NATURAL RESOURCES CONSERVATION BOARD

Application No. 1701

SPRINGBANK OFF-STREAM RESERVOIR PROJECT

P R O C E E D I N G S

Volume 7

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(Via videoconferencing)

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Volume 7

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

THE CHAIR: Good morning, everyone. I think we're ready to begin today. It looks like we have everyone on.

I'd like to welcome Ms. DiPaolo this morning, she's court reporting, and Ms. Kaminski? Ms. Kaminski, are you online?

MS. KAMINSKI: I am.

THE CHAIR: That's our document manager out of Lethbridge, so welcome this morning.

Just to start, I believe we do have at least one preliminary matter, and I've got -- I have a couple, but Mr. Secord indicated you have a prelim?

MR. SECORD: Could we go with yours first, sir? Because that's going to affect my submissions.

THE CHAIR: Oh, I see. Is it? Okay.

Well, good -- well, one may and one may not. I

did want to apologize, Mr. Secord, I did have the time wrong. Because we had agreed that we were moving some of Mr. Secord's cross from Topic 3 over to Topic 4, so my apologies.

So we had 45 minutes that we were bringing over from Topic 3, we have an hour and 15, according to my calculations remaining in Topic 4.

So I think you had indicated you thought you had about two hours, and you were correct. So you've got two hours this morning for completing Topic 3 and the remainder of Topic 4.

So that does sound correct, Mr. Secord?

MR. SECORD: Yes, and that will be -- hopefully, I won't need all of that time, sir, so thank you for that.

And maybe -- I don't know whether you want to do your second one or whether you want me to...

THE CHAIR: Well, you've got me guessing a little bit because I might be changing some of your answers. I'm not sure you know what I'm coming with, but --

MR. SECORD: So -- so I phoned Mr. Kruhlak this morning to discuss the schedule, and I've done sort of a minute-by-minute schedule, and by my calculations, we will be done tomorrow afternoon -- my guess is we'll

actually be done prior to the 5:00 break, 5:00 stop point on Wednesday.

That, of course, is subject to obviously the cross-exam from AT, questions from the Board, but based on what we've seen so far, I believe that we will be completed by the end of the day tomorrow.

So Mr. Kruhlak and I discussed argument. We -- you know, the record here is fairly immense, in terms of pre-filed record, the exhibits, and we would both be reluctant to start argument on Thursday. We think that that would be inefficient, likely result in a longer argument than needed.

So Friday is Easter, is Good Friday. Monday is Easter Monday and a holiday for many people, and I know you were expecting us to sit on Easter Monday, but Mr. Kruhlak and I would like to float the idea of having argument on the Tuesday, which would be the 6th.

And we put that out to you for your consideration and perhaps you could get back to us on that.

THE CHAIR: Yeah, we did have -- we have been doing the same, the Panel has had some informal discussions. This does look to us that it would be no problem finishing by Thursday. You were maybe a little bit more ambitious than we were, but if it turns out tomorrow we're done, then we're done.

I don't see any reason to sort of push final argument quicker than that. I will confer with the Panel based on what we discussed this morning; but, you know, based on our informal discussions, I don't think this will be a problem. We'll confirm that, get back to parties today, and that will be for final -- the request is for final argument on Tuesday, and I think there's some merit in that, so...

MR. SECORD: And I should mention that I think Mr. Kruhlak is needing to get instructions on that from his client, so I expect Mr. Kruhlak will get back to us perhaps on that question --

THE CHAIR: Mr. Kruhlak, do you have something this morning or do you need some time to respond?

MR. KRUHLAK: Yes, Mr. Chairman, I've had a discussion. I think that would -- that would be -- certainly make sense from our perspective.

THE CHAIR: And Mr. Rae?

MS. LOUDEN: Good morning, Mr. Chair. This is Sara Louden. We take no issue with that. Final arguments on Tuesday would work for us, as well.

THE CHAIR: Okay. Any other objections, just to note?

Hearing none. Okay. Panel will get back to parties. Thank you.

Was that it for this morning, Mr. Secord?

MR. SECORD: Yes. Thank you.

THE CHAIR: Any other prelim matters by other parties?

MR. KRUHLAK: Mr. Chairman, it's Ron Kruhlak. I just have two minor matters that I'd like to speak to.

THE CHAIR: Please.

MR. KRUHLAK: Firstly, sir, in the questioning of Mr. Yoshisaka, he referred to a map and was asked to locate it, and for reference, this is at transcript page 1539, but he referred to the CEAA conformity information request and -- in referring to the map, and then it was later determined to mark that document as an exhibit.

And, Mr. Chairman, I thought it might be useful as I know all parties have been referring to documents on the registry, as well as exhibits during the course of these proceedings that the Board, and perhaps Board counsel can just confirm, that the record actually comprises those documents on the registry, whether they be marked as exhibits in addition to the documents we've been introducing during the hearing.

I thought that would just allay any concerns with respect to that issue.

THE CHAIR: Mr. Kennedy?

MR. KENNEDY: I think it's -- certainly the comment is a fair comment.

As we built the record coming into this hearing, we've compiled a registry, I don't know whether we named it that, but certainly we have -- have a long list of documents going back several years now. And, in fact, I think it's also fair to state that the Board has been considering that record as all -- all part of consideration of this application, and, as such, you know, the fact that a document has been marked as an exhibit or is in the registry, I think it's all part of the Board's record on this proceeding.

I think that addresses your question, Mr. Kruhlak?

MR. KRUHLAK: Yes, Mr. Kennedy, I appreciate that. We were certainly operating on that premise, as I think have others, so I appreciate that confirmation.

THE CHAIR: Thank you. Thank you, Mr. Kennedy.

And I think the marking of the exhibit, as we did yesterday, as an example, as having -- for transcript reasons because they're just easier to locate, so that works. Thank you.

MR. KRUHLAK: I have one other matter, sir.

Just yesterday, Mr. Secord asked Mr. Wood about a question that he was going to get back, and I can

address that.

So the question was what station the snow water equivalent data came from. And on behalf of Alberta Transportation, I can confirm that it was the Little Bow -- I'm sorry, the Little Elbow Summit station was the source of that data.

THE CHAIR: Mr. Kennedy, I think that was essentially an undertaking?

MR. KENNEDY: I don't recall it is.

THE CHAIR: Yeah, I guess my question was, do we want to mark that as an exhibit so, once again, we can find it again, but I don't recall it being an undertaking.

Mr. Kruhlak or...

MR. KRUHLAK: My recollection, sir, was he was asked to confirm it and it was that he would be checking on it and getting back. I didn't have an opportunity to see whether it was formalized as an undertaking, but since it seemed to be relatively straightforward, we just thought we'd put it on the record orally.

THE CHAIR: I think that works for me and the Panel and other parties. Thank you.

MR. KRUHLAK: Thank you, sir. Those are my matters.

THE CHAIR: Okay. I do have one request based on the request that was made by Mr. Rae yesterday.

So in consideration of Mr. Rae's request on behalf of Stoney Nakoda for the Panel to direct that TransAlta/government of Alberta agreement be produced, the Panel does have a couple follow-up questions before we decide on the matter, and for Alberta Transportation, and/or perhaps the City of Calgary, could you confirm that benefits measured through damage avoidance for SR1 are completely attributable to the operation of SR1.

So when you did the calculations for the cost and benefits, our question is, can you confirm that the benefits measured through damage avoidance for SR1 are completely attributable to the operation of SR1.

Furthermore, is the Panel correct in its understanding, when Alberta Transportation indicates it has no knowledge and has not considered the TransAlta/government of Alberta operating agreement in preparation of the EIA, including the cost-benefit analysis.

So, as a follow-up to that, regardless of operating parameters for the Ghost Reservoir, is it AT's position, Alberta Transportation's position, that cost and benefits of SR1, as calculated, are completely

independent of those operating parameters.

And secondly, if there could be impacts on the EIA from the Ghost Reservoir operation, are these impacts expected to be significant. And when we say "from the Ghost Reservoir operation," as related to the operating arrangement in the TransAlta/government of Alberta agreement.

I think those would be -- there'd be some merit to having answers to those questions for the Panel in its determination as to whether or not we believe that that document should be produced.

If agreeable, if Alberta Transportation -- and I can forward this document if required, but we wouldn't have the transcripts that quickly, but we can forward this document to Mr. Kennedy, to parties, but if we could have the answer to these questions by 1:00, we could also entertain any further discussion we might have on the motion itself, if any, and then we would anticipate having the Panel ruling on the matter on the motion by tomorrow morning.

So, Mr. Kennedy, I'll forward this to you so if parties would like a copy so that -- because that is maybe a lot to write down -- you want to make sure we get that right, so I'll forward it to Mr. Kennedy, if you could offer it to parties. Does that work? You're

on mute, I think.

MR. KENNEDY: I'm sorry. Yeah, indeed. I'll forward it to Mr. Kruhlak and Ms. Louden. I don't see Mr. Rae on this morning, but I'll copy it to him, as well.

THE CHAIR: Ms. Senek -- I mentioned that maybe the City of Calgary may need to confirm some of this because they had done some of this work between the two, so Ms. Senek, as well.

MR. KENNEDY: Yeah, I will indeed, and I don't know that Mr. Secord has an interest in the document, but would you like me to forward it to you as well?

MR. SECORD: Certainly, sir, that would be fine. Thank you. It may feature in final argument.

MR. KENNEDY: And if others -- other parties have an interest in getting it, please reach out to Laura Friend or to me and just let me know you'd like a copy, and I'll make sure it gets into your hands.

THE CHAIR: And Mr. Kennedy has identified -- thank you, Mr. Kennedy -- your request by Stoney Nakoda was made yesterday, and it's at transcript -- starts at Transcript page 1451. So if you just wanted to refer to that at some page. 1451 of transcripts from yesterday.

Okay. So I think that takes us through prelim.

Is there anything else from any parties with prelim this morning?

Hearing none. Mr. Secord, we've agreed that two hours, and it sounds like you may not need the complete two hours, but please proceed.

MR. SECORD: Thank you.

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

MR. SECORD CROSS-EXAMINES THE PANEL:

Q. Mr. Wood, picking up on Mr. Kruhlak's statement on the record that the Little Bow Summit snow data was used. My understanding is that Dr. Fennell used the Little Bow Summit snow data and got very different percentile values.

Could we ask you to provide us with those calculations and the actual data that AT used, and could you undertake to provide that to us.

