 itself, on the higher end of the range of what we  
12 observed in the field. So, again, we believe there's  
13 some conservatism built into this figure.

14 **Q.** And if we go back to PDF page 113. What colour is the  
15 till north in this -- in this Figure 4-5?

16 **A. MR. YOSHISAKA:** So the till north in that figure  
17 would have been the deep purple regions.

18 **Q.** 113. Right.

19 So my understanding, Mr. Yoshisaka, is that the  
20 clay is the purple and the till is what I would call  
21 a -- let's call it turquoise, it's close. Are you sure  
22 you're right that the till is purple?

23 **A. MR. YOSHISAKA:** Yes, sir, I'm sure.

24 **A. MR. BACK:** This is Dan Back, the geotechnical  
25 engineer. Just to be clear, the till is also

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1           predominantly a low permeability clay. So both the  
2           lacustrine and the till are very similar in their  
3           hydraulic conductivity.

4       Q.   Okay. Now, do you agree that the groundwater model  
5           does not include the presence of sands and gravels  
6           contained within the Unnamed Creek valley and is  
7           therefore incomplete with respect to modelling, or as  
8           accurately as possible, the local site conditions, and  
9           why was the decision made not to include these  
10          permeable deposits?

11       A.   MR. YOSHISAKA:           Mr. Chairman, members of the  
12           Panel, I would disagree with that statement  
13           wholeheartedly.

14           The permeable sands, which we are -- have been  
15           talking about are indeed included within the model.  
16           They are explicitly modelled as a unit within there.  
17           Again, they came straight from our geologic model which  
18           was first built and based upon the borehole records  
19           that we drilled in the area.

20           So, again, we know the extent of the sand unit.  
21           We know its thickness. We know how that varies over  
22           space, and indeed it has been included within the model  
23           and modelled explicitly as such.

24       Q.   And where is the sand unit shown on Figure 4-5?

25       A.   MR. YOSHISAKA:           The sand unit will not be shown on

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1 Figure 4-5 because Figure 4-5 is too shallow.

2 So in fact if we continue to scroll downwards on  
3 the page, document manager, please, and if we continue,  
4 and we continue yet; too far now. That's too far now,  
5 we need to go back up, please. I believe one more up.  
6 Sorry, I'm only seeing half a page at a time here.

7 It's Figure 4-9. If we could find Figure 4-9,  
8 it's just down a couple. Right there, thank you.

9 So the sand units which were identified and which,  
10 Mr. Secord, you pointed to in the geotechnical report  
11 are captured there. It's the green kind of polygon  
12 shapes there which represent those sands.

13 Q. Now, you're indicating deep sand? Or are we talking  
14 about the shallow sand at the surface? Because this is  
15 layer 4, and I would have thought layer 4 would be deep  
16 sand.

17 A. MR. YOSHISAKA: That's correct, Mr. Secord. So  
18 this sand is situated below the till; this is not sand  
19 at surface. And as we previously noted, there is no  
20 surficial gravel layer in -- in the project area. So  
21 this is sub-till sand.

22 Q. So this is not sand at the Unnamed Creek, is it?

23 A. MR. YOSHISAKA: That's not correct. This is sand  
24 at -- that is, in part, located at or underneath  
25 Unnamed Creek.

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1 Q. Is that right, Mr. Back?

2 A. MR. BACK: Mr. Chairman, I'm not sure I  
3 totally understand the question.

4 As I stated before, in the Unnamed Creek, the  
5 sand/gravel/cobble layer is overlain by a clay  
6 formation. So there is a few stray boulders that lie  
7 along the creek for sure, but there is not a formation  
8 of sand and gravel and cobbles exposed on the surface.

9 THE CHAIR: Mr. Secord, Mr. Yoshisaka, I'm not  
10 sure if this helps at this point. But we apparently  
11 have been able to locate the document that you were  
12 referring to, Mr. Yoshisaka. If that is better now,  
13 then we can get it; if it isn't, then please continue.

14 A. MR. YOSHISAKA: Yes, it's very relevant for this.  
15 So if we could please bring that up, appreciate that.

16 THE CHAIR: And Laura, Ms. Friend, if we're  
17 going to be referring to it, if it isn't already  
18 entered as an exhibit, we should do that now.

19 MS. FRIEND: Okay. It would be Number 375.

20 MR. BARBERO: Mr. Chair, it's Michael Barbero  
21 here, sir.

22 THE CHAIR: Yes.

23 MR. BARBERO: Might I suggest we just confirm it  
24 is the right document before we mark it as the exhibit,  
25 sir?

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1 THE CHAIR: Sounds good. Let's put it up, I  
2 mean at least the title, so we can confirm with  
3 Mr. Yoshisaka.

4 MS. FRIEND: This is Laura again. I just sent  
5 it to Carolyn, so she's been out of the loop. So give  
6 her a minute to catch up.

7 THE CHAIR: Okay.

8 MR. BARBERO: In the interest of time, it's  
9 Michael Barbero again, sir. Ms. Friend, I have just  
10 sent you an email with the exact link to the document,  
11 so you should have that as well.

12 MS. FRIEND: Thank you.

13 **EXHIBIT 375 - 2019/12/10 ALBERTA**  
14 **TRANSPORTATION SIR TO AGENCY RE ANNEX 1**  
15 **INFORMATION REQUEST ROUND 1 PART 3**  
16 **CONFORMITY REVIEW DATED 2019/08/21**  
17 **RESPONSE**

18 MR. SECORD: Well, while we're waiting for  
19 that.

20 Q. Stantec indicates in Exhibit 327 at PDF page 44 that  
21 while Dr. Fennell is correct that the range of  
22 hydraulic conductivities measured were estimated  
23 through the completion of three in situ well response  
24 tests, several other attempts to measure the hydraulic  
25 conductivity values were attempted during the

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1 hydrogeology field program.

2 Some of these test attempts were unsuccessful due  
3 to extremely slow water level recovery in the  
4 monitoring wells and lack of sufficient standing water  
5 in the well casing.

6 Can you direct us to where that is made clear in  
7 any of the application materials?

8 **A. MR. YOSHISAKA:** Mr. Chairman, I don't believe that  
9 that is referred to anywhere else in the materials, the  
10 reason being is that the tests we did not consider to  
11 be successful because they could not be completed for  
12 the reasons that Mr. Secord just mentioned. As such,  
13 they were not reported.

14 We do submit them in that response because in  
15 themselves, they do provide some qualitative support  
16 for the observations that the hydraulic conductivity  
17 values of those clay materials are very low.

18 In fact, if we cannot completely complete the test  
19 because the recoveries are so slow, that it can be  
20 inferred that the conductivity at those locations is in  
21 fact lower than where we completed the successful test.

22 **Q.** Do you agree that this does not diminish the fact that  
23 the properties of the glacial deposits are only  
24 constrained with a minimum number of K test readings,  
25 i.e., three, one of which has a calculated value of up

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1 to 2.2 times 10 to the minus 7 metres per second, do  
2 you agree that this hardly frames the range of possible  
3 K values and seriously undermines the efficacy of the  
4 groundwater model?

5 **A. MR. YOSHISAKA:** Mr. Chairman, I would not agree  
6 with that statement.

7 They are correct in stating that there were three  
8 values yielded from the hydrogeology field program.  
9 However, if I could point you to Exhibit 175, please,  
10 and starting on page -- PDF page 101.

11 **THE CHAIR:** Just one moment, Mr. Yoshisaka,  
12 thanks. It's 175 at page 101; is that correct?

13 **A. MR. YOSHISAKA:** Beginning on 101, thank you.  
14 Thank you, document manager.

15 Mr. Chairman, as you can see here in this exhibit,  
16 starting in Section 5.4.3.6 are presented additional  
17 hydraulic conductivity testing results from the  
18 geotechnical testing program.

19 If we scroll down in this document here as well,  
20 please, this first table here, Table 11, is a summary  
21 of additional measurements that were taken. You can  
22 see they total an additional 14 measurements based on  
23 falling head tests.

24 In addition in Table 12, we have another four  
25 results based on CPT pore pressure dissipation tests.

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1           Table 11 and 12 just pertain to the glacial  
2 lacustrine materials.

3           You can see from these tables that the K values  
4 are extremely low, ranging in the orders of 10 to the  
5 minus 10.

6           Now, if we continue downwards in this document,  
7 document manager. Thank you.

8           Table 13 and Table 14 also present additional K  
9 values from tests completed on the glacial tills. So  
10 here we have an additional seven measurements taken  
11 here from falling head permeability testing, as well as  
12 testing CPT pore pressure dissipation tests as well.

13           So in addition to the results that we yielded from  
14 the hydrogeologic field program, we also have available  
15 to us these results as well, both of which were  
16 considered in our models and in terms of how we  
17 characterized those values.

18           Again, what you can see from the majority of these  
19 values are measured values are much much lower, that  
20 what we eventually carried in our model which is again  
21 why -- why I'm quite confident that our model is  
22 conservatively set up and would tend to overestimate  
23 effects related to impoundment of water within the  
24 reservoir.

25       Q. Well, Mr. Yoshisaka, you are referring to lab tests



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1 which are not the same as field measurements; correct?

2 A. MR. YOSHISAKA: They are not the same; I will  
3 agree with that. They are no less representative,  
4 however.

5 So tests are conducted under different conditions,  
6 and perhaps Mr. Back can hop in here. He can explain  
7 these much better than I.

8 A. MR. BACK: Yes, this is Dan Back.

9 Q. Just before Mr. Back comes to the rescue, Mr. Yoshisaka  
10 was the one who referred us to these lab tests.  
11 Mr. Yoshisaka, field measurements give more accurate  
12 results in place, do they not?

13 A. MR. YOSHISAKA: That's not -- not the case  
14 necessarily, no. I wouldn't agree with that.

15 THE CHAIR: Mr. Secord, you're leaning back.  
16 It's very difficult to hear you.

17 MR. SECORD: Sorry.

18 Q. So you're saying that lab tests are more representative  
19 than actual tests taken in the field in place?

20 A. MR. BACK: If I could -- this is Dan Back.  
21 If I could address that perhaps.

22 Our goal as engineers and geotechnical engineers  
23 is to understand better what happens in the field.  
24 Always we're interested in what's going to happen at  
25 the project site when the facility is built, and we

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1 used a lot of tools to get there.

2 Obviously field tests is one direct measurement of  
3 what's setting in the field. Unfortunately field tests  
4 have a lot of limitations. Another way to do that is  
5 laboratory tests, which are able to do a much more  
6 precise test under controlled conditions.  
7 Unfortunately, lab tests also have some drawbacks  
8 relative to sample disturbance and so forth.

9 So, typically, in understanding what's going to  
10 happen with the parameters relating to soil, in this  
11 case particularly the hydraulic conductivity, we use a  
12 mix of different test values to give us a best  
13 understanding.

14 Typically, you have a difference in horizontal and  
15 vertical permeabilities, and we often rely on the  
16 laboratory tests as giving us a better understanding of  
17 the vertical permeabilities because that's usually the  
18 way that we test the soil in the laboratory. Often we  
19 rely on the field measurements to give us a little  
20 better understanding of the horizontal permeabilities,  
21 and then we use empirical relationships between the two  
22 to give us a better understanding.

23 I would point out that in these tables that  
24 Mr. Yoshisaka showed you, there's both lab tests, the  
25 one that are currently in the screen, they're Table 13,

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1 those are laboratory tests. Table 14 are CPT, pore  
2 pressure dissipation tests which are done in the field.

3 We had a significant -- how shall I say, we had a  
4 significant challenge with the field testing due to the  
5 extremely low permeability of the clay. I had it up  
6 here a minute ago, and it's probably not worth going  
7 there, but we did probably 30 different pore pressure  
8 dissipation tests, and because of the extremely low  
9 permeability, most of those were terminated before  
10 enough data was obtained to get a meaningful hydraulic  
11 conductivity from the soil. It simply takes such a  
12 long period of time to let the pressure equalize, which  
13 is what the field test is, to really establish a  
14 meaningful hydraulic conductivity.

15 In a laboratory and controlled condition, we can  
16 run the tests for longer, we can apply higher pressures  
17 and scale the tests to field conditions and get a lot  
18 better confidence in what the numbers are telling us.