A. MR. HEBERT: Mr. Chairman, we'll take that as an undertaking.

Q. Thank you, Mr. Hebert.

UNDERTAKING - TO PROVIDE ALBERTA TRANSPORTATION'S LITTLE BOW SUMMIT SNOW

DATA CALCULATIONS AND ACTUAL DATA THAT WAS USED

Q. So, Mr. Yoshisaka, good morning.

A. MR. YOSHISAKA: Good morning, Mr. Secord, Mr. Chairman, members of the Panel.

Q. I don't see you up quite yet on my screen. There he is, there he is.

How are you this morning?

A. MR. YOSHISAKA: Well, thank you.

Q. Good. So I just want to recap from yesterday, based on the record of our discussions -- somebody is talking, so you might want to mute yourself.

THE CHAIR: I think we have someone not muted. Could everybody just check their mute, please?

And, Ms. Beckmann, it does not look like Ms. Beckmann is muted. There we go. Thank you.

Q. MR. SECORD: So, just to recap from our lengthy discussion yesterday, Mr. Yoshisaka, Exhibit 110, Figure 3-10, on PDF page 47 shows that the base of the SR1 reservoir is underlain by at least 5 metres of lacustrine clay. So that's point Number 1.

Point Number 2, Figures 4-5 to 4-8, on PDF pages 113 to 115 of Exhibit 110 show the top three layers of the model with a low permeability soil beneath the base of SR1 reservoir footprint.

Point Number 3, the lacustrine clay should be at least three layers because it is in the uppermost formation.

Point Number 4, the K value for the top three layers is indicated on those figures, 4-5 to 4-8, in the legend, as being 7.2 times 10 to the minus 8 metres per second.

Point Number 5, Exhibit 110, Table 4-3, on PDF page 128 indicates that clay should have a value of 5.1 times 10 to the minus 6 metres per second, but it is nevertheless given a value of 7.2 times 10 to the minus 8 metres per second, which is more consistent with "Till North." That's "T-I-L-L," capital N, "North."

Point Number 6, missing from the top three layers of the model is the documented sand and gravel in the Unnamed Creek valley which was indicated by AT to be anywhere from 1 to 7 metres thick overlain by a layer of glacial material.

Point Number 7, the sand and gravel in the Unnamed Creek valley should have at least been in layer 1 or 2 of the model, given its proximity to the surface.

And, finally, point Number 8, sand and gravel is given a K value of up to 2.8 times 10 to the minus

3 metres per second in the previously cited Table 4-3 on PDF page 128 of Exhibit 110.

How -- so I have just five questions for you: How is this configuration of soils, and associated K values, in the model in any way reflective of the actual geological conditions documented beneath the SR1 reservoir from the exploratory drilling programs?

A. **MR. YOSHISAKA: Mr. Chairman, as I mentioned in evidence yesterday, the process through which we established the distribution, thickness, and relative order of these materials was -- was based upon our examination of numerous borehole records across the project development area.**

That information was then fed into our three-dimensional conceptual site model, which was the geologic model, describing the geology of the entire -- our A-A and honours the observations, the lithological observations which were collected during drilling.

I believe, yesterday, we put up a cross-section oriented in general down the main axis of the reservoir area, again, the sands in question are shown on that cross-section, they are rather isolated in their extent, and thin, relative to the overlying layers. The presence of that sand is also overlain by tilled materials, so that sand does not extent all the way to

ground surface, which is why it does not appear in the upper layers of the model.

So, again, I will submit that we do understand the location of those sands, and, again, they are below the till units, and that's why they are isolated from the surface and thus do not appear in the upper layers of the numerical model.

Q. Did you use geotechnical drilling information in the model development?

A. MR. YOSHISAKA: Mr. Chairman, yes -- yes, we did. We used various sources of information. As I indicated yesterday, ranging from data sourced from regional scale reports, the Alberta Water Well Information Database information, in addition to the more than 150 boreholes that were drilled as part of the hydrogeology and geotechnical field programs.

Q. How will the presence of this much lower K value layer of 2.8 times 10 to the minus 3 metres per second influence the leakage from the base of the SR1 reservoir, and will it not reduce it by up to two orders of magnitude or so, all things being equal?

A. MR. YOSHISAKA: Mr. -- Mr. Chairman, subject to -- to check, I believe the figure just described there by way of a K value of 10 to the minus 3 was related to the alluvial deposits within the Elbow River valley, so

these are again different deposits. These are -- yes, the coarse, the gravelly deposits within the alluvium of the Elbow River valley. These are not the same deposits that we're speaking about under the till under the reservoir area.

Now, continuing on that thought, again, the small sandy unit of limited extent that we're speaking of, resides below the till. We are not relying on it to form, you know, any of the containment associated with downward flows. So we recognize that it is a more permeable unit, it does sit directly on top of bedrock, and, again, because it's below the till, we don't consider it to have a low permeability that contributes to the retardation of downward flows.

So, again, it's a -- we do recognize it's a more permeable unit, and we don't consider it to be part of that barrier.

Q. Did the geotechnical drilling identify the sand in the Unnamed Creek valley?

A. MR. YOSHISAKA: Mr. Chairman, yes, it did.

Q. And did you actually test the sand and gravel in the Unnamed Creek valley?

A. MR. YOSHISAKA: The --

A. MR. BACK: This is -- sorry, this is Dan Back, the geotechnical engineer.

Can you clarify what you mean by "test"?

Q. Did you analyze the shallow sand and gravel that is in the Unnamed Creek valley?

A. MR. BACK: The fluvial formation that was in the Unnamed Creek valley under the footprint of the storage dam embankment environment was evaluated. It was logged by the engineers and geologists that were in the field. Furthermore, there was a test pit program that excavated through to expose that, and I was there for much of that program.

So we have a very clear understanding of that formation there under the dam at that location. Laboratory tests were performed to understand the gradation of the material.

Q. And did you K test the sand and gravel? And where is that information?

A. MR. BACK: I don't believe that any permeability tests were performed. It's extremely difficult to perform laboratory tests, meaningful laboratory tests on granular material of that type because the disturbance and remolding has such a big impact on the permeability. I don't believe that there were any field permeability tests performed in that formation. I would have to check to verify.

Q. Given that only three field measures of K values were

obtained by Stantec, with only one for the lacustrine clay, how can my Springbank clients and the NRCB have any confidence that the full range of values has been obtained, including any influence from fractures or other features that would result in higher K value like silt layers?

A. **MR. BACK: I apologize, Mr. Secord. Could you repeat that question?**

Q. Given the fact that only three field measurements of K values were obtained by Stantec, with only one for lacustrine clay, how can my Springbank clients and the Natural Resources Conservation Board have any confidence that the full range of values has been obtained, including any influence from fractures or any other features that would result in a higher K value like silt layers?

A. **MR. BACK: I believe we did many more than one test on the lacustrine clay. As I indicated yesterday, field permeability tests of very low permeability soil is extremely difficulty, and a number of tests were attempted, but due to the extent and time to reach equilibrium, only a few of those reached a result with a permeability value.**

In the laboratory -- just let me look here -- it looks like we did 15 or so laboratory tests on

undisturbed samples of the glacial lacustrine.

Then in conjunction with the classification data for the soil, and the field test results that we had, and some available literature information, we feel very confident that we have characterized the permeability of the lacustrine within a reasonable range of the actual field values.

Q. Now, Mr. Yoshisaka, picking up, I think, on what Mr. Back just said, you indicated in your evidence yesterday that a number of K tests were performed, but were not documented because of slow recovery or lack of water; however, we see in Exhibit 110, Table 3-4, PDF page 93, that samples were collected through water quality analysis from up to 16-monitoring wells in the unconsolidated deposits.

If you were able to sample these wells that were obviously full of water, then why were you not able to K test them, as well?

A. **MR. YOSHISAKA: Mr. Chairman, basically, you know, when we are preparing to sample a well, there's a certain procedure that is followed, and the procedure involves purging of a well, so removing any water that has accumulated in the well prior to collecting the sample. And this is done in order to ensure that the sample that you've collected is "fresh," if we could**

say so, in terms of just having entered the well. So we don't want to be in a situation where we're collecting a water sample from a well that's basically reflective of stagnant water sitting in the well. We want to collect a sample that is representative of the conditions and the formation itself.

So, after having purged out the contents of the well, we wait for it to recover such that we can collect a sufficient volume of water for -- for a sample.

Now, in the extremely low permeability wells where, you know, we had difficulty performing a complete field test, I mean, we were barely able to connect -- collect enough sample to submit for -- for water -- water analysis. You know, pretty much, we were getting the final last drops out of the well to even collect enough volume for -- for a sample.

So, you know, I guess we prioritized collecting a sample, and then submitting that over perhaps waiting longer and completing a test; however, given that we did have some successful tests, we felt that, you know, we understood that relative to the wells where we had a successful test, the recoveries at those particular wells were even slower than that.

And thus, you know, while we don't yield a numeric

result from that well in terms of a hydraulic conductivity test, qualitatively, we know what that meanings, and if the recovery out of a well is slower than the recovery at a well where a test was successfully completed, that would then infer that the permeability at that well is in fact lower.

Q. When you purged a well, the water has to recover. Why did you not measure it to get a K value?

A. MR. YOSHISAKA: Again, because the recovery was so slow, and the level of standing water in the bottom of the well was -- was just minuscule. It wouldn't really be deep enough to insert the instrumentation required to collect that information. It was barely enough to be able to bail it out with a bailer, but was not of sufficient depth necessarily to insert the instrumentation required to collect that information.

Q. When water wells are drilled in till, you can get smearing of the borehole that reduces the K value. Did you take that into consideration in your K estimates because they could be higher than you think?

A. MR. YOSHISAKA: My apologies, Mr. Chairman. They may be higher than you think; is that correct, Mr. Secord?

Q. Yeah, did you take that into consideration in your K estimates?

A. **MR. YOSHISAKA: As...**
Q. That the smearing of the borehole reduces the K value?
A. **MR. YOSHISAKA: There is possibility for the influences of -- of drilling a borehole. The act of drilling a borehole can lead to some of the smearing that you had mentioned; however, we do do our best to develop that well as much as possible.**

And by "develop," that means trying to remove some of the fines that may have smeared in the well screen region.

Further, you know, the effects of smearing are much more notable in more permeable deposits. So if you can imagine, if you're drilling through something that's relatively sandy and some clay-type materials get smeared on the surface of your borehole, then yes, there could be an apparent reduction in K values.

However, when drilling through a material that is already low in K, and you're simply smearing it with the same materials in which you have completed the well, then that potential for it to have skewed your numbers is greatly reduced.