19 Q. Then why do field tests at all, Mr. Back?

20 A. MR. BACK: Again, you want to use as much  
21 data as you can and correlate those data with each  
22 other.

23 In the empirical relationships, the field scale is  
24 important. We had some discussion earlier about large  
25 scale fractures. The field tests might find those when

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1 the laboratory tests would not.

2 Sometimes you have differing materials and layers  
3 in the field that you might not pick up in a small  
4 laboratory sample.

5 So all in all you want to rely on both sources of  
6 information to give you the best understanding of how  
7 the sub-surface will respond.

8 Q. Okay. So if we could go back to Exhibit 110, PDF page  
9 113, 113, the first layer. Document manager, you're  
10 doing a superb job, thank you.

11 So, Mr. Yoshisaka, you have the -- you totally  
12 have the configuration of Layer 1 wrong for the K value  
13 and the presence of sand and gravel; correct?

14 A. MR. YOSHISAKA: No, that's not correct. There is  
15 no sand and gravel at ground surface as we've  
16 previously mentioned. So there is nothing that's wrong  
17 with this.

18 Q. I thought there was at the Unnamed Creek?

19 A. MR. YOSHISAKA: No. Again, Mr. Secord, I'll  
20 refresh your memory that that sand in question is  
21 below -- below the till. It is not at ground surface.

22 Q. The sand and the gravel at the Unnamed Creek --

23 A. MR. YOSHISAKA: That's correct.

24 Q. -- is not in Layer 1. And what's the thickness of  
25 Layer 1?

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1     **A. MR. YOSHISAKA:**            **It's -- it's variable.**

2     **Q.**    So the area of the Unnamed Creek, what is the thickness  
3       of Layer 1?

4     **A. MR. YOSHISAKA:**            **I'm not sure I totally answer or**  
5       **understand your question.**

6                **I mean Layer 1 is built based on the topographic**  
7       **surface, so it follows the contour of the land, you**  
8       **know, what you see here is a plain representation of**  
9       **that, so you can't see the topography here. But**  
10       **Layer 1 is the uppermost layer in the model that is**  
11       **constrained at the top by the digital elevation model**  
12       **for the area.**

13               **So the surface topography is -- and all of its**  
14       **variability is captured in Layer 1 in the model.**

15    **Q.**    Okay. So let's go to Layer 2. Where is the sand in  
16       Layer 2?

17    **A. MR. YOSHISAKA:**            **The sand will not be present in**  
18       **Layer 2.**

19               **Perhaps I could go to -- if we could refer within**  
20       **Exhibit 110, just bear with me and I'll find a better**  
21       **figure here for us to refer to.**

22    **Q.**    And while you're doing that, what is the total  
23       thickness of the seven layers that was used for the  
24       model? What depth does it go down to in metres? Is  
25       that described anywhere?

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1       **A. MR. HEBERT:**                   Mr. Chairman, we'll just take a  
2                   moment, and we'll ensure we have the right information  
3                   and be able to proceed with answering Mr. Secord's  
4                   questions.

5       **THE CHAIR:**                    Thank you.

6       **MR. SECORD:**                  Mr. Chair, if it's okay with you,  
7                   can we take our break early, come back at --

8       **THE CHAIR:**                  Mr. Yoshisaka, we could also then,  
9                   if you could please confirm -- document manager will  
10                  put up a document and for Mr. Barbero's request, you  
11                  can confirm that that is for sure the document that you  
12                  want. Let's do that before break, please.

13                 Ms. Taylor, do you have that document handy?

14       **MS. TAYLOR:**                 Yes, we do.

15       **THE CHAIR:**                  Would you put it up, please, just  
16                  so we can get that confirmed so when we come back,  
17                  we'll have it ready to go?

18       **MR. BARBERO:**                 Document manager, it's  
19                  Michael Barbero of Alberta Transportation. I think  
20                  we're looking for PDF page 42.

21       **THE CHAIR:**                  And is this the correct document?  
22                  Or you will know that by page 42, I suppose, will you?

23       **A. MR. YOSHISAKA:**         Yes, I believe so. If we could  
24                  actually scroll down a couple of pages to page 47, and  
25                  I'm hoping that's the map that I'm -- there's a table,

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1           yes, and then continue on down.

2           Yes, these would be the figures that I was going  
3           to point to.

4       THE CHAIR:                    Okay. So this document, then,  
5       Ms. Friend, can be, let's ensure this is the one,  
6       ensure this is document we enter as Exhibit -- sorry,  
7       the number again, the previous number?

8       MS. FRIEND:                    375.

9       THE CHAIR:                    375. Thank you. Okay. And  
10       panel, it is close to 3, it's 10 to 3. So Mr. Secord,  
11       if you're going to need a bit of a caucus, anyway...

12       MR. SECORD:                    No, I don't need a caucus at all.

13       THE CHAIR:                    You just need a break.

14       MR. SECORD:                    I just want a break, sir.

15       THE CHAIR:                    You need a break, well, we've  
16       finally got you.

17           Okay, so let's turn at five minutes after 3, then,  
18       everyone, thank you.

19       (ADJOURNMENT)

20       THE CHAIR:                    Okay. Panel, is the panel ready,  
21       and Mr. Secord, are you ready?

22       MR. SECORD:                    I am, thank you.

23       Q. So if we could turn to Exhibit 110, PDF page 47. And  
24       Mr. Yoshisaka, you took me to this figure earlier, and  
25       if we look at the -- I don't think you need to zoom in,

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1 Document host, but I can tell you that in the left-hand  
2 side there is a figure which says: (as read)  
3 "Glacial lacustrine isopach thickness in  
4 metres."

5 And it's a blue line. And can you confirm that most of  
6 the SR1 reservoir area appears to have this glacial  
7 lacustrine isopach; correct?

8 **A. MR. YOSHISAKA:** That's correct, Mr. Secord. The  
9 reservoir area is underlain by the lacustrine deposits  
10 as noted there.

11 **Q.** And that would be clay; correct?

12 **A. MR. YOSHISAKA:** Low permeability clay, that's  
13 correct.

14 **Q.** And then if we go to PDF page 113, and we look at  
15 Layer 1 -- and while we're at it, I'm still waiting for  
16 an answer on the thickness of the seven layers.

17 **A. MR. YOSHISAKA:** Sure, if we could pull up the  
18 other document that we were searching for.

19 **Q.** I want to just stay here for a second before we go to  
20 the other document. So do you have an answer for me on  
21 the thickness of the seven layers?

22 **A. MR. YOSHISAKA:** It's variable, and the other  
23 figure that I'm trying to address will highlight that.

24 **Q.** Okay. Well, then, let's go there.

25 So this is Exhibit 375, PDF 101 -- or, sorry, this



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1 is the new exhibit, Ms. Friend?

2 THE CHAIR: Ms. Taylor, this is Exhibit 375?

3 MS. FRIEND: This is Laura. Yeah, that was the  
4 right one. It doesn't show 375 on her copy yet, so --  
5 but it was the 2019 document.

6 THE CHAIR: Thank you.

7 Q. MR. SECORD: Okay, over to you, Mr. Yoshisaka.

8 A. MR. YOSHISAKA: Thank you, Mr. Secord,  
9 Mr. Chairman, actually, document manager, if you could  
10 scroll down just a couple of pages here. Actually one  
11 back up just so we understand what we're looking at  
12 here. Thank you.

13 Yeah, I'm just going to present a cross-section  
14 A-A, which you can see there in "Plan View," and if we  
15 scroll down now to the next page, this is cross-section  
16 A-A, and this is a vertical slice through the model  
17 domain. So this is a cross-section that depicts the  
18 various layers in the model, and, you know, their  
19 varying thickness.

20 Now, the sand in question that we were talking  
21 about earlier is now shown near the right side of the  
22 cross-section here. It's that magenta colour there.  
23 You can see that it's underneath the till units in this  
24 location and, in fact, in all locations, and resides  
25 directly above bedrock.

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1 Q. And that's towards the A prime side of the Figure 17-2?

2 A. MR. YOSHISAKA: That's correct, yeah.

3 Also, Mr. Secord, you had a question about the  
4 overall thickness of the model. It is shown here. As  
5 you can see, it depends on where you are in the model  
6 because there is so much topographic change that's  
7 going on across the model domain, so ultimate thickness  
8 does vary.

9 But, ultimately, the bottom let's say of the model  
10 is approximately at an elevation of 1,024 metres above  
11 sea level. So, roughly, it's about 200 metres thick.

12 Q. And so the magenta that we see in towards A prime, that  
13 would be how many -- how many metres would it be below  
14 the surface before you encounter the sand and gravel or  
15 the sand unit?

16 A. MR. YOSHISAKA: Again, at -- it is variable across  
17 the project area at which depth it is encountered.  
18 This particular section is near the diversion channel  
19 area, actually.

20 So, at this particular location, it's a little bit  
21 shallower than it can be found in other locations. And  
22 again, its thickness varies from about a metre. I  
23 think, at thickest, it's approximately 7 metres thick.

24 Q. I think the document I took you to earlier indicated  
25 there was a sand unit that was 7 metres or so in depth,

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1 and would it be -- and then the -- what is the sort of  
2 light grey above the sand unit?

3 I guess there's -- first of all, there's a blue  
4 layer and then what unit is the blue layer above the  
5 sand unit? A thin blue layer it looks like.

6 **A. MR. YOSHISAKA:** So the blue layer directly above  
7 the sand layer is the till, and the units on top at  
8 ground surface is the lacustrine clay.

9 **Q.** And then document host, if you could just zoom up so we  
10 can see the legend on the right-hand side a little  
11 better. A little bit more. That's great. If you can  
12 slide it over.

13 So as I look at this, the sand unit would be first  
14 encountered just a -- well, I guess just a little bit  
15 below -- 1216 metres above sea level; correct?

16 **A. MR. YOSHISAKA:** That's correct, yes.

17 **Q.** And then there would be a very infinitesimal amount of  
18 till, so basically we're looking at something like  
19 between the top of the clay, which would be  
20 at -- actually, it looks like the top of the clay would  
21 be at 1216 metres above sea level, and then you would  
22 have within the next 8-metre segment, you would have, I  
23 guess, maybe 3 metres of clay, a thin -- maybe a metre  
24 of till, and then you would get about 3 metres of sand.  
25 Does that work as you go from 12 16 to 12 08; we're

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1 talking about an 8-metre interval there?

2 A. MR. YOSHISAKA: Approximately.

3 Q. Thank you. Is there anything else you wanted to take a  
4 look at in this document?

5 A. MR. YOSHISAKA: Not in this document, I believe.  
6 There's some other cross-sections in the TDR update  
7 that I could present as well.

8 It will also highlight the distribution of that  
9 sand unit which we again will well understand.

10 And then again, I can present some other  
11 cross-sections that will show you its position  
12 stratigraphically below the till.

13 Q. Now this cross-section A-A prime is not under the SR1  
14 reservoir footprint, so how is this relevant?

15 A. MR. YOSHISAKA: This just happens to be a location  
16 that I knew had handy that did in fact show the  
17 presence of that sand. I believe the assertion being  
18 put forth at the time was that the sand was not  
19 incorporated into the model.

20 So I'm bringing this to your attention,  
21 Mr. Chairman, so that you know that it is in fact  
22 included within the model.

23 Q. So if we look at that map that you pulled up earlier,  
24 can you direct us to that which shows where the A-A  
25 prime --

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1 A. MR. YOSHISAKA: It's just -- just above this  
2 particular figure, I think. It's one page up.

3 Q. So A-A prime is not in the project area?

4 A. MR. YOSHISAKA: A-A prime is within the project  
5 area; it just cuts across the diversion channel area.

6 So if you'd like to see some conditions under the  
7 reservoir area, I could point you to a different figure  
8 that would describe that. Document manager, if you  
9 could pull up Exhibit 110, and if we could move to PDF  
10 page 55 of that document, please.

11 So this figure here is a figure again showing some  
12 cross-section locations cut across the PDA. And if we  
13 look at cross-section A-A prime in this here which is  
14 oriented in a northwest to southeast direction and  
15 basically follows the low point down the main axis of  
16 the reservoir. So that's the location of cross-section  
17 A-A.

18 And if we now move down one page, so this is now  
19 the cross-section itself.

20 There are two parts to this figure. The upper  
21 cross-section is the entire cross-section A-A. So if  
22 you recall, it spans the entire regional assessment  
23 area. The bottom cross-section you see there is  
24 actually a zoomed-in portion of the cross-section shown  
25 above that is zoomed in specifically in the PDA of the

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1 project area.