Q. Where is the information to confirm that you took that into account?
A. **MR. YOSHISAKA: It -- Mr. Chairman, it was taken into account by nature of the way in which we completed**

the wells. So the manner in which we construct a monitoring well is done so in, you know, in accordance with best practices, and those best practices include provisions for minimizing the influence of that type of mechanism.

Q. And my last question arising from the recap of yesterday, you brought up some evidence yesterday in new Exhibit 375, Table 17-1 on PDF page 47 showing very different K values for the model layers, all of which are lower by orders of magnitude than those indicated in Table 4-3 of Exhibit 110.

Why the change, and how can my Springbank clients and the NRCB have any confidence in a groundwater numerical model that just keeps on changing and incorporating lower and lower K values beneath the SR1 footprint, lower K values that lack a sufficient degree of field verification?

A. **MR. YOSHISAKA: Mr. Chairman, I must admit I had a little bit of difficulty following Mr. Secord there. You flipped through a number of exhibits and tables. If you could perhaps walk me through that a little bit slower, I think that would be helpful.**

Q. Sure. So yesterday, Mr. Yoshisaka, you brought up evidence in the newly filed Exhibit 375, Table 17-1 on page PDF page 47 showing very different K levels or K

values for the model layers, all of which are lower by orders of magnitude than those indicated in Table 4-3 in Exhibit 110.

So the question -- the first part of the question was why the change, and the second part of the question was how can my clients and the Board have any confidence in a groundwater numerical model that just keeps on changing and incorporating lower and lower K values beneath the SR1 footprint, lower K values that lack a sufficient degree of field verification?

A. MR. YOSHISAKA: Mr. Chairman, I would contest that notion that the K values assigned in the model were lower than our field measurements.

I believe, as we noted yesterday, the measurements or estimates of hydraulic conductivity values for both the lacustrine clay unit, as well as the till unit, as observed, were lower than the values which we -- we carried in our model.

Now, further to that, we also discussed the hypothetical examination of what could happen if higher K values are indeed present, and we did that through the sensitivity runs that we did conduct.

Those runs, again, we assigned K values much higher than was observed, based on our measurements, and the results of that sensitivity run again inform us

as to, you know, the differences in the extent and magnitude of effects that might be borne out, should those conductivities be that much higher.

So we don't carry that as a case that supports our effects assessment because those K values are not reflective of the conditions; however, we did embark on a journey to examine, again, the what-ifs of -- of if they are.

So in either case, I mean, we understand that overall the effects will be, you know, relatively localized. We have used that sensitivity analysis to also inform our plans for monitoring of these areas.

So our monitoring plan is robust. It is scaleable, and it is adaptable. And it's really designed to offer the appropriate level of monitoring rigor over the entire project life cycle.

So this monitoring program establishes varying levels of rigor, monitoring rigor that are commensurate with the types of risks that are relevant during a particular project phase. So this goes from construction through to dry operations, through to flood operations, as well.

So, you know, I do have confidence that, with the monitoring plan in place, should some unexpected response of the system develop, that we will be able to

detect that change and in turn, implement additional mitigations in those areas where it may be required.

Q. Now, Stantec states in Exhibit 327, PDF page 45, third paragraph of Concern Number 2 that, and I quote, open quotes: (as read)

> "Examination of the groundwater flow patterns under either baseline or operational conditions indicate that in general, groundwater flow within the bedrock are generally directed south or southeast from the reservoir area to where the water discharges in the Elbow River Valley."

Full stop, closed quotes.

Do you recall that sentence, Mr. Yoshisaka?

A. MR. YOSHISAKA: Yes, sir, I do.

Q. Do you agree that the same flow pattern is true for the glacial deposits under normal conditions?

A. MR. YOSHISAKA: Generally speaking, yes.

Q. Do you agree that there is no assessment by AT of how contaminants may be further mobilized into, or flushed from, the glacial sediments into the groundwater and excavated diversion and outlet channels when SR1 is constructed and operational?

A. MR. YOSHISAKA: Mr. Chairman, members of the

Panel, I would not agree with that statement.

Again, we understand that yes, there could be some small changes in flow directions and the flow regime under flood operations. Also, there could be some effects, localized effects in the diversion channel area related to its incision in the landscape.

So we do acknowledge that there are potentials for changes in flow patterns here, but, overall at the scale of the PDA, the flow directions, as previously noted, are still dominantly towards the Elbow River, and that really is because, you know, the Elbow River itself imparts a relatively large hydraulic control over -- over this area.

It's very difficult to change the pressure regimes when you're so close to something that serves as pressured relief. And as such, it -- under flood conditions or dry conditions, the directions of those flow paths are generally directed to the Elbow River.

Again, in terms of changes in water quality, it was considered. Again, we do acknowledge that there is potential for some changes in groundwater quality, but these changes are localized to the reservoir area, and are -- would be irregular in their occurrence. Keeping in mind that these changes would -- would only happen during flood operations, particularly for the design

flood event, it's a very infrequent event.

So again, these -- these potential changes are duly considered. They have been characterized in the EA [verbatim], and, again, we have some mitigation in place to help address those concerns.

Q. Do you agree that there is equally no assessment by AT of how mobilized contaminants may impact the receding aquatic environment when groundwater discharges to surface water?

A. MR. YOSHISAKA: Mr. Chairman, members of the Panel, I would -- you know, just like to contextualize again that, you know, when the project is in operation, it's diverting floodwater from the river, and it's, you know, essentially the same water that's getting diverted into the reservoir as is flowing down and continuing beyond the project down the Elbow River valley.

One of the main constituents of floodwater in terms of water quality are increased qualities of TSS, so this would be total suspended solids. It's the reason why, you know, floodwater, somewhat resembles chocolate milk. There's just a lot of suspended material in that water that is carried along with it due to the, you know, the enhanced velocities that are happening during a flood.

Fortunately for the groundwater environment, suspended materials have very little mobility, so because of the small intergranular spaces between the matrix particles, they serve as a means to filter out that suspended material, and, as such, you know, suspended material has -- has low mobility in the subsurface environment. And, you know, really, that's why you can have a well in the ground and clean, clear water come out of it.

So, you know, in terms of the constituents of floodwater that perhaps would change the most dramatically, it's generally associated with the suspended materials. And again, those materials would have very low mobility in the subsurface.

Q. Document manager, could you please turn up Exhibit 110, PDF page 78.

Now, a series of hydrograph figures were presented in Exhibit 110, PDF pages 78 to 80. These figures were made by a 3D Conceptual Site model or 3D CSM. Who built the 3D CSM?

A. MR. YOSHISAKA: The 3D CSM would have been built by our Stantec team and overseen by myself.

Q. And, for instance, in the Figure 3-24 under -- with the information dealing with monitoring well 16-6-11, what does the red line indicate?

A. MR. YOSHISAKA: I believe that the red line indicates that the elevation of the ground surface at that location.

Q. Do you agree that some of the monitored locations have a shallow and deep well installed to determine the direction and magnitude of the gradient?

A. MR. YOSHISAKA: Yes, that's correct.

Q. And do you agree that, although Stantec has indicated that upward flow exists from the bedrock to the overlying clay tills, there is evidence that this gradient is dynamic and weak, meaning it could switch, depending on the seasonal water table conditions?

A. MR. YOSHISAKA: I certainly would accept that the gradient is weak, it's -- it's, you know, slightly upwards. It's, you know -- it could be characterized as near -- near neutral.

Yes, it is possible that the direction of these gradients could -- could switch over -- over time, and this is simply a reflection of, you know, the response of the shallow system to meteoric input to run-off events, to precipitation events, things like that, which can, you know, have an effect on water levels, which in turn can affect the direction of these gradients.

In terms of, you know, areas where -- in

particular in areas under the reservoir, we understand in that area the underlying heads within the bedrock are being driven by their recharge areas, which are situated at, you know, higher elevations than -- than the ground surface. So pressures in the bedrock are essentially being driven through their recharge areas in higher elevation areas of the -- the local area.

That elevation difference and source of recharge will, you know, always tend to keep those levels in bedrock a little bit higher and, you know, it is the reason that, you know, we see it manifest themselves in the form of springs.

You know, we've certainly heard evidence from some of the landowners in the area that many of the springs in the area are flowing year-round and, you know, despite changes in precipitation that happen during a year, you know, some of these springs continue -- continue to flow. Some of them may cease to flow at given times of the year.

So, yes, there is some variability in -- in those relationships and that is, in part, dependent upon some of those annual trends.

But, again, we don't anticipate that suddenly gradients would shift to a strongly downward direction. The controls on the flow regime in that area are --

are, you know, most importantly, topographically driven.

So given that the ground surface topography will not be changing, those driving mechanisms will persist over time.

Q. Document manager, could you go to PDF page 79, please, and then PDF 80.

And what is the red line? What does that indicate for the location NW16-26-18?

A. MR. YOSHISAKA: The red line in this case would again indicate the elevation of the ground surface. As you can see here, there's times within this record where water levels are above ground surface, and as well, points in time where the water levels are below ground surface. Though the variation in those levels is, you know, at an absolute scale is really not that -- that much.

Q. And do I understand that the time period of Stantec's reported data is very short. What is the time period of Stantec's reported data that it plugged into the 3D CSM model?

A. MR. YOSHISAKA: The water level record that we have for the wells which we instrumented is approximately -- let's see here -- you can see it starts in about October and ends at about May the

following -- following year, late May.

Q. So not even a year's worth of data?

A. MR. YOSHISAKA: That -- that is correct, in terms of our instrumented record here.

I will note, Mr. Chairman, that, as per our monitoring plan, so we are still within the baseline phase of our monitoring program. So, you know, as a -- we are still planning to continue that phase of the program.

The monitoring program contemplates actually a high level of rigor of monitoring during this baseline phase prior to construction. And that again is to enable further collection of information regarding water well -- water levels, water quality, as we, you know, are still within this baseline phase of the monitoring program.

This is all pre-construction monitoring that's being contemplated to, you know, assess if there's unusual changes in levels or quality.

Q. Now, do you agree that the results from a hydrograph near Big Hill Springs Provincial Park indicate that the period of record assessed by Stantec is very short, maybe 8 months, as you have just indicated on the record, and is not representative of the magnitude of water level changes up to 2 metres or more over a much

longer period of record, say, at least 8 years, do you agree that it is unrepresentative to say that the vertical gradient will always be in an upward direction from the bedrock?

A. **MR. YOSHISAKA: Mr. Chairman, members of the Panel, I will acknowledge that our monitoring record at the PDA is not as long as obviously some of the regional monitoring wells established by Alberta Environment in the area. Certainly, they have a longer monitoring record. However, that does not necessarily mean that the levels that we have noted are unrepresentative.**

Again, we need to keep in mind that a couple metres of change in water level elevation, while it may be more marked at a particular location, when you consider, you know, a couple of metres of change in water levels, again, across a basin where there's more than 200 metres of change in water levels, these fluctuations are relatively small.

So despite those water levels, yes, going up and down in response to precipitation events, perhaps even interannual, you know, seasonal patterns, the degree of flood mitigation at a particular location is minor compared to the changes in head that are seen across the whole -- the whole basin.

So, with that in mind, yes, we acknowledge there can be some variation locally, but it's not going to be enough to change the overall flow patterns within the study area.

Q. Document manager, you can take this exhibit down, please, thank you.

Now, Stantec states in Exhibit 327, PDF page 42, second paragraph, below Concern Number 3 that, open quotes: (as read)

"While during flood operations the vertical gradients are anticipated to be downward directed due to the additional head of water imparted by the impounded water, once that water is released the vertical gradients will revert to their baseline conditions since the topographic drivers that govern that potential will remain unchanged."

Full stop.

: (as read)

"Thus in topographically lower areas of the reservoir, water that temporarily migrates downward into the clay till -- clays/till would again flow upward back toward ground surface once the

floodwater is released and gradients return to baseline conditions."

Full stop, closed quotes.

Do you recall that -- those sentences in Exhibit 327, Mr. Yoshisaka?

A. **MR. YOSHISAKA: Yes, I do.**

Q. Do you agree, however, that if the gradients are reversed, this will not be the case, and why was this dynamic not assessed given its role in continuing the downward migration of contaminants from the clay/tills into the bedrock when SR1 reservoir is filled?

A. **MR. YOSHISAKA: Mr. Chairman, again, we understand that the flow system that governs those gradients, particularly in the area of the reservoir, which is the low -- topographically low area within the LAA, the reason, again, the pressures in the levels in the bedrock are slightly higher is because the recharge areas for that bedrock is situated at higher elevations than the low-lying areas of the reservoir area.**

So those, again, topographic drivers are not going to change over time with their -- without the project in place; and, thus, we believe that the gradients that are there naturally will reestablish themselves once water is released.

Q. What topographic influence will the construction of SR1

have on local gradients?

A. MR. YOSHISAKA: In terms of the driving potential for heads in the bedrock vary very little, if any. There's no changes proposed to the upland areas of the local area, there's no gross changes in topography that are contemplated in this project.

Q. In Exhibit 327, second paragraph of concern Number 3, Stantec indicates that, and I quote: (as read)

> "It is an oversimplification to imply that because the upper unconsolidated and upper bedrock units are connected, that in turn there will be high potential for downward 'flushing' of naturally occurring minerals into the underlying bedrock given that in many areas the vertical flow direction is upward directed."

Full stop, closed quotes.

How can this statement be justified when there has been no comprehensive assessment of how the vertical gradients may change, include where and by how much, once the SR1 is constructed and commissioned under either dry, partially full, or full conditions?

A. MR. YOSHISAKA: Mr. Chairman, again, we -- we have considered that effect pathway. We do, you know, need

to keep in mind that the low permeability of these materials, regardless of which direction that gradient is directed, be it upwards or downwards, limits the flux rates through those materials.

So, you know, to put things into context, if we are talking about groundwater flow velocities in the order of centimetres to perhaps metres to, maybe on the upper end, tens of metres per year, so, you know, it's over the course of a couple months of impoundment of water within a reservoir at those rates of movement, things just cannot travel that far.

So, yes, the, you know, vertical gradient is anticipated to change during flood operations to a downward directed flow, but the velocity at which groundwater can move, even under those conditions, is still very slow and, you know, in terms of the timeline over which this project's going to operate, things just can't move that far.

Q. Maybe we'll look at the Copithornes' situation maybe a little later in terms of the proximity of some of my clients to the PDA.

Dr. Fennell presents in Exhibit 261, page 17, Eh and pH diagrams for selenium and uranium -- pH being redox, right -- indicating that: (as read)

"The predominant species that would

exist under assumed groundwater conditions using redox sensitive elements provided by Stantec as a guide..."

You recall that in -- from Dr. Fennell's evidence that we filed in February?

A. **MR. YOSHISAKA: Yes, I do.**

Q. And then Stantec, in response, states in Exhibit 327, third paragraph, under Concern Number 3, and open quotes, I quote: (as read)

"What is not clear from these diagrams is how the introduction of oxygenated flood water into a system that is already oxygenated would exacerbate the situation given the lack of other species above the currently applicable regions of the diagrams."

Full stop, closed quotes.

Do you agree that Stantec is assuming that the groundwater is naturally oxygenated and has provided no measurements to substantiate this claim.

A. **MR. YOSHISAKA: It is our belief that, yes, the shallow subsurface in the area is under oxygenated conditions. I believe Dr. Fennell, in his own evidence, highlights the regions within those diagrams**

that he believes as well persist in the area, and those would be under oxygenated conditions.

The source of this oxygenation is in its baseline condition, I mean, related to infiltration of precipitation which is oxygenated; it can be some infiltration of, you know, spring run-off.

Every year some water is going to flow over the land surface in this area and -- as run-off, and that water will be oxygenated. The uppermost materials here that are exposed to the atmosphere are oxygenated because, as we know, there's oxygen in air, as well.

So, yes, it's our position that the system -- currently, the shallow system there is currently under oxygenated conditions.

Q. My question -- I don't know that it deserved such a fulsome response, Mr. Yoshisaka -- my question was simply, do you agree that Stantec is assuming that the groundwater is naturally oxygenated and has provided no measures to substantiate this claim?

I think the short answer to my question would be "yes." You gave a very long answer, but the question was really quite simple. Do you agree that Stantec is assuming that the groundwater is naturally oxygenated and has provided no measures to substantiate this claim?

That was all I asked. If there are measurements, please point them to me?

A. MR. YOSHISAKA: Mr. Chairman, I'll acknowledge that we have not provided specific redox measurements, though it is not an assumption that it is oxygenated, again, for the reasons I just spoke to, it's -- it's entirely appropriate to consider the conditions to be oxygenated.

Q. So it's an appropriate assumption, Mr. Yoshisaka?

A. MR. YOSHISAKA: You could characterize it as such, sure.

Q. Sure. So do you agree that Stantec has done no geochemical modelling to determine how the introduction of oxygenated floodwaters may exacerbate the mobilization of certain contaminants through enhanced mineral weathering and surface reactions?

Maybe you can talk about, first of all, what is enhanced -- what is mineral weathering?

A. MR. YOSHISAKA: Mineral weathering would refer to the release of certain constituents that are found within various minerals that are present. So some of the minerals present, naturally present in the clays could bear within their crystalline structure, certain elements, you know, things like selenium and uranium that has been identified.

Some weathering reactions could serve to free those elements from those minerals and then, you know, release them into the groundwater environment as a dissolved species at that -- that point.

Q. So maybe just to go back then, the question was do you agree that Stantec has done no geochemical modelling to determine how the introduction of oxygenated floodwaters, which you indicate as a certainty, may exacerbate the mobilization of certain contaminants through enhanced mineral weathering and surface reactions?

A. MR. YOSHISAKA: Mr. Chairman, members of the Panel, I can confirm that we did not do mathematical geochemical modelling of this -- of these potential reactions; however, again, I want to ensure that we understand the context of these types of potentials are, you know, limited in terms of the operating scenarios for this project.

These types of reactions, this type of assessment of potential geochemical reactions resulting in gross changes in groundwater quality are something you would most definitely consider in the case of a mine or some other activity where you're disturbing the subsurface. You know, in the case of a mine, you are excavating and exposing rock material that perhaps has never seen the

light of day.

And, yes, in those circumstances, you know, some of those reactions could set up because there is a gross change in what the minerals are used to seeing, versus what they're now seeing as a result of -- of a project.

The SR1 project really does not fit into that same category, right? There's no gross disruption of the materials in their present environment that would lead to a high potential for driving some of these reactions.

Further, I would like to mention that a lot of these geochemical reactions are kinetically limited. These reactions take time to -- to happen, and they require a change in the conditions which, again, we don't anticipate so. Because we're introducing oxygenated water into a system that's oxygenated, the driving potential for those reactions is -- is limited.

So yes, I acknowledge that we haven't modelled this numerically through a geochemical model, but I submit to the Panel that this is really not the driving mechanism of concern for potential changes in groundwater quality for this project.

Q. Mr. Yoshisaka, you anticipated my next question. Stantec goes on to say in Exhibit 327 in the same

paragraph that: (as read)

"In reality, these potential reactions are kinetically limited and take time to occur."

Full stop, closed quotes.

Do you agree that no work of any kind has been done by Stantec to support this claim either? In fact, no geochemical work beyond a cursory review of groundwater quality has been provided, and so how can this statement be substantiated?

A. **MR. YOSHISAKA: Mr. Chairman, I would submit that the laws of thermodynamics would govern those reactions. So the basis for our statement that these reactions are kinetically limited is founded in the laws of thermodynamics.**

So, you know, I don't again acknowledge that we haven't numerically modelled this, but it remains a fact that these reactions are kinetically limited. We don't need field information to confirm that.

Q. Stantec then goes on to say in Exhibit 327: (as read)

"It is more likely that over the short term duration of impoundment of flood water, that if it were able to migrate downward at a high rate as he suggests, then it would serve to further dilute

the concentrations of metals in solution."

Full stop, closed quotes.

Do you agree that Stantec has done absolutely no mass balance or fate and transport modelling to substantiate this claim of dilution?

A. **MR. YOSHISAKA: Mr. Chairman, we have not conducted the fate to transport modelling, as was noted there.**

Again, I think we discussed yesterday that, you know, we did not embark on that because, conservatively, we are assuming that contaminants can flow advectively with -- with groundwater.

Again, in terms of the potential for contaminants to be transported in the subsurface, the maximum rate at which they can move is the same as the rate of movement of groundwater. In fact, in the subsurface, there's additional reactions that could happen.

These could be again processes like absorption, dispersion, other processes that happen in the subsurface that, in effect, retard the movement of contaminants relative to the speed of groundwater.

So by assuming, in the absence of detailed feet modelling -- by assuming if the contaminants can move at the same rate as groundwater, again, it would tend

to overestimate the rate of that movement and, you know, again, does inform us as to how far those potential contaminants could -- could move.