2 So here in this section, you can see the  
3 lacustrine clay shown in brown at ground surface.  
4 Below them in green are the tills, and the lower sand  
5 unit which is beneath the till is barely visible there,  
6 and that's really how thin it is relative to some of  
7 these other units.

8 If you look kind of in the central area of that  
9 cross-section just to the left of Elbow River, you can  
10 see a very thin deposit there in yellow.

11 Perhaps, document manager, if you could zoom in a  
12 little bit, maybe a little bit more.

13 Yeah, so if you look just left of the Elbow River  
14 in that lower cross-section, you can see a thin yellow  
15 unit there, and that is that lower sand unit that's  
16 represented there within the model.

17 And, again, you can see there relative to the  
18 thickness of the overlying clays and tills, it's  
19 relatively thin, it's relatively isolated in its  
20 extent, but despite that, we acknowledge its presence  
21 and it is modelled within our models.

22 Q. Right. In Exhibit 110 and PDF page 127, Stantec  
23 reports on results of the residual head calculations to  
24 assess for any systemic bias in the groundwater model.  
25 What is systemic bias?

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1       A.   MR. YOSHISAKA:           Systemic bias would be referring  
2       to -- you know, in this case we were examining  
3       calibration residuals and these are basically the  
4       difference between a modelled and observed result.

5                In this particular figure, Figure 4-15 that we're  
6       looking at here, plots the value of the residual  
7       relative to the elevation of the groundwater level. So  
8       you can see that residuals fall above and below the  
9       zero line so the zero line in this case would be a  
10      perfect fit between a modelled and observed value. And  
11      you can see here that -- the distribution of the  
12      residuals.

13               So systemic bias would be indicated by the  
14      majority of the points either falling far above that  
15      zero line or the majority of points falling below that  
16      zero line, or there could be cases where there's  
17      clustering of dots in certain regions of the model as  
18      indicated by the elevation shown there that, you know,  
19      could lead you to suspect that there is some overall  
20      bias in those residuals.

21      Q.   And how does systemic bias arise in numerical  
22      groundwater models?

23      A.   MR. YOSHISAKA:           I mean, it is one of the metrics  
24      through which we assess successive calibration. So,  
25      again, really a residual is just comparing what the

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1           model value is versus an observed value. And, yes, as  
2           you are calibrating your model, one of the metrics that  
3           you are trying to optimize are those residuals.

4           Q. Now, on this page, Stantec goes on to say in the second  
5           paragraph on PDF 127, and I quote: (as read)

6                       "The plot indicates that the residuals  
7                       are distributed both above and below the  
8                       zero line, again indicating no systemic  
9                       bias in the calibration."

10           Do you agree that when assessing the actual residual  
11           values presented in Table 4.1 starting on page PDF 123,  
12           the results are not consistent with this conclusion?

13                       If we could go up to PDF 123? Do you agree that  
14           out of the 72 residual values provided, 42 or almost 60  
15           percent are above the zero line?

16           A. MR. YOSHISAKA:           Subject to check -- I have not run  
17           those numbers myself, but yes, I could accept, I  
18           believe in your evidence it was stated that 58 percent  
19           were above the zero line.

20           Q. Can you confirm that Figure 4-14 on PDF page 121 of  
21           Exhibit 110 also shows the location of calibrated  
22           targets used and range of residual values as shown by  
23           coloured dots?

24           A. MR. YOSHISAKA:           Yes, I can confirm that.

25           Q. Do you agree that, although it would have been more



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1 helpful to show the actual values at each point, there  
2 does appear to be some bias towards more positive  
3 residuals on the east side of the SR1 footprint?

4 A. MR. YOSHISAKA: I would agree that, spatially  
5 speaking, some of the resids [verbatim] on the east  
6 side of the domain are more positive than those values  
7 in the PDA area.

8 Mr. Chairman, I would like to point out that when  
9 we are calibrating a model of this nature, this is a  
10 large regional scale model. What we are most  
11 interested in in calibrating is the area where the  
12 effects are likely to start.

13 So, you know, in calibrating the model, we  
14 definitely focus on that area first because that's the  
15 areas where there's change in stressors in the system,  
16 and those stressors in this case being, you know, the  
17 impoundment of water behind the dam.

18 So first and foremost, we want to optimize the  
19 calibrations in those areas first, and then recognizing  
20 that, yes, in some areas, distal to those main area of  
21 effects, the calibration may not quite be as strong.

22 I would also like to point you to another figure  
23 in Exhibit 110, and this figure just precedes the plot  
24 that we just had up. It's Figure 4-14, please,  
25 document manager, on page 126. Thank you.

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1           So this is another plot of the same residuals. So  
2 this graph, basically examines the residuals in a  
3 different way.

4           What you can see here in this is the red dotted  
5 line that goes across this graph at a 45-degree angle  
6 there and represents the line of perfect fit. So dots  
7 that fall on that line, the simulated and observed  
8 groundwater levels have a very good match.

9           Again, you can see from this plot that the  
10 residuals all plot very close to the line of perfect  
11 fit. Yes, there is some scatter in the data and that  
12 is certainly expected of a regional scale model. But  
13 what we see here, as well, is that the fit of those  
14 residuals is quite good across the entire range of  
15 values in the model as well.

16           So we need to keep in mind that this is a regional  
17 scale model in an area of high topographic relief.  
18 There's more than 200 metres of relief in this model  
19 from its highest point to its lowest point.

20           So, you know, residuals that are, you know,  
21 averaging a couple of metres within the framework of a  
22 model that has over 200 metres of relief are actually  
23 quite small. And if we actually scroll up one more  
24 page, I believe, we can see in Table 4-2 there some of  
25 the residual statistics based on the calibration, the

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1 correlation coefficient notably at the bottom there  
2 being .99, which is actually a relatively high level of  
3 correlation for those residuals, and the normalized  
4 root mean squared residual is 2.8 percent there, you  
5 know, common metric for the adequate calibration of a  
6 model of this nature would be in the order of  
7 10 percent.

8 So it's a rather good calibration of this model.  
9 Again, there's going to be some variations in the  
10 residuals and where they are, but overall we have  
11 confidence that this model is adequately calibrated.

12 Q. So going back, zoom host, to PDF page 121. I  
13 had -- you confirmed that Figure 4-14 shows the  
14 location of calibration targets used and the range of  
15 residual values shown by coloured dots. You agree that  
16 it would have been more helpful to show the actual  
17 values at each point, and you agree that there does  
18 appear to be some bias towards more positive residuals  
19 on the east side of the SR1 footprint.

20 How is this considered unbiased? And how does it  
21 speak to areas of the model domain that are not  
22 appropriately configured?

23 A. MR. YOSHISAKA: Mr. Chairman, I believe I said  
24 that I acknowledged the residuals in some eastern areas  
25 of the model are higher than those in the main areas of

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1 influence, namely within the project PDA.

2 I don't see overall, at a model scale, that there  
3 is systemic bias. So there is no, you know, broad  
4 pattern of all the residuals being positive or all the  
5 residuals being negative. Again, yes, there is some  
6 variation and they do swing from negative to positive,  
7 which, in fact, means that it's pretty close.

8 When you have residuals that are close to zero  
9 and, yes, some are positive and some are negative, then  
10 that means that your calibration has honed in in the  
11 right area.

12 Q. Zoom host, you can take that down. Thank you.

13 Now Stantec indicates in Exhibit 327, PDF page 45  
14 that -- and I quote: (as read)

15 "Effects on pore pressures were, in  
16 fact, examined under the most  
17 conservative scenario where the complete  
18 external loading due to the weight of  
19 water impounded in the reservoir was  
20 applied directly to the underlying  
21 bedrock, assuming that none of this  
22 external load would be borne by the  
23 overlying clay tills."

24 How is it possible that none of the external load will  
25 be carried by the clay tills when that is the actual

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1 material that the SR1 reservoir will sit on?

2 A. MR. YOSHISAKA: Mr. Chairman, I believe the  
3 passage that Mr. Secord referred to was in reference to  
4 how we modelled the effect of an external load applied  
5 to the ground surface, how those loads would translate  
6 into pressures within the underlying bedrock aquifer.

7 So we are saying here that this is what we hit was  
8 a conservative approach because we took the entire load  
9 that would be related to the impoundment of water, so  
10 the so-called weight of the water on the land surface,  
11 was applied as an additional head to the underlying  
12 bedrock.

13 So Mr. Secord is correct in saying that, in  
14 reality, you know, that wouldn't happen. Yes, the clay  
15 tills and the underlying materials would, in fact, bear  
16 some of that load.

17 But for conservatism, we did not -- you know, we  
18 assumed that none of the load would be carried by those  
19 materials because that, in turn, overestimates the  
20 pressure effect in the underlying bedrock.

21 So this was a conservative approach and, in  
22 reality, some of that load would be borne by the  
23 overlying materials which would actually reduce the  
24 pore pressures underneath because, again, the portion  
25 of that normal stress that has now been applied is just

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1 borne by the matrix itself and not the pore fluid.

2 So our approach in this case, when examining the  
3 effects on groundwater, was to adopt something, you  
4 know, entirely conservative in that we were not  
5 discounting any of that loading that's actually borne  
6 by the matrix itself, and we apply that directly to  
7 groundwater assuming that it's got to take it all.

8 Q. What about the pore pressures in the clay and tills?

9 A. MR. YOSHISAKA: So, again, we embarked on that  
10 exercise because the question at the time was being  
11 what will happen to water levels within the bedrock due  
12 to the weight of water impounded in the reservoir, and  
13 you know, how far out could the pressure effects in  
14 bedrock be observed, what would their magnitude be, and  
15 with that in mind, I mean that was the question we were  
16 seeking to answer. And, again, to do that, we applied  
17 that full load of additional head directly to the  
18 bedrock. So we feel, again, that's a highly  
19 conservative approach, would tend to overestimate the  
20 pressure influence within the bedrock, but it is  
21 informative for us in terms of developing our  
22 monitoring and mitigation plans.

23 Q. If the impact of applying the full external load onto  
24 clay tills had been applied in the model, how would  
25 this change the results of the assessment and what

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1 would the risk of failure be like in those  
2 circumstances?

3 **A. MR. YOSHISAKA:** Mr. Chairman, I think we are  
4 talking here about slightly different issues.

5 So our approach to assess effects on the  
6 groundwater system assumed that that load would  
7 translate as pressure down to the underlying aquifer.  
8 So our assessment on the groundwater system was not  
9 intended to assess the effect of that additional load  
10 in terms of a geomechanical response of those  
11 underlying tills. That assessment was conducted by our  
12 geotechnical teams, and was also duly considered, but  
13 it is a separate assessment than the effects assessment  
14 for groundwater.

15 **Q.** Yeah, you understand my question is not about the  
16 bedrock?

17 **A. MR. BACK:** This is Dan Back. Do I need to  
18 address that question, Mr. Secord, as far as the  
19 geotechnical stability analysis relative to pore  
20 pressures?

21 **Q.** Yeah, I'm just trying to understand Mr. Yoshisaka's  
22 response.

23 **A. MR. BACK:** He was modelling pore pressures in  
24 the bedrock, so that's why he allowed the load to pass  
25 through the soil formations directly to the bedrock.

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1           If you're interested in the performance of the  
2           soil formations, we looked at that in great detail in  
3           our geotechnical records.

4       Q.   That was my question. I referred to Exhibit 327, PDF  
5           page 45, which said that the weight of the water was  
6           applied directly to the underlying bedrock.

7           And my question to Mr. Yoshisaka was how is it  
8           possible that none of the external load will be carried  
9           by the clay tills when that is the actual material that  
10          the SR1 reservoir will sit on. And I had a long  
11          explanation.

12          But my -- I guess the question that I have is, if  
13          the impact of applying the full external load onto clay  
14          tills had been applied in the model, the groundwater  
15          numerical model, how would this change the results of  
16          the assessment?

17       A.   MR. YOSHISAKA:        So Mr. Chairman, we're talking  
18          about different models here.

19          So the groundwater model was developed to assess  
20          effects on groundwater levels, pressures, flow regime,  
21          and so forth. There is a separate modelling exercise  
22          that has been completed as well to address the  
23          geotechnical concerns that Mr. Secord has raised here.