Q. As we noted yesterday, there were exceedances of selenium and uranium found in water wells in your materials, uranium above the Canadian Drinking Water Quality Guidelines.

Given that no comprehensive work has been performed by Stantec or AT to provide the Board with the information necessary to assess the risk, how can the Board and my clients have any confidence that this refusal to believe that such mobilizations of contaminants is reasonable? How can we have any confidence that that refusal to believe that such mobilizations of contaminants is reasonable, given the absolute lack of assessment?

A. MR. YOSHISAKA: Mr. Chairman, members of the Board Panel, I wouldn't characterize that we've refused to acknowledge the potential for these reactions to occur. What we are saying is that it's unlikely that they'd be the driving mechanism that we'd be most concerned about, keeping in mind that, you know, the project, by its design, will bring floodwater onto the landscape behind the dam and reservoir, and that floodwater carries with it constituents, you know, that are more

likely to be the driving mechanism that we're -- that we're most concerned about.

So, you know, it's not that we're totally discounting that these things could what happen; what we're saying is that they're not likely to be the driving factor that we're most concerned about.

Further, the monitoring programs that we have designed, again, are prepared in contemplation of the changes that we anticipate could happen. So the monitoring program is positioned with wells, both shallow and deep, to cover these possibilities. And again, we will know if there is a change in groundwater quality that could lead to incremental risk to users in the area, and if that is the case, then additional mitigations will be put in place.

THE CHAIR: Mr. Secord.

MR. SECORD: Yes.

THE CHAIR: Not sure -- how many more questions for Mr. Yoshisaka you have, but a break now would work if it works for you or --

MR. SECORD: I was just thinking I would go to 10:45, but if you would like a break now, I can break, yes.

THE CHAIR: Let's break until 10:10.

MR. SECORD: Yes, thank you.

THE CHAIR: Okay, thank you.
(ADJOURNMENT)
THE CHAIR: Mr. Hebert, your panel is all back?
A. MR. HEBERT: Mr. Speller has an item to address before we continue, if that's possible.
THE CHAIR: Sorry, the -- from previous questioning you mean?
A. MR. HEBERT: Yeah, from a previous item raised yesterday.
MR. KENNEDY: I think the question to the Panel is should this be on the record or not?
A. MR. HEBERT: Oh, yes, Mr. Chairman, it should be on the record, yes.
THE CHAIR: So is this a further response to today's question from Mr. Secord, is that -- do I have this right?
A. MR. HEBERT: Yesterday's testimony.
THE CHAIR: Oh, yesterday's.
A. MR. SPELLER: Mr. Chairman, it's Wayne Speller. Dr. Luzi has identified a minor correction to a reference he made yesterday, and he was hoping to share it before we finish Mr. Secord's cross.
THE CHAIR: Mr. Secord, are you okay?
MR. SECORD: I'm fine with that. Thank you.

THE CHAIR: Thank you.

A. MR. LUZI: Mr. Chair, this is Dr. Luzi. I just wanted to correct yesterday that when I was commenting on the uncertainty in the data used in the tree ring data and the Sauchyn and Ilich paper, I was actually referring to numbers in the Axelson paper which did the -- which was the source of data for the Sauchyn and Ilich paper. So I just wanted to correct that mistake.

MR. SECORD: Okay, thank you.

THE CHAIR: Ms. DiPaolo, that was Dr. Luzi. Sorry, Mr. Secord, go ahead.

MR. SECORD: Thank you.

Q. So, Mr. Yoshisaka, there has been no assessment of how other contaminants like nutrients from fertilizers or septic and sewer waste incorporated in the floodwaters from inundated systems may impact the groundwater beneath the SR1 reservoir and how those contaminants may make their way into the local springs and ground -- and local groundwater supplies.

How can the NRCB and my clients judge this risk if no work has been done to assess it?

A. MR. YOSHISAKA: Mr. Chairman, members of the Panel, again, as we've stated previously in our evidence, these -- the risk associated with, you know,

the downward migration of flood-affected water has been considered in our assessments. We do acknowledge that -- that there is a risk of changes in groundwater quality related to that affect pathway.

The -- the nature of those effects have -- have been characterized and presented in the EIA and further -- you know, with an understanding of how far those effects could extend.

Again, we have developed the monitoring program to monitor for those effects with that in mind, and, again, have suitable mitigations presented that could deal with those things, should -- should they come to pass.

Q. Did AT engage a professional qualified in organic and inorganic geochemistry to assist in the assessment of water quality risk, or was the siting and design of SR1 mainly an engineering exercise?

A. MR. YOSHISAKA: Mr. Chairman, you know, I can't speak directly to the siting of the site, I was not involved in the siting of the project. But, you know, regardless of why the project was sited where it is, we are fortunate to have these low permeability materials underlying the reservoir area.

I would suspect that that was a factor in their site consideration, because it is an important one, and

it is important mitigation that is in place for this project, that it's passive mitigation, it doesn't require, you know, human intervention to yield the benefits of that mitigation.

But, you know, we definitely recognize that that is in the project area, and it is good that it is.

Q. Yeah, my question was, did AT engage a professional qualified in organic and inorganic geochemistry to assist in the assessment of water quality risk?

A. MR. YOSHISAKA: Mr. Chairman, members of the Panel, again, it's -- it was our approach to conservatively look at the potential for migrations of contaminants in combination with our understanding of how groundwater moves advectively.

So, irregardless of the chemical species that we're talking about, the maximum extent at which they could move and travel is advectively with the flow of groundwater.

The other factors that may be parameter specific, contaminant specific, are those, you know, which you'd consider in terms of fate modelling. Again, some of those things will vary depending on the parameter; but, again, all those serve to -- all those mechanisms serve to further retard the movement of contaminants in the subsurface.

So we feel that the manner in which we've looked at this issue is conservative, and -- and, again, our monitoring and mitigation plans are designed with those effects in -- in mind.

Q. Mr. Yoshisaka, I'll try this question for a third time now.

Did AT engage a professional qualified in organic and inorganic geochemistry to assist in the assessment of water quality risk?

A. MR. YOSHISAKA: Mr. Chairman, no. No, we did not. We did not feel it was necessary, given the analysis that we did undertake.

Q. Now, release of water from SR1 will occur following a flood event and could extend up to 40 or so days, we've been told.

The release rate down the engineered low-level outlet channel to the Elbow River will have a maximum flow of 27 cubic metres per second, we've been told.

This water will contain contaminants entrained during flooding of the Elbow River, which will also be associated with any suspended sediment particles that you've talked about.

So my first question, Question 1 is: It does not appear that the release of this contaminated water and its effects on the receiving aquatic environment has

been fully assessed. Is that an accurate statement?

A. MR. BRESCIA: Mr. Chairman, it's Dave Brescia. And first I'd like to just clarify. We don't expect the water coming into the reservoir to be contaminated. We expect it to be reflective of the floodwaters in terms of their -- their constituents that are picked up through the flood; and we don't expect the contaminants to be at levels that would have of concern flowing into the reservoir.

Q. But my understanding from the Luke and Mary Robinson's presentations, Mr. Brescia --

A. MR. BRESCIA: Mr. Chair --

Q. -- which showed the sewage that was strewn across her property from the Redwood Meadows' sewage facility. Did you see that?

A. MR. BRESCIA: Mr. Chairman, I do recall seeing that. That -- that, I believe, looked like a point source release onto her property, and while we didn't specifically assess sewage as a -- as an individual component, we did some high-level calculations on the total volume of sewage that would be contained at either Bragg Creek or Redwood Meadows or both, and based on the designs of those facilities, that would amount to about 325 cubic metres of total wastewater. And so if that were -- both of those treatment

plants were to be completely inundated and the entire wastewater mixed with the Elbow River, and I do mean it would be mixed and diluted, and then even if we assume the entire volume were to be entrained into the reservoir, that would make up about 325 cubic metres out of 77 million cubic metres, which would amount to about .0004 percent of the total volume in the reservoir. And, again, upon release into the river, that would again mix and dilute with the Elbow River floodwaters.

Q. So how can the Panel and my clients properly understand and make a judgment on these risks if they haven't been fully assessed?

A. MR. BRESCIA: Mr. Chairman, we have assessed what we believe are the driving parameters for contaminants, which are the TSS and nutrients, as Mr. Yoshisaka mentioned earlier.

So those are fully assessed in the -- in the EIA and the results and conclusions are presented.

Q. Now, Mr. Yoshisaka, are you a geochemist?

A. MR. YOSHISAKA: No, sir, I am not.

Q. Now, my clients have a few questions that they've asked me to ask, and some conditions that they've asked me to put to you, Mr. Hebert.

Now, my understanding -- and maybe you can accept

this subject to check -- is that Springbank is named after the Springbank Creek, which flows southeast into the Elbow River; that Springbank was first given -- it was first given as a school district name in 1887 because of the numerous springs breaking out of the sides of the lesser coulees all over the district; and perhaps you'd accept, subject to check, that most of the early settlers located near the springs.

You heard from Mr. Copithorne about the groundwater and springs that he has, which basically abut the PDA, but that's Brian Copithorne, in terms of accessing drinking water and water for the cattle from these springs.

What -- what is the potential for these springs to be impacted by the reservoir in full supply level? Is there any potential that these springs may be negatively impacted and either reverse course or end up not flowing?

I'm just wondering if there's been any assessment of Mr. Copithorne's springs?

A. **MR. HEBERT: So, Mr. Chairman, the specific details about the history of Springbank, certainly subject to check, I'll accept Mr. Secord's information.**

In conversations with landowners and local area residents, they've shared with me and they've shared

with other members on the team the history of the area, the nature of the springs, the reason why individuals and farmers settled there. So I think that's certainly accepted.

In terms of the specific question relating to Mr. Copithorne, I'd invite the appropriate member of the panel, which I believe it would be Mr. Yoshisaka, to provide that response.

A. MR. YOSHISAKA: Thank you, Mr. Hebert.

Mr. Chairman, members of the Panel, yes, springs were -- were duly considered in our assessment. We do provide maps of known or suspected locations of springs that fall within the LAA.

The locations of these, either known or suspected spring locations, were derived based on our, again, understanding of the shallow groundwater flow regimes, you know, keeping in mind that springs really are a manifestation of -- of groundwater levels.

So we know that, in the area, that there's, you know, a good potential for the development of springs, and this is due to, you know, a couple of things, a couple of different types of springs can be present in the area.