24          So they are two separate models, and we shouldn't,  
25          you know, mix them up here in our discussion.



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1           The text, Mr. Secord, that you're referring to was  
2           specific to the groundwater model. So for a  
3           groundwater modelling perspective, that approach is  
4           conservative because we're taking all the pressure and  
5           we're putting it in the groundwater system. So we're  
6           overestimating the effects on the underlying aquifer.

7           It is not meant to reproduce conditions accurately  
8           within the tills for the purposes of a geotechnical  
9           assessment. That line of investigation was handled by  
10          our geotechnical teams, and Mr. Back can comment more  
11          on those.

12        Q. Okay. I think I'm more interested in the groundwater  
13          numerical model at the moment. So Mr. Back, we'll  
14          leave you out of it for the moment.

15                 In Exhibit 327, the last paragraph on PDF page 44  
16          indicates: (as read)

17                 "Stantec acknowledges that the Spy Hill  
18                 formation contains notable  
19                 concentrations of montmorillonite which  
20                 indeed does swell when hydrated."

21          It is noted that -- and I quote: (as read)

22                 "Because water levels in the clay tills  
23                 in the SR1 reservoir area are in general  
24                 near ground surface, these units are  
25                 continuously hydrated with water in

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1           their existing state, and thus the  
2           potential for a formation of large scale  
3           desiccation fractures beneath the  
4           shallow water table is minimal."

5           Do you agree that while this may be true, so long as  
6           they stay hydrated, what happens when an extended  
7           drought occurs and the water table declines?

8           **A. MR. YOSHISAKA:**           Mr. Chairman, as we've stated  
9           before, we do acknowledge that when clays dry out,  
10          there's a potential for them to -- to form these  
11          desiccation fractures.

12                   However, should the project be put into operation  
13          and then these fractures are present, you know, once  
14          the water starts percolating down, I mean those clay  
15          materials will swell again, and those fractures will  
16          anneal.

17          **Q.** Do you agree, and I don't know whether this might be  
18          for Mr. Back, do you agree that the fact that the  
19          montmorillonite is hydrated is a concern given that it  
20          has a tendency to shear slip when placed under external  
21          load?

22          **A. MR. BACK:**                   Yeah, this is Dan Back. I guess I  
23          need to address that.

24                   Montmorillonite is a clay mineral. It's a  
25          component of many clays that occur. Based on the

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1 plasticity of the clays, particularly, the lacustrine  
2 clay, we would believe that a significant component of  
3 that is montmorillonite. There's other clay minerals  
4 that are in the clay, and usually the performance of  
5 the clay depends on the combination of the proportions  
6 of those within it. We would expect changes in the  
7 performance of the clay soil, depending on the moisture  
8 content that was present.

9 The way that the text in that report is written,  
10 it implies that the clay exists in an unhydrated  
11 condition; that's not accurate. Both the till and the  
12 lacustrine clay are currently moist. They're saturated  
13 to a depth of somewhere between 1 and 3 metres below  
14 the surface, and then they're in a moist condition from  
15 there to the surface.

16 In the event of an extensive drought, there would  
17 be some drying near the surface. Again, as I stated  
18 earlier, we -- I don't see any evidence based on the  
19 condition of the soil currently of that drying  
20 extending deeper than a couple of metres below the  
21 surface.

22 When clay soil is totally dried out and has  
23 no -- no or very little moisture in it, it becomes very  
24 hard. Think of like adobe brick or something; right?  
25 And so it has a great deal of strength. Its strength

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1 performance is dominated by the cracks that might form  
2 in the adobe block, if you will.

3 But when it is hydrated and has water content  
4 above the shrinkage limits, certainly above the plastic  
5 limits, it has a different set of characteristics, and  
6 it has softening kind of as implied there. The  
7 strength of the soil is probably not going to vary that  
8 much once it is in a moderately hydrated condition.

9 What happens when we have loading on the  
10 structure, and that could come from the construction of  
11 an embankment; it could also come from loading from the  
12 reservoir water loading, the pore water within the  
13 clay -- well, maybe I should back up.

14 The clay is subject to some shrinkage,  
15 consolidation, settlement, whatever word you want to  
16 apply, due to the vertical load that's applied to it.  
17 And as that occurs, the voids within the soil, that'll  
18 be the spaces that don't have soil particles, tend to  
19 get squeezed or reduce in volume.

20 And if there's enough water, in this case, in the  
21 clay is saturated and those voids are full of water,  
22 the water will not compress.

23 And so the load is carried by the water, and so  
24 that reduces the effect of normal load on the soil  
25 material, and that reduces the effect of sheer strength

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1           that you can achieve in that soil.

2           So let's just say we were to build the embankment  
3           and the soil underneath was saturated, then we would  
4           end up with high pore pressures. Those high pore  
5           pressures would reduce the normal load that pass  
6           through the foundation soil, and that would result in  
7           an apparent reduction in strength. Sheer strength  
8           cohesion is the term that Fennell used.

9           And so yes, we anticipated in our analysis, we  
10          went through a number of fairly sophisticated  
11          laboratory tests with a lot of different conditions on  
12          the soil samples to try to understand more clearly how  
13          the soil would respond under different normal loading  
14          and different shear loading and different pore  
15          pressures so that we could reasonably well predict how  
16          it would perform.

17          And we had some interaction with other engineers,  
18          both within Stantec and the technical review board  
19          retained by Alberta Transportation to look at our  
20          analysis, and as a result, we actually ended up doing a  
21          very sophisticated fine element model to help us  
22          understand what the pore pressures might be depending  
23          on how quickly the embankment was constructed.

24          So if you notice in the Preliminary Design Report,  
25          there's an extensive discussion about both traditional

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1           empirical methods of analysis and fine element analysis  
2           methodologies of understanding the strength of the soil  
3           under the embankment due to the loading that's based  
4           upon it.

5                        So I don't know if that answers your question  
6           directly. Perhaps you could restate your question or  
7           add another question for me.

8       Q.   Okay. Let's add another question.

9                        So hydrated soiling clays can slip; correct?

10      A.   **MR. BACK:**                    I would take your term "slip" to  
11           mean a shear failure, sheer movement, sheer  
12           displacement?

13      Q.   Sure.

14      A.   **MR. BACK:**                    Yes, depending on the loading  
15           that's applied to them, that can happen, yes, it can.

16      Q.   So how is this risk incorporated into the geotechnical  
17           assessment and how can my clients who are in the  
18           Springbank community who are going to be immediately  
19           downstream of the structure, within metres downstream  
20           of the structure, in fact there's one resident just at  
21           the end of the Unnamed Creek where the low-level outlet  
22           flows into, how can they be confident that the degree  
23           of sampling and lack of mineralogy to substantiate  
24           local conditions beneath SR1 is enough to provide  
25           comfort that a rather unique dam structure will not be

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1 subject to catastrophic failure at some point in time?

2 A. MR. BACK: Well, just to be clear, our goal  
3 is to develop a design that will not have a  
4 catastrophic failure. We'll incorporate redundancies  
5 into the design and do the analysis in such a way to  
6 essentially rule out that as a possibility.

7 As far as the shear slip I think is the  
8 terminology that you applied there, the way that the  
9 soil works is it slips or shears on the plain like that  
10 when the shear strength is exceeded.

11 So you take a sample, and you apply a load to, and  
12 it fails on a shear plain.

13 So the goal of our laboratory tests and  
14 geotechnical analysis was to understand what the shear  
15 stress is within the soil, both in the embankment and  
16 the foundation underneath, will be during the  
17 construction and operation and various conditions both  
18 failing during a flood, seismic conditions, drawing  
19 down the pool after the flood, all the different  
20 conditions is to understand what the shear stresses  
21 will be here in the soil.

22 And the laboratory testing program is to help us  
23 understand what point will the soil exceed the strength  
24 that it has speak and begin the shear slip that we  
25 speak of.

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1           So our entire design is based on doing those  
2           computations and understanding at what point the shear  
3           slip will occur and making sure that we never get close  
4           to that value. The factors of safety that we use in  
5           our geotechnical analysis allow us to have a difference  
6           between the strength of the soil to resist the shear  
7           slip and the loading that would cause the shear slip.

8       Q. Did you test any of the intervals between the  
9       interfaces between the clay till and bedrock for  
10      slippage risk?

11     A. MR. BACK:           We evaluated all of the materials  
12      from the ground surface to within the bedrock. We  
13      looked specifically at what was likely to be occurring  
14      at the top of rock location. We looked at what was  
15      going on in the interfaces between the lacustrine clay  
16      and the clay till. And our conclusion was that those  
17      interfaces would be -- the strength of those interfaces  
18      would be dominated by the weaker of the materials at  
19      the interface.

20           So if we're looking at the clay till versus the  
21           lacustrine clay, the lacustrine clay is typically less  
22           strong, so the strength of the lacustrine clay would  
23           drive the performance of that interface.

24           If we look at the clay -- the clay till and the  
25           underlying bedrock, the clay till was less strong than



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1 the bedrock, and so the strength of that clay till  
2 would drive the strength of the interface.

3 Q. So you didn't test any of the intervals at the  
4 interfaces between the clay till and bedrock for  
5 slippage risk?

6 A. MR. BACK: I guess I could answer that  
7 positively yes, we did not. And it's not traditional  
8 in geotechnical engineering practice obtain samples  
9 that are testable that would have a portion of soil and  
10 a portion of rock and then try to test the interface.

11 I can tell you from my experience in laboratory  
12 testing, when you do that, your shear will be in the  
13 soil.

14 There was some discussion of mud stone layers  
15 within the bedrock and some concern about the strength  
16 of those. However, in our extensive drilling program,  
17 we came to the conclusion that if those did in fact  
18 occur at the interface, they were over limited extents  
19 because of the dipping nature of the bedrock formation.  
20 And so there might be a little bit of mud and stone for  
21 a few metres, and then there would be more sandstone.

22 So to have a failure, we'd have to have a  
23 relatively large area many metres long that would  
24 actually move, and so you would get a composite of  
25 whatever the strength might be in the mud stone

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1 location and in the sandstone locations.

2 So our very confident belief is that any failure  
3 that occurs along the top rock interface will occur at  
4 the strength of the glacial clay too.

5 Q. Now, in Exhibit 178, starting at page PDF 325, there  
6 are a number of figures that show the depth of possible  
7 slope stability issues extending down into the clay  
8 tills underlying the SR1 dam structure.

9 And maybe we could pull up Exhibit -- sorry, PDF  
10 page 409 of Exhibit 178. Perfect. Maybe you could  
11 just reduce it by one. Thank you, zoom host.

12 Do you agree that this raises the risk of failure  
13 within the glacial units themselves or at the interface  
14 between the clay and underlying till, and how has this  
15 risk been assessed in relation to increased pore  
16 pressures from external loading that may serve to  
17 reduce friction and increase shear slip in the lateral  
18 direction? And a good example of this is on PDF page  
19 409, which we have in front of us now.

20 A. MR. BACK: I'm sure I don't follow your  
21 question, and it's awfully complex with a lot of parts.  
22 Could you state it again or perhaps break it into  
23 smaller pieces so I could answer each one.

24 Q. Sure. So taking a look at this figure on PDF page --  
25 at 409 of Exhibit 178, can you describe what the black

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1 vertical lines show?

2 A. MR. BACK: Yes, I can. I'm very familiar  
3 with this figure and all of the figures that you're  
4 referring to here.

5 Q. So can you just take me through what this figure is  
6 depicting in terms of this incipient motion in the  
7 downstream direction?

8 A. MR. BACK: Yes, absolutely. This is a  
9 GeoStudio analysis for slope stability, and you're  
10 seeing the section that we analyzed. This is one of  
11 the sections of the embankment dam. This particular  
12 case, as it says there, "Load Case End, Construction  
13 Year 3, Flood, Total Stress Parameters."

14 So the layers that you see starting from the  
15 bottom, the orange yellow colour is the bedrock; the  
16 purple is the glacial clay till; the bright red is the  
17 lacustrine clay; and then above that, we have the  
18 embankment. The blue is the core, the grey is the  
19 shelves, the brown are the rock toes. And then over on  
20 the left, you see kind of the dark crosshatch and that  
21 would be the pool because this is an assumed flood  
22 condition.