The springs I believe on Mr. Copithorne's property are more what we would term "contact springs." So more

likely related to, you know, because he is located next to an area with a bit higher slope, those springs are likely related to groundwater that's trying to move down through the subsurface, but then, you know, encounters a lower permeability unit below it, and thus the path of least resistance let's say, is out -- outward to the side releasing, you know, out of -- of the side of the valley wall.

So, you know, we understand through the baseline work that we've done that the flow regimes, yes, can promote the development of these springs.

It was interesting to note that, you know, when we were mapping out shallow groundwater flow patterns in the area, there was areas where, you know, even at a desktop level, where we suspected, hey, there, this looks like this is a condition favourable to the development of springs, and it so did turn out in the field as well that springs were found at some of those locations. So, with that corroboration in mind, we're confident that we understand where those locations are and why they are where they are.

And, with that in mind, with that understanding in mind, again, we can development an appropriate monitoring program to monitor for those potential effects to springs, and, yes, I think we'll have a good

understanding of that.

Q. Did you do any physical or chemical measurements at Mr. Brian Copithorne's springs?

A. MR. YOSHISAKA: At his springs in particular, no, I don't believe that we -- we did. The couple of springs that we were able to visit were visited in combination with the domestic well testing program that we completed.

Q. Now, Mr. Hebert, is the proponent aware that a new development of 40 homes is proposed between Range Road 34 and Range Road 35 just adjacent to the east side of the SR1 project? Can you tell me, has AT considered that the development may be negatively impacted by the cumulative effects of SR1, including possible groundwater effects, high groundwater tables as a result of the project?

A. MR. HEBERT: Mr. Chairman, we're aware of the development. I'd invite Mr. Yoshisaka to provide a response on this specific question.

A. MR. YOSHISAKA: Mr. Chairman, sorry, I just would offer a correction here, I am not intimately familiar with this particular development.

However, based on our understanding of -- of the flow regimes and potential changes to those flow regimes under flood conditions, I mean, we know the

extent of that eastward progression of the zone of influence of the reservoir area.

If I could, I'll just bring up a figure here to help support our discussion. Bear with me for -- for a moment.

MR. BARBERO: Mr. Chair, it's Michael.

THE CHAIR: Yes?

MR. BARBERO: Sir, perhaps in the interest of time, I could just update the Panel on an undertaking Mr. Yoshisaka gave yesterday so that in case Mr. Secord would like to ask any questions, he has an opportunity to do that in his remaining time, sir.

THE CHAIR: Thank you, Mr. Barbero.

MR. BARBERO: So, yesterday, Mr. Yoshisaka noted in direct there was a correction to a legend in a table in Exhibit 157, page 9.

I can advise we have now provided the corrected legend in a new document, and that has been filed at Exhibit 381, and Mr. Secord has been provided a copy of that directly.

THE CHAIR: Thank you.

MR. SECORD: Thank you, Mr. Barbero.

THE CHAIR: Ms. Friend, you have that in exhibit number, as well?

MS. FRIEND: Yes, that's correct.

EXHIBIT 381 - CORRECTION TO LEGEND IN A TABLE IN EXHIBIT 157, PAGE 9

THE CHAIR: Thank you.

Q. MR. SECORD: So maybe while you're looking for that, I am going to put some conditions to Mr. Hebert.

So Mr. Hebert, I've been asked to suggest to you the following conditions as part of any approval that might be given to SR1.

The first condition is the community requests that an independent agency be set up to oversee the rights of residents in the greater west Rocky View area with regard to SR1.

The independent body or agency shall be the point of contact for the community and shall be responsible for the entire process of dispute resolution, with the power to recommend mitigations, reporting requirements, monitoring capabilities that would be implemented by -- I'm assuming it would be by AT, or I guess Alberta Environment and Parks for the life of the project, or whoever, I guess, ends up operating with the SR1 because I mean governments change their -- department names seem to go through changes every once in a while.

This agency would serve as a formal mechanism for raising concerns, having these concerns addressed in a

timely manner, and to represent community interests with regard, you know -- regarding drinking water, groundwater impacts, air quality, reservoir safety, emergency response, land use, and transportation-related concerns.

Would you consider having that attached as a condition to an approval?

A. **MR. HEBERT: One moment, Mr. Chair.**

Mr. Chairman, I think as a matter of reality, the regulator -- in the case, this Board, and the federal regulator and other entities will be applying conditions that will have legal force, there will be other cases of legislation or regulation that the project will be subject to.

We've made varying commitments as it relates to monitoring plans and the existence of a community liaison, but I think it would be responsible for Transportation to take this as an undertaking, subject to the advice of counsel.

Q. Thank you.

UNDERTAKING - TO ADVISE IF AN INDEPENDENT AGENCY CAN BE SET UP TO OVERSEE THE RIGHTS OF RESIDENTS IN THE GREATER WEST ROCKY VIEW AREA WITH REGARD TO SR1 (SEE TRANSCRIPT FOR

FURTHER CONDITIONS)

Q. MR. SECORD: The second condition is as follows: The proponent shall establish a contingent liability fund to be administered by the independent agency to address community concerns for air quality, water quality, et cetera, to ensure that there is sufficient funding set aside to address potential complications and unexpected outcomes of the project.

My clients are concerned that issues raised by the community, residents, and businesses may not be dealt with in a timely manner or affected parties will be forced to take legal action against the Alberta government. So this liability fund would allow the residents to access funding for independent assessments, legal aid related to SR1 claims, and provide a mechanism to address issues and avoid delays.

I wonder if you would consider taking that condition away and getting back to us on that request.

A. MR. HEBERT: Mr. Chairman, we'll add that to the undertaking.

UNDERTAKING - TO ADVISE IF THE PROPONENT WILL ESTABLISH A CONTINGENT LIABILITY FUND TO BE ADMINISTERED BY THE INDEPENDENT AGENCY TO ADDRESS COMMUNITY CONCERNS FOR AIR QUALITY,

WATER QUALITY, ET CETERA (SEE TRANSCRIPT FOR FURTHER CONDITIONS)

Q. MR. SECORD: The next condition is: The proponents shall conduct baseline testing of all water wells prior to construction or provide funding for well testing for any Rocky View residential location, commercial, and agricultural operation who so choose.

So it would be on a request basis.

MR. BARBERO: Mr. Secord, sir, sorry to interrupt you. I'm just curious. The entire County of Rocky View?

MR. SECORD: So these would be people who request testing of their wells, and this would be for any west Rocky View residents.

MR. BARBERO: And what constitutes "west Rocky View," sir?

MR. SECORD: Those would be those who would be sort of in the -- basically impacted by the footprint of the project. So that could be something that could be determined -- in terms of a geographical, that could be part of the condition, but we're not talking about all Rocky View County, Mr. Barbero.

I mean, we pulled up a map yesterday showing a number of water wells in close proximity to the project area. So it would be similar to the map that you saw

yesterday.

So the condition would read: The proponent shall conduct baseline testing of all water wells prior to construction and provide funding for water well testing for any west Rocky View residential location, commercial and agricultural operation who so choose at any point of the project lifecycle from pre-construction through operations for the life of the project.

These reports will serve as the basis for future -- any future claims by residents negatively impacted by SR1 and must be held on file.

The proponent shall create a mechanism for landowners to submit these well reports, compensate them for the cost, and provide a method for storing these well report files.

I'm wondering, Mr. Hebert, whether you would take away that request for consideration.

And, obviously, the wording -- if you suggest refinement to the wording of these conditions, that also would be something that you could come back to us on, would be appreciated.

A. MR. HEBERT: Mr. Chairman, I would note that the project has proposed a draft groundwater monitoring plan that contemplates domestic well testing, but I

think it would benefit if Transportation could provide a response as part of the undertaking.

MR. SECORD: Thank you.

UNDERTAKING - TO ADVISE IF THE PROPONENT WILL CONDUCT BASELINE TESTING OF ALL WATER WELLS PRIOR TO CONSTRUCTION AND PROVIDE FUNDING FOR WATER WELL TESTING FOR ANY WEST ROCKY VIEW RESIDENTIAL LOCATION, COMMERCIAL AND AGRICULTURAL OPERATION WHO SO CHOOSE AT ANY POINT OF THE PROJECT LIFECYCLE FROM PRE-CONSTRUCTION THROUGH OPERATIONS FOR THE LIFE OF THE PROJECT (SEE TRANSCRIPT FOR FURTHER CONDITIONS)

Q. MR. SECORD: So the next condition is as follows: When the reservoir is in use, the operator shall be responsible for any adverse health or safety outcomes from the use of the reservoir by trespassers and accidents within the PDA.

A. MR. HEBERT: Mr. -- sorry, Mr. Secord.

Q. Would you be able to take that one away and get back to us on it?

A. MR. HEBERT: Yes, Mr. Chairman, we'll add that to the undertaking response.

UNDERTAKING - TO ADVISE WHETHER, WHEN

THE RESERVOIR IS IN USE, THE OPERATOR SHALL BE RESPONSIBLE FOR ANY ADVERSE HEALTH OR SAFETY OUTCOMES FROM THE USE OF THE RESERVOIR BY TRESPASSERS AND ACCIDENTS WITHIN THE PDA

Q. MR. SECORD: The next undertaking is to -- that the proponent shall provide, as a condition of approval, resolutions with landowners downstream of SR1 who are not adequately protected by the project.

This may include land purchases, flood mitigation projects, or compensation agreements as a result of the inferior flood mitigation outcomes of SR1 for downstream residents.

Is that a condition that you would be prepared to look at -- take away and look at it and get back to us on?

A. MR. HEBERT: Mr. Chairman, we've previously addressed our position regarding residences or infrastructure downstream of the project, but under the circumstances, it may benefit from the response in forming the undertaking.

UNDERTAKING - TO ADVISE WHETHER THE PROPONENT SHALL PROVIDE, AS A CONDITION OF APPROVAL, RESOLUTIONS WITH LANDOWNERS DOWNSTREAM OF SR1 WHO ARE

NOT ADEQUATELY PROTECTED BY THE PROJECT
(SEE TRANSCRIPT FOR FURTHER CONDITIONS)

Q. MR. SECORD: Now, the next condition is that the independent agency or body shall ensure that project reporting is made available to the public in a format acceptable to the public and the Springbank community.

Is that something that you could take away, Mr. Hebert, and get back to us on?

A. MR. HEBERT: Mr. Chairman, we've made varying commitments regarding the reporting of monitoring plans and activities, but if it benefits Mr. Secord's clients, we could certainly describe those in the form of the undertaking.