23 There is, as you see there, a somewhat irregular  
24 sort of partially circular surface that starts up at  
25 the crest in the blue, sends down through the bright

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1 red and comes down at the downstream toe. That is the  
2 failure surface for this particular analysis.

3 The vertical lines that you see in there, I  
4 believe those are slices the GeoStudio generates that  
5 it does its computation of the slope stability on. Up  
6 above that, you see a red dot and, beside that, the  
7 number 1.4.

8 The way this works is we set the model up and we  
9 identify the geometry of the layers as in here. We  
10 identify the properties of the layers, you see that in  
11 the table above, unit weight, cohesion, different  
12 friction parameters, and then we identify what failures  
13 we want to look at.

14 In this case, we're talking about a downstream  
15 motion. The incipient means its going downstream if it  
16 moves and when it moves. We did another one -- maybe  
17 on the flood gates we did another one. Most of them we  
18 did both downstream and upstream.

19 Then you give the program certain restraints. In  
20 this case, we have an entry and exit restraint. You  
21 see the little kind of dashed red lines on the surface  
22 of the crest of the dam and down at the toe, and then  
23 you give it some search parameters and tell it to start  
24 looking and it does hundreds or thousands of different  
25 computations of different potential movement surfaces,

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1 circles, and then non-circular surfaces. It changes  
2 the nodes around and it keeps doing a calculation of  
3 the factor of safety until it lands on the least factor  
4 of safety, the one that gives us the most likely, if  
5 you will, probability of movement.

6 In this case it landed on the least value as 1.4.  
7 The resistance of the soil from the shear slip is 1.4  
8 times the loading that's being applied to the soil  
9 along that specific surface right there.

10 Perhaps you could ask another question or tell me  
11 what I haven't clarified for you.

12 Q. Sure. Can you confirm that the risk assessment for  
13 geotechnical stability has been limited to the dam and  
14 diversion channel only?

15 A. MR. BACK: I'm not sure I would use the term  
16 "risk assessment." The seepage and stability analyses  
17 was primarily focused on the embankment dam and the  
18 little saddle dam and sections of the channel. Excuse  
19 me.

20 I believe there were some slope stability analyses  
21 done on the reservoir rim and also along the bank of  
22 the Elbow River in addition to those that were most  
23 concentrated on the embankment dam and the channel.

24 There were other geotechnical evaluations of other  
25 elements, but the primary geotechnical analysis focused

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1 on the embankment data in the channel.

2 Q. And how has the risk of shear slip underneath the rest  
3 of the reservoir been assessed, including the  
4 additional pore pressure that will occur when the  
5 reservoir is full of water?

6 A. MR. BACK: Well, as I indicated, some  
7 stability sections were performed on what we called  
8 "reservoir rim." We looked at areas around the  
9 reservoir where the existing topography is steepest  
10 where we'd be most likely to have some failures.

11 I would point out that the loading from the  
12 reservoir water is going to be laced with the least  
13 amount of water on the edges, the loading from the  
14 reservoir is going to be greatest at the bottom, in  
15 fact right next to the dam where it's 20 metres deep or  
16 whatever. And in those locations, there's not really  
17 very much shear stress applied to the soil; it's mostly  
18 just compressive stress because there's really no place  
19 for the soil to go to, there's no outlet.

20 Like, you look at this figure here. The soil that  
21 might move would exit to the right side or the  
22 downslope side. If you're in the bottom of the  
23 reservoir, there's no place for the soil to exit to.

24 Q. So when we look at this figure, "Load Case End,  
25 Construction, Year 3, Flood, Total Stress Parameters,

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1 Incipient Motion in the Downstream Direction," this  
2 shows a slippage risk at the clay till interface;  
3 correct?

4 A. MR. BACK: Clay till interface with what?

5 Q. With the reservoir. Where is the clay in this picture?

6 A. MR. BACK: Well, the clay till is the purple  
7 and the lacustrine clay is the bright red. And this  
8 is --

9 Q. So does this show a slippage risk at the clay till  
10 interface?

11 A. MR. BACK: So, I'm sorry. You're referring  
12 to the lacustrine clay and the till as till.

13 What you see here is the search. When GeoStudio  
14 is doing that slope stability search, it finds  
15 different circles, right?

16 And there was probably some circles that went down  
17 to the bedrock and it said, oh, no, that's really  
18 resistant because of the high strength. They had some  
19 that were shallower and they had high factors of safety  
20 because the driving load was less, so it landed on the  
21 critical surface.

22 And you'll notice what happened there is the  
23 bottom of that thinner circle searched downward until  
24 it hit the till which is the purple, and it decided it  
25 didn't want to go into the till because the till was

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1 stronger.

2 So it found the maximum circle that was still in  
3 the weaker lacustrine layer and that's where it came up  
4 with the minimum factor of safety for shear slippage to  
5 occur.

6 Q. And that factor was 1.4?

7 A. MR. BACK: That's correct.

8 Q. Were there any factors of safety less than 1 for the  
9 dam embankment that were run by Stantec?

10 A. MR. BACK: I would have to go back through  
11 and see. We have different criteria for different  
12 conditions. I believe this particular condition had a  
13 1.3 criteria for the long term, we have a 1.5. For the  
14 pseudostatic, we looked at 1.0. For the flood  
15 condition, we looked at a couple of different,  
16 long-term conditions -- so I'm not into construction --  
17 one was 1.2, one was 1.4.

18 So, at the end, we adapted the design until it  
19 achieved those target factors of safety according to  
20 CDA and other references to meet the requirements based  
21 on the analysis that we did.

22 Q. Zoom host, could you go to PDF page 423?

23 A. MR. BACK: Thank you.

24 Q. This figure has a factor safety of .07; correct?

25 A. MR. BACK: That is correct.



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1 Q. That would be below the Canadian Dam Safety Guidelines?

2 A. MR. BACK: Yes and no. What happens is  
3 there's not a -- there's not a criteria for  
4 pseudostatic factor of safety. What there is is  
5 there's a trigger that says if the pseudostatic factor  
6 of safety is less than 1.0, which this one is, then  
7 it's incumbent on the designer to do a deformation  
8 analysis to establish what would happen during the  
9 earthquake, and that's what we did on this section.

10 Q. Now, the estimate of leakage from the reservoir has  
11 been provided. And if we could turn to Exhibit 110,  
12 PDF page 151. Stantec indicates that, and I quote:  
13 (as read)

14 "An estimate of seepage out of the  
15 reservoir area when full, and just prior  
16 to commencement of release (when seepage  
17 rates out of the reservoir area would be  
18 at their maximum) was obtained through  
19 examination of the flux values at each  
20 of the nodes within the reservoir,  
21 summation of the net fluxes yielded an  
22 estimated seepage rate of 425 cubic  
23 metres per day out of the reservoir."

24 Would you agree that this is based on having a much  
25 lower clay value for the clay layer of 7.2 times 10 to

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1 the minus 8 metres per second rather than the 5.1 times  
2 10 to the minus 6 metres per second reported in  
3 Table E.1-2, Exhibit 110, PDF page 473 that we looked at  
4 earlier?

5 So just to recap, because there was maybe a little  
6 bit to that, Mr. Yoshisaka, I read to you the sentence  
7 from PDF page 151 of Exhibit 110, which indicated that  
8 the seepage rate was going to be -- was estimated to be  
9 426 cubic metres per day out of the reservoir.

10 So the first part of the question, this is based on  
11 having a much lower K value for the clay layer of 7.2  
12 times 10 to the minus 8 rather than the 5.1 times 10 to  
13 the minus 6 metres per second reported in Table E.1-2.

14 **A. MR. YOSHISAKA:** No, that's not correct. The  
15 values -- so this estimate of flux came from the model.  
16 Again, as was indicated here, it's based on, you know,  
17 selecting the model nodes that are wet when the  
18 reservoir is full, and summing the flux values for each  
19 of those nodes across the entire wooded area of the  
20 reservoir. Now, the underlying hydraulic conductivity  
21 conditions are those that be carried in the model.

22 So, yes, there's a value for the clay. There's a  
23 different value for the till, as was the case in all  
24 the simulations that we ran.

25 **Q.** How would increasing the K value to 5.1 times 10 to the

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1 minus 6 metres per second impact the leakage rate from  
2 the reservoir?

3 A. MR. YOSHISAKA: It would not. These values are  
4 based on that conductivity value.

5 Q. If the model is not set up correctly, how can you get  
6 an accurate leakage rate?

7 A. MR. YOSHISAKA: We believe that the model is set  
8 up correctly and thus have confidence in the seepage  
9 rate that we've estimated.

10 Further, Mr. Chairman, I mean if there is question  
11 around the hydraulic conductivity values that we  
12 carried in the model, we did endeavor to undertake some  
13 sensitivity analysis simulations, again, where we  
14 turned up the permeability of some of these units by a  
15 factor of up to 1,000.

16 So, again, we made some of these units more  
17 permeable by a factor of 1,000 to evaluate, you know,  
18 what -- the what-if scenario, what if these materials  
19 are more permeable than we think, what are the  
20 outcomes.

21 Based on those simulations, yes, we see further  
22 propagation of effects and higher magnitude effects,  
23 but, in general, those effects are still limited to the  
24 local assessment area.

25 So they are relatively local in scale despite

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1 turning up conductivity values far in excess of what we  
2 ever observed in the field.

3 Q. So in terms of your sensitivity analysis, what was the  
4 highest K value you looked at to impact the leakage  
5 rate?

6 A. MR. YOSHISAKA: I believe we multiplied the K  
7 values of those till deposits by a factor of 1000.

8 Q. So what are we looking at in terms of 10 to the minus  
9 what?

10 A. MR. YOSHISAKA: Approximately 5, 10 to the minus  
11 5.

12 Q. Okay. Now, Stantec did conduct some baseline  
13 groundwater analyses for the SR1 area; is that correct?

14 A. MR. YOSHISAKA: That's correct.

15 Q. And is it correct it did not go further in terms of  
16 assessing the chemical information of the groundwater  
17 analyses?

18 A. MR. YOSHISAKA: So we completed a baseline  
19 monitoring event that covered all of the monitoring  
20 wells which we installed as part of the hydrogeologic  
21 field program. So each of those wells was sampled. We  
22 collected water samples from them and submitted them to  
23 the lab for analysis of a rather broad suite of  
24 parameters.

25 Through that analysis, we feel that we are -- have

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1 very well-constrained baseline conditions for the  
2 project area.

3 Q. Sorry to go back, Mr. Yoshisaka, but you indicated that  
4 you increased the K value to 10 to the minus 5. How  
5 did that impact the leakage rate? When you went from  
6 7.2 times 10 to the minus 8 to, you know, let's say 5  
7 times 10 to the minus 5 metres per second, how did that  
8 change the estimated seepage rate?

9 A. MR. YOSHISAKA: I don't believe that we presented  
10 that number. Again, that sensitivity run, you know,  
11 the main intent was to understand okay, if these  
12 materials are more permeable than we believe, how far  
13 away could those effects extend. You know, how might  
14 that change the groundwater flow patterns within that  
15 area relative to the case that we carried in the  
16 effects assessment, yeah, and to understand, you know,  
17 what -- how our characterization of some of those  
18 effects might change as a result of that.

19 So we did not specifically recalculate the seepage  
20 rate on those values and in part because those values  
21 are so high now, I mean they're essentially  
22 non-credible in terms of what our observations are.  
23 Basically we turned clays into sands, and we just know  
24 that that's not -- not the case.

25 So we did that effort, again, to see how far the

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1 effects on the flow regime could extend outwards, and  
2 that again gives us an idea of the area of effect that  
3 could be the case should these materials be much more  
4 permeable.

5 Q. Is there some reason why you didn't present the  
6 sensitivity analysis using the increased K value?

7 A. MR. YOSHISAKA: We did present those results.

8 Q. But it doesn't translate to the seepage rate under the  
9 reservoir? I'm just trying to understand your answer.  
10 I don't know that I got it or follow it.

11 A. MR. YOSHISAKA: No, I don't believe we  
12 recalculated the seepage rate.

13 Again, we feel that the rate that we have is  
14 already conservative because, even outside of the  
15 sensitivity analysis, the model that we carry in our  
16 effects assessment, again, assigns a K value of 10 to  
17 the minus 6 for the clay, which is already at least one  
18 order, if not two orders of magnitude higher than our  
19 observations.

20 So we feel there's sufficient conservatism in that  
21 seepage estimate already.

22 You know, I would also like to point out that, you  
23 know, the incremental head associated with the  
24 impoundment of water behind the dam, you'll hear  
25 numbers of 24 metres of head being drawn out there, and

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1 that is accurate. But it's important to keep in mind  
2 that the area over which there is an incremental 24  
3 metres of head is actually quite small. I mean it's  
4 quite limited to the upstream toe of the dam.

5 As soon as you progress in the northeasterly,  
6 sorry, northwesterly direction basin, those incremental  
7 pressures become much, much less.

8 So, you know, in actual averaging over the entire  
9 area of the reservoir, the incremental head is nowhere  
10 near 24 metres. It's probably closer to around 12.

11 Q. Now, Stantec did some baseline groundwater analyses for  
12 the SR1 area as I discussed a moment ago, but did not  
13 go any further with assessing this chemical  
14 information.

15 Can you tell me, how is it possible to determine  
16 that the effects of SR1 will be not significant as  
17 indicated in paragraph 3 under Concern Number 2 of  
18 Stantec's Exhibit 327, PDF page 45, when Stantec has  
19 done no geochemical modelling or feet in transport  
20 assessment to substantiate that claim?

21 A. MR. YOSHISAKA: In terms of the feet and transport  
22 modelling, Mr. Chairman, I'd like to point out that,  
23 you know, when we construct a groundwater flow model,  
24 we are modelling the flow of groundwater  
25 through -- through the system.

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1           Now in terms of, you know, entrainment and  
2           subsequent transport of potential contaminates, we can  
3           conservatively estimate that in the absence explicit  
4           feet transport modelling, if we assume that the  
5           contaminants will move through -- effectively with  
6           groundwater that.

7           And again, this is a conservative approach. When  
8           you actually endeavor on a more detailed feet transport  
9           modelling of contaminants, the additional terms that  
10          you're adding to your flow equations really have to do  
11          with mechanisms that slow the transport of  
12          contaminants. So things like, you know, hydrodynamic  
13          dispersion, absorption, those types of processes would  
14          be additional terms that you would include within your  
15          mathematical formulation of the flow system.

16          So by not doing that, you're essentially assuming  
17          that contaminants move effectively with groundwater,  
18          and in turn, it arrives at a conservative approach.

19          So if we simply assume that a contaminant will  
20          move at the same rate as groundwater, even though we  
21          know in reality that's generally not the case,  
22          contaminants move slower than the average speed of  
23          groundwater because of these other processes that  
24          happen. But again, conservatively one could assume  
25          that they just do move at the same time rate as



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1 groundwater, and thus estimating your flow velocities  
2 and extent of influence serves as a conservative  
3 surrogate for the areas of effects that you might  
4 expect for contaminants as well.

5 Q. Did you do any particular work to look at this for SR1,  
6 or are you just speculating?

7 A. MR. YOSHISAKA: Again, we use the groundwater flow  
8 model that we created to also assess the potential for  
9 migration of contaminants. A contaminant cannot move  
10 any quicker than the groundwater moves. A contaminant  
11 could only in reality move slower, aside from some, you  
12 know, perhaps scenarios that really aren't applicable  
13 to what we're looking at here.

14 So, again by assuming simply that contaminants  
15 would move at the same rate as groundwater, it is a  
16 conservative approach and would tend to overestimate  
17 the rate at which they would migrate to the subsurface.

18 Q. Stantec states at Exhibit 327, PDF page 46, paragraph  
19 1, of Concern Number 3, that: (as read)

20 "In general -- "

21 You can take this down, Zoom host: (as read)

22 "In general, average TDS concentrations  
23 within the upper bedrock are lower than  
24 average TDS concentrations in the  
25 unconsolidated clay/tills."

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1 Do you agree that a review of the difference in TDS  
2 values between the bedrock and the clays/tills using a  
3 non-parametric sign test does not substantiate this  
4 claim?

5 **A. MR. YOSHISAKA:** I think our claim is simply this,  
6 is that the average TDS concentrations within the upper  
7 unconsolidated materials is -- is, on average, a little  
8 bit higher than the average TDS concentrations in the  
9 underlying bedrock.

10 **Q.** How did Stantec arrive at the conclusion that the TDS  
11 values are from different populations, and how does  
12 this information change their opinion of hydrochemical  
13 connectivity between the clay tills and the bedrock?

14 **A. MR. YOSHISAKA:** Mr. Chairman, in our baseline  
15 assessment, we provide that text that again states that  
16 the average TDS concentrations in those upper deposits  
17 is slightly higher than those found in the bedrock.

18 And then why we highlight this is because if you  
19 can imagine a groundwater flow path, as that flow path  
20 and residence time through the system increases,  
21 groundwater tends to become more mineralized. So the  
22 higher TDS will prevail when the flow path through the  
23 system is longer.

24 So when you consider that TDS values in an  
25 underlying formation are lower than those in an

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1           overlying formation, the manner in which that can come  
2           about is because the transit time through the system in  
3           that lower unit is shorter than it is in the overlying  
4           sediments, so meaning that the bedrock system is  
5           being -- as is the upper unconfined sediments, but its  
6           travel time through the system in bedrock is likely a  
7           little bit shorter in time, and thus, we have some  
8           evidence that, you know, all of the water in the  
9           bedrock is not percolating through the upper materials.

10           If that were the case, then the TDS values in the  
11           bedrock would at least be the same or even higher than  
12           those within the unconsolidated deposits.

13           So, really, we're not, you know, offering that  
14           evidence to suggest that, you know, there's necessarily  
15           a stark contrast between these TDS values, but it is  
16           evidence to suggest, again, that water in the bedrock  
17           is derived from its recharge areas, which we know are  
18           in the more upland areas of the region, and that water  
19           that's slowly migrating through the upper sediments is  
20           not the sole contributor to the water that's found in  
21           bedrock. And that's the point we're trying to make  
22           there.

23        Q.   You understand that my question here is are the  
24           datasets distinct from one another or not; right? You  
25           understood that was the point of my question?

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1       **A. MR. YOSHISAKA:**           Yes, we categorize the  
2       hydrochemical results into bedrock results and results  
3       for the unconsolidated deposits so they are separate  
4       datasets.

5       **Q.** And in this case, I put it to you that there is no  
6       significant difference between the TDS and the clay  
7       tills versus the bedrock?

8       **A. MR. YOSHISAKA:**           Again what we've presented in  
9       evidence, and though I've not conducted the same  
10      statistical test that Dr. Fennell has presented, but it  
11      was a simple comparison of averages in one group with  
12      the averages in another group.

13      **Q.** Okay. Zoom host, if we could have Exhibit 110, PDF  
14      page 141. Thank you.

15               Now, in Exhibit 110, PDF page 141, this figure  
16      shows the simulated net change in head for the  
17      PPX0/EEX0 scenario; correct?

18      **A. MR. YOSHISAKA:**           That's correct.

19      **Q.** And an area drawdown of up to 8.5 metres is noted along  
20      the diversion channel leading from the Elbow River to  
21      the SR1 reservoir and up 2.5 metres above 500 metres or  
22      so out from the channel in certain areas. Do you agree  
23      with that?

24      **A. MR. YOSHISAKA:**           That's correct.

25      **Q.** And what is not shown is a drawdown influence for the

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1 outlet channel leaving from SR1 -- leaving from the SR1  
2 reservoir to the Elbow River; correct?

3 **A. MR. YOSHISAKA: That's correct.**

4 **Q.** And this channel is -- appears to be in the order of  
5 9 metres deep in areas where the water table is close  
6 to the surface, i.e. less than 1 to 2 metres, and  
7 perhaps, Zoom host, you could turn to Figure 3-23 on  
8 PDF page 75.

9 Can you please explain why there's no drawdown  
10 projected for the outlet channel when the excavation  
11 will be below the water table?

12 **A. MR. YOSHISAKA: I believe the outlet channel in**  
13 **that area is relatively -- the excavated portion of the**  
14 **outlet channel is a relatively small feature. It's**  
15 **probably also relatively close to where the -- the**  
16 **Unnamed Creek is as well.**

17 **Q.** Can we go back to PDF page 141? So what are you  
18 referring to there, Mr. Yoshisaka?

19 **A. MR. YOSHISAKA: So Mr. Chairman, the outlet**  
20 **channel is situated quite close to the natural channel**  
21 **of Unnamed Creek. Within that creek, I mean there is**  
22 **some hydraulic control exerted by the creek as well**  
23 **because in the model we have the creek feature modelled**  
24 **as constant head conditions.**

25 So we have water coming into the model from the

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1 creek itself as well, which tends to, again, with our  
2 model, elevate water levels in those areas because  
3 there's modelled inflow entering the system.

4 Q. If we could turn up Exhibit 110, PDF page 479.

5 Now, under sensitivity analysis scenario 3 of the  
6 groundwater model where the simulated net change in  
7 hydraulic head for the PPX0, this is baseline after  
8 construction with no floodwater and the EEX0 baseline  
9 pre-construction are compared in a steady state mode as  
10 if SR1 was permanently filled, based on this  
11 assessment, do you agree there are indications that  
12 head values could increase by up to 24 metres beneath  
13 the dam itself and up to 6 metres within about 500  
14 metres of the dam, and from .6 to 3 metres up to 2  
15 kilometres to the west and east of SR1?

16 A. MR. YOSHISAKA: Mr. Chairman, this figure here was  
17 a sensitivity analysis run for a series of simulations  
18 run on our former model domain. Over the course of  
19 this process, we have updated the model since then,  
20 including the sensitivity analysis scenario. So I  
21 would actually refer you to Exhibit 157, starting on  
22 about page 9, I believe, document manager.

23 Yes. Thank you.

24 So this is the updated sensitivity analysis that  
25 was run on the most recent and current version of the

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1 model. It does depict largely the same picture that  
2 you showed there in the previous version, Mr. Secord.

3 Yes, we will acknowledge that changes in head can  
4 extend outwards from the project development area, and,  
5 yes, they -- at their maximum near the upstream toe of  
6 the dam, can be found at levels of up to 24 metres.

7 But what you will note as well when you examine  
8 this figure is that the deeper red colours are higher  
9 increases in head and as they grade into the oranges  
10 and yellows and finally to the blue-ish hues, the  
11 incremental head is decreasing.

12 So the area of 24 metres of head is that thin  
13 sliver on the upstream toe of the dam, and it grades  
14 down in terms of incremental pressure from there.

15 But yes, we do acknowledge that, under this  
16 conservative sensitivity analysis, that, you know,  
17 there could be effects that extend beyond the PDA;  
18 however, they are contained within the LAA, and the LAA  
19 is an area that extends approximately 1 kilometre  
20 beyond the boundary of the PDA.

21 Mr. Chairman, I'd also like to put some context  
22 around these sensitivity runs. It's important to keep  
23 in mind here that this sensitivity run represents us  
24 keeping water in the reservoir indefinitely. So this  
25 is a simulation of what could happen to the pressures

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1           when (a) the hydraulic conductivity values are turned  
2           up to more permeable levels than what we observed, and  
3           in addition, we are now holding water within the  
4           reservoir indefinitely, which is obviously not an  
5           operational case.

6                        So this exercise was meant to (a) evaluate the  
7           robustness of our model but also understand some  
8           worst-case scenarios of what could happen should that  
9           unrealistic operating scenario come to pass.

10                      And, yes, you do see some effects, again,  
11           extending a little bit beyond the PDA but not really at  
12           levels that are -- that would cause a problem or that  
13           would be at levels that we couldn't mitigate with the  
14           proposed mitigation measures that we have presented.

15       MR. BARBERO:                        Mr. Chairman, it's Michael Barbero  
16           speaking sir.

17       THE CHAIR:                            Yes.

18       MR. BARBERO:                        Mr. Secord, my apologies to  
19           interrupt. It's just -- I note this was a document  
20           that I spoke to in my opening because I believe there's  
21           a revised version of this figure and document that we  
22           had intended to put in. I just thought I would ensure  
23           that we are not looking at the old version of this  
24           document when, in fact, there's a new one.