UNDERTAKING - TO ADVISE WHETHER THE INDEPENDENT AGENCY OR BODY SHALL ENSURE THAT PROJECT REPORTING IS MADE AVAILABLE TO THE PUBLIC IN A FORMAT ACCEPTABLE TO THE PUBLIC AND THE SPRINGBANK COMMUNITY

Q. MR. SECORD: The next condition is that the proponent shall commit to remediate all roads, driveways, access roads that are impacted by SR1, including construction traffic and roads flooded downstream of the SR1 outlet, and that these should be

project costs and should not be borne by Rocky View County taxpayers.

Mr. Hebert, would you be prepared to take that condition away and get back to us on that?

A. MR. HEBERT: Mr. Chairman, we've previously confirmed in our application, and with Rocky View County itself, that Alberta Transportation would be responsible for the cost of repairs of Springbank Road in the event of project operations.

We can certainly identify that reference if it benefits the Panel and Mr. Secord's clients.

I believe, as we've -- we've also clarified that in the event that there were individuals that require access points within the project development area -- access meaning to private residences or private property -- that Transportation is interested in discussing with those landowners the ability to -- to create or maintain access and the associated costs.

UNDERTAKING - TO ADVISE IF THE PROPONENT SHALL COMMIT TO REMEDIATE ALL ROADS, DRIVEWAYS, ACCESS ROADS THAT ARE IMPACTED BY SR1, INCLUDING CONSTRUCTION TRAFFIC AND ROADS FLOODED DOWNSTREAM OF THE SR1 OUTLET, AND THAT THESE SHOULD BE PROJECT COSTS AND SHOULD NOT BE

BORNE BY ROCKY VIEW COUNTY TAXPAYERS

Q. MR. SECORD: The next condition is the proponent shall establish a detailed plan and process steps for school bus rerouting during flood events. This should consider the likelihood that roads upstream and Bragg Creek and Highway 22 may also be impacted.

The proponent shall confirm the detour route for school buses during Springbank Road closures as a result of the operation of SR1 and ensure that all detour routes meet standards for school bus traffic safety.

My clients have been told that school buses cannot turn left onto Highway 22, so are they going to send the buses onto Highway No. 1?

As an alternative, perhaps the intersection at Highway 22 and Range Road 250 could be upgraded.

Would AT undertake to take that condition away and look at it and get back to us on that?

A. MR. HEBERT: Mr. Chairman, one moment.

Mr. Chairman, as we confirmed last week in a different undertaking, we have made commitments related to the upgrade of Range Road 40. A detour route in the instance of the project's operations that would close Springbank Road are identified. But for the benefit of Mr. Secord's clients and the Panel, we will provide

that in written response.

UNDERTAKING - TO ADVISE WHETHER THE PROPONENT SHALL ESTABLISH A DETAILED PLAN AND PROCESS STEPS FOR SCHOOL BUS REROUTING DURING FLOOD EVENTS (SEE TRANSCRIPT FOR FURTHER CONDITIONS)

Q. MR. SECORD: And just two further conditions. If evacuations are recommended or mandated, residents within the evacuation zone will be evacuated in a timely fashion and housed at the expense of the proponent until they can safely go home; and all Springbank community members that will have to be evacuated will be notified of this consequence to their property as a condition of approval and before construction takes place.

A. MR. HEBERT: Mr. Chairman, I believe it would be appropriate for Transportation to take that as part of the undertaking and provide a written response.

UNDERTAKING - TO ADVISE, IF EVACUATIONS ARE RECOMMENDED OR MANDATED, WHETHER THE PROPONENT WILL EVACUATE RESIDENTS IN A TIMELY FASHION (SEE TRANSCRIPT FOR FURTHER CONDITIONS)

Q. MR. SECORD: And then the last one is a request by my clients that the proponent will not name this

structure as the "Springbank Off-Stream Reservoir," that they requested it be named the "Elbow River Diversion" or the "Elbow River Off-Stream Reservoir."

Would -- I think you've heard some of my clients say they don't want it to be associated with the name "Springbank."

Is that something that you would take away, Mr. Hebert, and look at and maybe get back to us, that name change?

A. MR. HEBERT: Mr. Chairman, that item can be added to the undertaking.

UNDERTAKING - TO ADVISE WHETHER THE PROPONENT WILL AGREE TO NOT NAME THE SUBJECT STRUCTURE THE "SPRINGBANK OFF-STREAM RESERVOIR"

Q. MR. SECORD: Thank you.

And then I just have a few questions on fish, Mr. Chair, and I think Mr. Yoshisaka is to get back to me, and I don't think I have many questions on fish, but I would like to ask a few.

And I was going to say to you if I should go over -- I think I've probably got till 11, but if I should go over by a few minutes, could I have you subtract that from our time allocation in Topic Block 5 if that would be agreed -- if that works?

THE CHAIR: Yes.
MR. SECORD: Okay, thank you. I'm not trying to go over by much.
Q. MR. SECORD: Did you get that reference, Mr. Yoshisaka, while we were working?
A. MR. YOSHISAKA: Yes, I did. Thank you, Mr. Chairman.

If I could please point you to Exhibit 157, and document manager, if you could please bring this up, and starting at page 9, please.

Okay, so I've called up this figure, we've seen it before, this represents the conservative sensitivity analysis run that shows the extent of the effects on the project, again, under this most conservative of cases of increased hydraulic conductivity, again, retention of the water indefinitely within the reservoir.

Mr. Secord, I believe your question was around development situated to the east of -- of the project.

I believe that development would be situated outside of these -- these areas, and with that in mind, you know, I would submit that that development would be outside of the zone of influence of this project under flood operations.

Q. And I guess just picking up on Mr. Barbero's

notification about the newly filed Exhibit 381, maybe while I ask the fish questions, Mr. Yoshisaka, I could ask you to consider this question: The revised scenario provide results provided in Exhibit 381, I'm told by Dr. Fennell, are very different than the result provided in Exhibit 110 at PDF page 477.

So maybe you can look at that and get back to me, or are you -- can you confirm that now that they are different?

A. **MR. YOSHISAKA: I can confirm that the simulation results presented are not different. The change comes in the labelling of the bins, which were erroneous, in the figure presented within the original exhibit.**

So even the figure that's up on the screen here now, you can see the legend labels there, you know, don't really make sense.

So the correction of the figure is solely limited to the labelling of those -- those bins. Nothing else changed in the figures. So there was no change in the simulation result itself. It's solely limited to the change in the legend to more -- and correctly label those various colour regions.

Q. All right. So --

A. **MR. YOSHISAKA: Sorry, Mr. Secord, just one more thing to draw your attention to.**

I do believe I also still owed you a response in relation to an undertaking we took yesterday. So when it's convenient for you, I can speak to that, as well.

Q. Let's do that now before we move to fish.

A. MR. YOSHISAKA: Sure. So the...

Q. And, document host, you can take the exhibit down, please. Thank you.

A. MR. YOSHISAKA: The undertaking was in relation to a figure that denoted dots representing locations of domestic wells in the RAA, all the way across the RAA. The question was around one of the dots that was marked in red as a location at which domestic well testing occurred.

I believe, Mr. Secord, you were asking if that dot represented a well of Ms. Robinson.

Q. Yeah, if any of those red dots were, you know, hers?

A. And we can confirm that the red dot that is near her property was associated with the Hawes/Gervais property adjacent to it, but does not represent Ms. Robinson's wells.

Q. Right. I think she owns that together with her sister, correct, the Hawes property?

A. MR. YOSHISAKA: I'm not sure of the familial relationships there, but I can accept that, subject to check.

Q. All right --
THE CHAIR: Mr. Secord, that's a -- the transcript on record is fine in terms of the response. We don't need an exhibit.
MR. SECORD: Yes, that's fine, sir. Thank you.
THE CHAIR: Thank you.
Q. MR. SECORD: So Ms. AuCoin, do I pronounce your name properly?
A. MS. AUCOIN: Yes, that's correct. Good morning.
Q. Good morning. So I'll put some questions to you, and you'll move them off to somebody else if you deem that appropriate.

I assume you've seen Mr. Christensen's report that was attached to the Alberta Environment letter deeming the EIA complete?
A. MS. AUCOIN: Yes, I have read that.
Q. And you recall Mr. -- do you know Mr. Christensen?
A. MS. AUCOIN: I know him through the capacity of the project and our communication.
Q. Right. And Mr. Christensen expressed some concern about the project causing the extirpation of bull trout in certain regions of the Elbow River. You read that?
A. MS. AUCOIN: I've seen that statement in this letter, yes.

Q. Would you consider Mr. Christensen's conclusion that bull trout may be extirpated a positive outcome of SR1?

A. MS. AUCOIN: I'm sorry, did you ask whether this would be a positive outcome?

Q. Yes, of constructing the project.

A. MS. AUCOIN: Mr. Chairman, AEP made a claim in this letter that Mr. Secord mentions. They've claimed that the project could result in the extirpation of bull trout from the local reach of the Elbow River, and Alberta Transportation maintains that this is an unsubstantiated claim.

Our assessment items have been -- the assessment items that have been identified in the AEP letter have been assessed and evaluated to the extent possible, and the outcome of our effects assessment does not indicate that bull trout would be extirpated from the lower reach of the Elbow River.

Alberta Transportation acknowledges that the project has some potential to affect bull trout or its habitat, but not to the level that poses a risk or likelihood that the population would be extirpated.

Q. And is there a plan to offset this potential impact on the bull trout?

A. MS. AUCOIN: Absolutely. Mr. Chairman, we've been consulting with Fisheries and Ocean Canada on this

file, it's an ongoing consultation currently, and as part of the project requirements under the *Fisheries Act*, Alberta Transportation is required to offset potential effects, potential residual effects, to bull trout or its critical habitat, and we're currently in discussion with the DFO regarding the offsetting plan and the offsetting options; but, to date, all the options that have been considered align with the bull trout recovery strategy.

So we're looking at offsetting options that specifically deal with bull trout and its critical habitat.

Q. Now, yesterday, it seems like ages ago now, in the opening statement, AT -- AT stated that an in-stream dam creates lake habitat where there was once river habitat, whereas SR1 doesn't do that, so that's preferable from a river system point of view. Do you recall that?

A. MS. AUCOIN: Yes, I do. It is one of the benefits of SRQ is that it's an off-stream structure and it minimizes an in-stream footprint in an area.