25       MR. SECORD:                          Well, maybe, Mr. Barbero, you can



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1 fire me an email after we break today and let me  
2 know -- and if you wish to confer with your team, I  
3 realize they're under cross-examination but you have my  
4 permission to sort this out and let us know. Is that  
5 agreeable?

6 **A. MR. YOSHISAKA:** Mr. Chairman, I can speak to that.  
7 This is the figure that we identified that we needed to  
8 file an errata regarding this figure. Again, there's  
9 nothing wrong with the modelled results here that are  
10 presented. The error shows up in the legend to this  
11 figure where the bins describing those colour ranges  
12 there in this version are not correct.

13 **MR. SECORD:** Okay. Thank you.

14 **Q.** So in terms of -- so if, for instance, the City of  
15 Calgary was desperate for water and said to Alberta  
16 Transportation, we want this -- we want you to store  
17 water in this structure, this would be the type of  
18 scenario that you would see in the event that water was  
19 stored in the reservoir for a longer period of time  
20 than contemplated. Do I understand that to be correct,  
21 Mr. Yoshisaka?

22 **A. MR. YOSHISAKA:** You do, Mr. Secord, and it's not a  
23 longer period of time; it's indefinitely. So this  
24 simulation is run in a steady state mode which, you  
25 know, refers to what happens if you hold the water in

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 the reservoir and you let -- you hold it forever, and  
2 somehow you actually maintain water levels in the  
3 reservoir as well. So, in reality, you would have to  
4 be continually adding water to the reservoir just to  
5 keep it at those levels -- but hold it there until the  
6 system re-equilibrates (phonetic) to its next  
7 equilibrium.

8 Q. And if the SR1 reservoir was to contain water for a  
9 longer period of time for any reason, how would this  
10 affect the flushing of the contaminants from the clay  
11 tills into the bedrock?

12 A. MR. WOOD: Mr. Chairman, this is Matt Wood.  
13 I would just like to make it very clear to the Board  
14 that the purpose of SR1 is not to hold water in this  
15 manner. This analysis was not done at the request of  
16 the City of Calgary and the project's purpose is not to  
17 hold water.

18 The analysis is done to show that the area under  
19 the reservoir is relatively impermeable, and even if  
20 you were to hold water for this period of time, the  
21 effects are limited in nature as you can see here.

22 Q. So my question, I think, Mr. Yoshisaka was if the SR1  
23 reservoir was to contain water for a longer period of  
24 time for any reason, how would this affect the flushing  
25 of contaminants from the clay tills into the bedrock?

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1       A.   MR. YOSHISAKA:        I would say, in general, not  
2       appreciably. I mean, the difference between this  
3       figure and the version that we carried within the  
4       effects assessment are really not that different. I  
5       mean, what you see here is an extension of the areas of  
6       blue slightly beyond the PDA, where as in the effects  
7       assessment, they are contained within it.

8                So, you know, the zone of influence is extended,  
9       you know, outwards. It's not far enough that it really  
10      would present any difficulties to the mitigation plans  
11      that are contemplated.

12               So, in fact, you know, the monitoring plan that we  
13      have developed, considered -- considered this. So the  
14      location of the wells that we're proposing, the depths  
15      of the wells that we're proposing, contemplate these  
16      types of changes in the system and thus are positioned  
17      strategically in those locations to detect that change.  
18      And should that change come to pass, we can implement  
19      further mitigation at that time.

20      Q.   Document manager, if you could pull up Exhibit 110, PDF  
21      page 94.

22               In this Table 3-4, it provides a number of sample  
23      locations and for the parameters, selenium and uranium,  
24      you'll notice on this page, 94, a number of these units  
25      are highlighted with, I'm going to use the colour

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 orange. Does that work for you, Mr. Yoshisaka?

2 **A. MR. YOSHISAKA: Yes, indeed. Thank you.**

3 **Q. And then if we go to PDF page 95. In this same table**  
4 **again, we see -- sorry, page 96. Again, we see**  
5 **highlighted -- units highlighted in orange for uranium**  
6 **and selenium; correct?**

7 **A. MR. YOSHISAKA: That's correct. There's a couple**  
8 **of instances highlighted there, as you've noted.**

9 **Q. And then on page 97, it indicates in the orange area,**  
10 **it indicates that the concentration exceeds the**  
11 **indicated standard.**

12 **A. MR. YOSHISAKA: That's correct.**

13 **Q. And for -- and for selenium and uranium, it appeared to**  
14 **me that the standard was Alberta -- was tabled to**  
15 **"Alberta Tier 1: Groundwater Remediation Guidelines,**  
16 **Agricultural Fine." Do I have that right?**

17 **A. MR. YOSHISAKA: Document manager, if you could**  
18 **scroll up for me, please.**

19 **So, yes, if you see those exceedance values that**  
20 **are highlighted in orange, the superscript there is D.**

21 **Q. I see. I see one that is C as well, right, for**  
22 **uranium. I missed that one when I was looking at it**  
23 **yesterday. Oh, and there's also -- yeah, C, so that**  
24 **would be on page 96. That would be -- sorry, page 97,**  
25 **that would be Guidelines for Canadian Drinking Water**

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1           Quality Maximum Acceptable Concentration. Do I have  
2           that right?

3       **A. MR. YOSHISAKA:           That's correct.**

4       **Q.** And what is this Alberta -- "Table 2: Alberta Tier 1,  
5       Groundwater Remediation Guidelines Agricultural Fine."  
6       What does the "fine" relate to?

7       **A. MR. YOSHISAKA:           The fine relates to a texture of  
8       the sediments in question. So the Alberta Tier 1  
9       guidelines will have separate tables for coarse  
10      materials and separate tables for fine materials.**

11      **Q.** Okay. So we can confirm, then, that there are elevated  
12      concentrations of selenium and uranium in the  
13      groundwater within the clay till deposits inside the  
14      PDA.

15           Do you agree this is an indication that these  
16      harmful elements can and have been mobilized under  
17      natural conditions?

18      **A. MR. YOSHISAKA:           I would agree that, given the  
19      mineralogy of these clays, that the original source of  
20      those dissolved constituents are -- it's certainly  
21      feasible that they came from the sediments themselves.**

22      **Q.** And do you agree there is both physical water level  
23      responses and chemical major ion compositions evidence  
24      that the groundwaters in the clay tills and the upper  
25      bedrock are connected. However, there has been no

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 assessment of how flushing of selenium, uranium, or any  
2 other contaminants that may accumulate in the SR1  
3 reservoir water and sediments may impact the  
4 groundwater that local residents rely on for themselves  
5 and their livestock?

6 **A. MR. YOSHISAKA:** Mr. Chairman, I wouldn't agree  
7 with the statement. We do, in fact, recognize in our  
8 effects assessment that there is potential for some  
9 changes in groundwater quality in the reservoir area.  
10 It is something that we do acknowledge and characterize  
11 within the effects assessment, and we do also  
12 contemplate that in the design of our monitoring  
13 program.

14 So, again, we have a robust monitoring program  
15 that has been established to monitor for these types of  
16 effects. And in so monitoring them, we would then  
17 implement further mitigation measures should they be  
18 required for the short-term duration that the water  
19 will be impounded within the reservoir area.

20 **Q.** Now, do you agree that although Stantec and AT has said  
21 that the groundwater flow may be to the south and  
22 southeast of the project area, pumping of water wells  
23 near the reservoir may intercept and capture some of  
24 the water?

25 **A. MR. YOSHISAKA:** The effects of intermittent

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 pumping of domestic wells would already be captured in  
2 the baseline conditions that we have characterized.

3 So we acknowledge that yes, wells have an  
4 influence on water levels, and the pumping of wells  
5 tends to locally depress those levels, but those  
6 conditions are captured within our understanding of the  
7 baseline conditions as they are today.

8 Q. So you're saying that your groundwater numerical model  
9 captures these events. Is that what you're saying?

10 A. MR. YOSHISAKA: What I'm saying is that the water  
11 levels to which we have calibrated the model already  
12 reflect the stresses of pumping in the system.

13 Q. And in relation to that, are you aware that my client,  
14 Mary Robinson, has five water wells on her property  
15 just to the south of the proposed SR1? In terms of  
16 calibrating the model, did you obtain information from  
17 Ms. Robinson as to how she operated her five water  
18 wells and how much water she pumps out of those wells  
19 for herself personally and for her livestock and her  
20 horses?

21 A. MR. YOSHISAKA: No, we did not obtain data  
22 specifically from Ms. Robinson's wells.

23 I would note that she's located near, you know,  
24 the diversion and the diversion structure which is, you  
25 know, distal from the reservoir areas.

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1           Further, you know, she's situated at a relatively  
2 low elevation within -- within the overall regional  
3 assessment area. And as well, I believe that her wells  
4 are located quite close to the Elbow River itself, and  
5 as such, a lot of the stresses for her wells would be,  
6 you know, somewhat buffered by the levels in the  
7 Elbow River itself.

8 Q. How does the model capture these pumping events  
9 cumulatively when it wasn't even assessed?

10 A. MR. YOSHISAKA:           Again the model is calibrated to  
11 the baseline water levels that we observed across the  
12 area. So those levels would already reflect pumping  
13 that happens. So that's what our model was calibrated  
14 to.

15           You know, Mr. Chairman, I think it's also  
16 important to understand what it is that we're asking of  
17 our model.

18           First and foremost, this model is created to  
19 assess the effects of the operation of the SR1 project,  
20 and the operational phases of this project even during  
21 the largest design flood event are relatively short in  
22 time. Certainly in terms of geologic time, I mean  
23 they're a blink of an eye.

24           So some of these effects and turning on and off of  
25 pumps, you know, at the timeframe over which we're



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Cross-examined by Mr. Secord

1 using this model, you know, we don't believe that  
2 they'll be largely material.

3 Secondly, you know, our model is there to assess  
4 conditions with the project and without the project.  
5 And by comparing those two, we get an understanding of  
6 what the incremental change is.

7 So you know, the operation of domestic wells  
8 within the regional assessment area are going to happen  
9 with the project and without the project. So in either  
10 case, the effects of them would tend to net out when  
11 you're examining change in level, change in groundwater  
12 levels related to operation of the project.

13 Q. So, Mr. Yoshisaka, you're asking the Natural Resources  
14 Conservation Board to make a decision based on a model,  
15 and so we need to have faith, right, in the model?

16 A. MR. YOSHISAKA: Mr. Secord, again the model is a  
17 tool that we've used to inform our effects assessment.  
18 It allows us to characterize the nature of those  
19 effects which we have done. It also informs our  
20 monitoring and mitigation plans.

21 So by conducting the modelling exercise, we have a  
22 sound understanding of the flow regime. We have a  
23 sound understanding of where water levels are in  
24 relation to wells. We have a sound understanding of  
25 the distribution of wells across ERA, and we have an

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 understanding of, you know, other features like springs  
2 as well and why they occur where they do occur.

3 So you know, the model helped us -- gave us  
4 information, everybody, all of that. And, you know, it  
5 informs our characterization of those pathways, of  
6 those effects, and also informs how we're able to  
7 monitor for those effects. And in turn, should the  
8 modelling, or sorry, should the monitoring suggest that  
9 there's changes afoot that we need to apply further  
10 mitigation to, then we'll be able to react in kind and  
11 put those measures in place.

12 Q. Will Mary Robinson be pumping effluent contaminants  
13 into her five water wells from the diversion channel?

14 A. MR. YOSHISAKA: No.

15 Q. Did you model that?

16 A. MR. YOSHISAKA: I'm sorry, Mr. Secord, I'm not  
17 sure I understand your question fully. Could you  
18 perhaps elaborate on the mechanism that you're speaking  
19 to right now?

20 Q. Okay. You have a flood, you have the diversion channel  
21 containing sewage. You have a head pond as a result of  
22 your operation of the inlet gates. Is there a  
23 potential for contaminants that are sitting in the  
24 diversion channel; is there the potential for those  
25 contaminants to find their way into my client's

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 drinking water?

2 **A. MR. YOSHISAKA:** Mr. Chairman, it's important to  
3 recognize that if this project is in operation, it's  
4 because there's a flood going on. And when there's a  
5 flood going on, the floodwater that's being diverted  
6 into the river channel is the same floodwater that's in  
7 the Elbow River valley itself.

8 Given that Ms. Robinson is situated quite close to  
9 the Elbow River valley, I would submit that that water  
10 is there in the river valley already; it's quite close  
11 to her already.

12 The project diverting water from there and moving  
13 it further distance away from her would pose no  
14 incremental risk associated with that.

15 **Q.** Do you agree that the new configuration of the  
16 landscape post-construction of SR1 will likely alter  
17 groundwater flow patterns to some degree, and why was  
18 this risk not assessed?

19 **A. MR. YOSHISAKA:** Mr. Chairman, we -- our modelling  
20 does indicate that there are potential for some changes  
21 in groundwater flow patterns as a result of the  
22 project; it does acknowledge that. We did assess that,  
23 and we characterized those effects within the effects  
24 assessment.

25 **Q.** If we could turn up Exhibit 110, PDF page 85,

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1 Figure 3-28.

2 THE CHAIR: Just excuse me, Mr. Secord. I'm  
3 not sure how many questions you might have on this  
4 exhibit, but it's 10 to 5. I would like to adjourn  
5 pretty close to 5, and I think we have just a couple of  
6 quick housekeeping things before that, but --

7 So did you have a number of questions on this  
8 exhibit? If so perhaps we could wait until tomorrow  
9 morning. If not, then if you could ask the question or  
10 two on this before we close and proceed.

11 MR. SECORD: Sure. That would be really good.

12 Q. And I think, Zoom host, if you could -- if you could  
13 give us the centre of this picture, and I've got mine  
14 at about, well, I would say, you know, maybe one more,  
15 but you're in a perfect position there. Thank you very  
16 much. That's beautiful.

17 So we have, as I understand it, the pink line, the  
18 pink shading on this figure is the Tsuut'ina First  
19 Nations lands; is that correct?

20 A. MR. YOSHISAKA: That's correct.

21 Q. And then you have the outlet of the PDA in black?

22 A. MR. YOSHISAKA: The outline of the PDA is in a  
23 solid black line. The extent of the LAA is in the  
24 dotted black line.

25 Q. And you have indicated to us that the flow of

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

Cross-examined by Mr. Secord

1 groundwater will be to the south and southeast of the  
2 PDA; correct?

3 **A. MR. YOSHISAKA:** In areas on the north side of  
4 **Elbow River, yes.**

5 **Q.** And you can confirm that my client Mary Robinson is  
6 to -- I guess she's to the south and southeast of the  
7 PDA, correct, her five water wells?

8 **A. MR. YOSHISAKA:** Relative to the PDA, yes.  
9 However, again, you know, her properties there are in  
10 the river valley itself.

11 So the flow directions in those areas are, you  
12 know, more constrained by the river itself, rather than  
13 what is experienced in other more upland areas of the  
14 PDA.

15 **Q.** And in the legend, there is -- the blue dot is the AWW  
16 ID records. So that would be basically the Alberta  
17 water well information?

18 **A. MR. YOSHISAKA:** That's correct.

19 **Q.** And are all five of Ms. Robinson's water wells shown on  
20 Figure 3-28?

21 **A. MR. YOSHISAKA:** Subject to check, they -- they  
22 could be.

23 One of the issues with the information coming out  
24 of the Alberta Water Well Information Database is that  
25 the positional information associated with a well is

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1           logged to -- in many cases, particularly for older  
2 wells, is logged to the centroid of a quarter section.

3           So if you have multiple wells in the same quarter  
4 section, they end up plotting on top of each other  
5 essentially.

6 Q. And were any of Mary Robinson's wells part identified  
7 by the red dots which in the legend is the domestic  
8 well testing program well?

9 A. MR. YOSHISAKA:           Mr. Chairman, I would have to  
10 double check on that point.

11 Q. Would you mind doing that.

12           And then maybe, Mr. Chair, I think you said you  
13 did -- do you want me to go till 5 or would you like me  
14 to stop here?

15 THE CHAIR:                   If this is a reasonable place to  
16 stop, Mr. Secord, I think that would be good because  
17 I've got just a couple of quick housekeeping and we can  
18 probably end then close to 5 and start again tomorrow?

19 MR. SECORD:                 Sure. So if you could give me an  
20 undertaking to just to let me know which of -- if any  
21 of these red dots represent Mary Robinson's wells.

22                               **UNDERTAKING - TO ADVISE IF ANY OF THESE**  
23                               **RED DOTS ON FIGURE 3-28 REPRESENTS**  
24                               **MARY ROBINSON'S WELLS**

25 MR. SECORD:                 And then just to leave you with my

## ALBERTA TRANSPORTATION TOPIC #4 PANEL

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1 question for tomorrow is, you know, dealing with over  
2 geologic time, given that we know that selenium and  
3 uranium are present, what is the potential for my  
4 clients' wells south and east of the PDA to be  
5 contaminated with selenium or uranium. You know, and  
6 maybe not Ms. Robinson, maybe not this generation but  
7 the next generation or the one thereafter. So that  
8 would be something we'll pick up tomorrow. But just a  
9 heads up, Mr. Yoshisaka, I'd like to ask you about  
10 that. Okay?

11 **A. MR. YOSHISAKA:** Thank you, Mr. Secord.

12 **MR. SECORD:** Thank you, Mr. Chair. By the way,  
13 can you tell me how much time I've got left for  
14 tomorrow? I'm hoping I've got two hours for tomorrow,  
15 but...

16 **THE CHAIR:** Well, I mean --

17 **MR. SECORD:** I'm in your hands.

18 **THE CHAIR:** Yeah, to meet your time, I think  
19 it's, if I have it right, closer to an hour and 15.

20 **MR. SECORD:** I had it as 90 minutes as a  
21 minimum tomorrow, but -- but I did my math with the 360  
22 minusing the 15-minute break so...

23 **THE CHAIR:** Right. I thought I did too. So  
24 it would be around an hour and a half, subject to  
25 check. I mean it's right around that.

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1 MR. SECORD: I'm fine with that, sir. Thank  
2 you.

3 THE CHAIR: Thank you, panel.

4 Just before we break for the evening, though, I  
5 understand, is there another errata that Alberta  
6 Transportation has to get on the record? Do I have  
7 that right?

8 MR. BARBERO: Mr. Chair, it's Michael Barbero  
9 speaking, sir. I've only referred to one today, and  
10 that's the one that I repeated this afternoon,  
11 Exhibit 157, page 9.

12 Sir, I'm in your hands if there was something else  
13 that you were thinking of.

14 THE CHAIR: No, I had a heads-up, Mr. Kennedy  
15 thought -- was there another one?

16 MR. KENNEDY: There was the corrections to the  
17 hearing transcripts that you filed at 10:15 this  
18 morning, something like that.

19 MR. KRUHLAK: Mr. Kennedy, I was thinking of  
20 speaking of those first thing in the morning as to the  
21 best way to deal with them, but I'm happy to receive  
22 your suggestions or directions now. We did file a  
23 series of what we identified as some transcript  
24 corrections for the transcripts from last week this  
25 morning, and we've also just recently filed this



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1 afternoon responses to several undertakings.

2 So if you have a preference as to how we best  
3 address those, we welcome hearing from you.

4 MR. KENNEDY: It seems to me the Chair opened  
5 the door to kind of deal with the housekeeping matters,  
6 so I thought sounds like a good time. And if we  
7 could -- and those documents in both cases were  
8 circulated broadly to counsel when you tendered them to  
9 the Board.

10 So barring any objections, I don't know why we  
11 wouldn't assign them an exhibit number, and then they  
12 could be circulated and posted on the website this  
13 evening.

14 MR. KRUHLAK: Thank you, Mr. Chairman, we  
15 appreciate doing that, and I appreciate Mr. Kennedy  
16 raising it right now. I thought we'd otherwise raise  
17 it in the morning, but it's good to have it dealt with.

18 THE CHAIR: Okay. So -- and Mr. Kruhlak, you  
19 indicated what those were, circulated to other counsel.  
20 Were there any objections to those?

21 MR. SECORD: Yeah, I notice that in the AUC  
22 hearings, you know, parties will send transcript  
23 corrections to the AUC, and they get posted. I don't  
24 know that they get marked as exhibits, but I don't have  
25 any particular problem with them being marked as an

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1 exhibit.

2 I'm just -- I'm not sure, sir, that we're going to  
3 go through the transcripts line by line and send in  
4 corrections. So I hope if, with Mr. Kruhlak, with his  
5 superior manpower, if he sees anything in our -- in our  
6 answers, it would be nice if he'd include those as  
7 well.

8 But I'm not sure we're going to spend the time to  
9 go through every line and say, "Oops, this should have  
10 been an "an" rather than whatever." So with that I  
11 just hope you won't judge us negatively.

12 MR. KRUHLAK: We hang on your every word,  
13 Mr. Secord.

14 MR. KENNEDY: I take it that's a non-objection  
15 to these corrections?

16 MR. SECORD: Yes.

17 THE CHAIR: Mr. Kennedy, what would be your  
18 preference in terms if -- it's on the record it's  
19 accepted I guess, that might be --

20 MR. KENNEDY: I don't know that there's any  
21 magic in the exhibit number, other than locating them  
22 in the future, which has some benefit. I don't see a  
23 reason not to assign an exhibit number.

24 THE CHAIR: Okay. If no objections, let's do  
25 that. And so those would be 376. Do I have that

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1 right, Ms. Friend?

2 MS. FRIEND: Yes, that's correct.

3 **EXHIBIT 376 - MARCH 22 TO 26, 2021,**

4 **TRANSCRIPT CORRECTIONS**

5 MR. KENNEDY: They should have separate exhibit

6 numbers, those two.

7 THE CHAIR: And there's an undertaking as

8 well; right?

9 MR. KENNEDY: Yes.

10 THE CHAIR: Yes, that one was -- what did that

11 deal with, sorry?

12 MR. KENNEDY: It was Undertaking 4, 5, and 6.

13 MS. FRIEND: And 9 all in one document.

14 THE CHAIR: Okay. And those were also

15 circulated --

16 MR. KENNEDY: Yes.

17 THE CHAIR: -- and no further questions.

18 Hearing none. Okay, those can be 377.

19 MS. FRIEND: Yes, that's correct.

20 **EXHIBIT 377 - AT RESPONSES TO**

21 **UNDERTAKINGS 4, 5, 6 AND 9**

22 THE CHAIR: And I -- thank you, Mr. Kruhlak

23 and Mr. Barbero. I understand the City of Calgary,

24 Ms. Senek was there an undertaking that you had

25 prepared and circulated as well?

1 MS. MUNKITTRICK: Yes, Mr. Chair. This is  
2 Sara Munkittrick with the City of Calgary. We had  
3 prepared a response to an undertaking that was with  
4 respect to the catchment area for MC1 that came up in  
5 cross-examination of Mr. Frigo on Friday, and that was  
6 circulated to Ms. Friend, as well as counsel for SCLG  
7 earlier today.

8 And I guess I would say the same as the  
9 undertakings we were just discussing, that it should  
10 probably be given an exhibit number as well.

11 THE CHAIR: Agreed, yes. Ms. Friend, that  
12 will be 378.

13 MS. FRIEND: Yes, correct.

14 **EXHIBIT 378 - CITY OF CALGARY**  
15 **UNDERTAKING RESPONSE WITH RESPECT TO**  
16 **THE CATCHMENT AREA FOR MC1**

17 THE CHAIR: Thank you, Ms. Munkittrick.

18 MS. MUNKITTRICK: Thank you.

19 THE CHAIR: Any other business or matters  
20 before we close today?

21 Okay. Hearing none. Tomorrow morning, 7:45  
22 sign-on and 8:30 start. Thank you very much, everyone.  
23 Much appreciated. Talk to you tomorrow morning.

24

25 PROCEEDINGS ADJOURNED TO MARCH 30, 2021 AT 8:30 A.M.

1 Certificate of Transcript

2

3 We, the undersigned, hereby certify that the foregoing  
4 pages 1365 to 1625 are a complete and accurate transcript  
5 of the proceedings taken down by us in shorthand and  
6 transcribed from our shorthand notes to the best of our  
7 skill and ability.

8 Dated at the City of Calgary, Province of Alberta, on  
9 March 29, 2021.

10

11

12

"Lorelee Vespa"

13

14

Lorelee Vespa, CSR(A) RPR CRR

15

Official Court Reporter

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"Deanna DiPaolo"

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Deanna DiPaolo, CSR(A)

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Official Court Reporter

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