Q. Now, my friend, Mr. Rae, on behalf of the Stoney Nakoda Nation has asked many questions about the proposal to build dams on the Bow River. I don't know whether you've been part -- been around for any of that

discussion. So is this reason, you know, changing riverine habitat to lake habitat, would that then be a reason not to build another dam on the Bow River?

A. **MR. WOOD: Mr. Chairman, this is Matt Wood of Transportation. I just wanted to highlight that, here on the Elbow River at the location of the off-stream storage reservoir, there is a unique topographic opportunity to build an off-stream reservoir.**

These -- you know, while these are available locations all across the province, as we mentioned earlier with the Pine Coulee Reservoir, those options aren't available on the Bow.

And so to characterize the lacustrine or the lake creation as a benefit or a drawback is not really appropriate at the Elbow River site here. As my colleague Ms. AuCoin mentioned, the benefit of off-stream storage, again, given the ability to do it at this location, is a benefit over the upstream option that would have -- that could have created a permanent pond for sediment management.

Q. Now, my clients have asked me to put forward this question, and it is: The proponent has stated that the emergency spillway is under design; where are the flows from the emergency spillway meeting the Elbow River; is erosion protection being supplied for the Elbow River

across from where these waters will meet the river; and has this erosion protection been considered for fish passage and other environmental impacts; and where is the design?

So it's maybe quite a bit in that question. But perhaps somebody can take that away for me?

A. MR. WOOD: Mr. Chairman, this is Matt Wood. Perhaps Mr. Secord could clarify. I believe you had said, regarding the emergency spillway, the erosion mitigations, and then something about fish passage. Can you please clarify?

Q. Sure. So the first part of the question was the proponent has stated that the emergency spillway is under design. Where are -- assuming it is engaged, where are the flows from the emergency spillway meeting the Elbow River? So that would be question Number 1.

A. MR. WOOD: Mr. Chairman, they meet the Elbow River downstream of the emergency spillway at the Elbow River channel.

Q. And is erosion protection being supplied for the Elbow River across from where these waters from the emergency spillway will meet the Elbow River?

A. MR. WOOD: Mr. Chairman, no, it is not.

In the contemplated scenarios, again, as mentioned in previous days' testimony, that these are

undesirable, unplanned emergency situations. Where the emergency spillway activates, it is contemplated that the Elbow River would already be flooding in these locations.

And so when you have flowing water meeting what is essentially standing water in the floodplain, there's limited need for those kind of erosion mitigation measures.

Q. And then in relation to the low-level outlet, the proponent stated last week that some form of erosion protection will be used in the confluence of the Unnamed Creek and the Elbow River. Has this been fully assessed for its environmental consequences, including fish passage?

A. MR. WOOD: Mr. Chairman, I can say that fish passage was not an element of design for those erosion mitigation measures.

Currently, the Unnamed Creek is not found to have fish passage characteristics in it. And so while these erosion mitigations were designed to in effect mimic natural features, specifically a step pool feature, fish passage wasn't necessary to be provided. And so it was not evaluated.

Q. So the next question deals with fish rescue personnel.

Is fish rescue realistic? Has there ever been a

successful fish rescue operation in conditions such as this across hundreds of acres of reservoir, much of which will, you know, have sediment?

So I don't know whether that's you, are you a -- is this the panel for the fish rescue efforts?

A. MR. HEBERT: **Mr. Chairman, Ms. AuCoin can provide that answer.**

A. MS. AUCOIN: **Yeah. Hi, this is Lacey AuCoin speaking again.**

Mr. Chairman, we've prepared a draft fish rescue plan for the project; I can pull up the exhibit number in a second. But this draft fish rescue plan acknowledges the scale of effort that would be required to rescue fish within the reservoir.

It's also -- the fish rescue plan is scaleable, in terms of the area that rescue is required, as well as the staffing requirements for the job.

In addition, we've provided some examples of other large scale fish rescues to contextualize the plan in response to Round 1 SIR 32. My apologies, I don't have -- okay, so the fish rescue plan is Exhibit 140, and one moment, and I can get the Round 2 response, Exhibit 138.

So the examples that we've provided give the fish rescue context. We acknowledge that it is a large

program that would be undertaken during a design flood event. But it's important to remember that the fish rescue operation is scaleable, so the effort that is required is proportional to the amount of water that gets diverted into that area.

Q. And what is the cost of this program?

A. MR. WOOD: Mr. Chairman, it's Matt Wood here. If I may request just a brief caucus.

THE CHAIR: Yes, please proceed.

A. MR. HEBERT: So, Mr. Chairman, there's a couple points on the question: One, the fish rescue plan is embedded within a draft monitoring plan that remains under development, presumably will be subject to regulatory approval by the appropriate body.

Second, the extent and scale of the fish rescue plan is subject to the size of the event. But I think just to assure the Panel that ultimately in the event that project is operated necessitating a fish rescue plan that will be captured within the operational costs of the project, that would be set and appropriated at the time.

Q. And what is the time required to rescue a fish? And are the fish placed in a bucket of water while they're being assessed? I'm just wondering how this -- so how much time do you have to get the fish out of the

reservoir, what do you put the fish in, that sort of thing?

A. MS. AUCOIN: Yeah, again -- this is Lacey AuCoin speaking, and there's a couple of points that should be made.

Firstly, it's important to remember that the low-level outlet provides opportunity for fish to exit the reservoir; therefore, it's not intended -- or it's not expected that every fish needs to be rescued from the reservoir.

So the intention of the fish rescue is to really focus on the perimeter of the reservoir and then work our way in so that we're ensuring that not -- there are no stranded pools as water levels recede.

So the fish rescue is not -- it's -- the intention is never to capture every fish in there because it's expected that a lot of them are going to naturally egress out through the low-level outlet.

So I think that answers one of your points.

Can you remind me what other question you had? Oh, it was with respect to --

Q. What do you put them in?

A. MS. AUCOIN: What do you put them in, right.

So how it will work is multiple crews will be working concurrently in the reservoir. And, again,

we're working along the perimeter of that reservoir. And the crews have portable buckets or totes with battery-operated aerated pumps in them, so as fish are captured, they're put into these smaller totes that the crews can carry around with them, and the buckets are aerated so that fish don't become distressed after capture. And then crews are bringing the totes back to a larger capacity tank -- like, a very large, like, 1,500-litre tank I think is what we said in the plan -- at a staging area.

So it requires a lot of trips back and forth, but the smaller totes are brought into the larger capacity tank, and that is also operated with a larger capacity aerated pump to keep the fish within healthy conditions upon capture.

Q. Now, I take it it's your understanding that AT has not provided any redundancies for the low-level outlet. There's only one low-level outlet being proposed for SR1. Do you understand that?

A. MS. AUCOIN: I do understand that, yes.

Q. And so if that low-level outlet is blocked, or if, for some reason, fish are unable to exit the low-level outlet, then the fish rescue will have to do more than simply look at the perimeter of the flooded area; correct?

A. MR. WOOD: Mr. Chairman, this is Matt Wood. I would like to add that there are redundancies built into the gating system, specifically gates that are double gates at the low-level outlet to help manage any risk of the structure becoming inoperable.

Q. And so in relation to the fish rescue effort, will the people who do the fish rescue, will they be volunteers, will they be AEP personnel? Like, where will these people come from? Will they have any special training?

A. MS. AUCOIN: Mr. Chairman, I can -- I can open with part of this answer.

The fish rescue will be led by a qualified aquatic biologist, and each crew that is included in the fish rescue will have electrofishing certification that allows each crew to operate independently, given that the efforts could -- could be large enough that multiple crews are required.

So the entire program is overseen by the qualified aquatic biologist, and there's likely some redundancy in that in that additional biologists are employed within each crew, and each crew has in -- an electrofishing certified lead.

And it's also important to note that the fish rescues -- a permit is required for this through both the province and DFO, and, as part of the permit

through DFO, crew leads are required to submit résumés in order to ensure that the leads that are employed in this program meet the qualifications required to handle fish and reduce injury to fish during rescues.

Q. So you have a -- let's say we have a 2013 flood. The reservoir is full. It fills up in a manner of hours. The fish, then, are going to be in that environment over the course of 40 days while the reservoir drains.

Do you apply for the permit once the reservoir is starting to fill? Do you wait until the reservoir is full and then apply the DFO and AEP for permits? I mean, how long does this permitting process takes place before you can actually get in there and start bagging the fish up?

A. MS. AUCOIN: Just one moment, Mr. Chair.

Thank you, Mr. Chair. I just wanted to double-check something with my colleagues.

The intention is that these permits would be secured prior to flood season, whether that's a blanket approval for multiple years or secured from year to year, but the intention is that the approvals would be in place prior to a flood season so that a program could be executed quickly.

Q. Right. So you've got your permits, you're going in with the team to electroshock the fish. So how does

that work? How -- how close do these people have to be to a bull trout in order to lasso it into the tote bag, so to speak? How does that work?

A. MS. AUCOIN: Sorry, could you clarify your question?

Q. So you mentioned that the -- these people would be coming into the reservoir with their electrofishing equipment. They're not catching the bull trout by hand; right? They're electrofishing?

A. MS. AUCOIN: So Mr. Chairman, it's important to note that what we know of the current distribution of bull trout is that bull trout are predominantly located in areas upstream of the project. We found very low captures near the project area; therefore, it's a point of clarification that the number of bull trout that might be in the reservoir is very low.

That being said, your question, it sounded like it was a combination of potentially -- like, how close, like, a radius you need to catch them. Efficiency --

Q. Yeah, so Ms. AuCoin, I wasn't really -- typically really concerned about the type of fish, whether it's a bull trout or whether, you know, it's a brook trout or whether it is some other species of fish.

My understanding is there's a fish rescue. So when they come into the reservoir with their

electrofishing equipment to rescue these fish, do you need to be able to see the fish before you can, you know, use your electrofishing equipment? Just can you run me through how that process works? My clients are interested in that.

A. **MS. AUCOIN: Yeah. So, again, going back to how the electrofishing process, or, I guess, the fish rescue process would work, is you're working along the perimeter and working inwards as water levels recede; therefore, electrofishing is one method that we would use to capture fish, but there's other methods, as well. It could be -- it could be the reliance on nets or seine nets in order to catch fish. So it's not -- it's not exclusively the use of electrofishing equipment.**

Q. And what is the expected survival rate of fish that are caught through electrofishing? You talked about the fish not being stressed, but wouldn't the electrofished fish be stressed through that process?

A. **MS. AUCOIN: Mr. Chair, this is, again, going back to the requirements of our crew, having crew leads that are certified electrofishing crew members, certified electrofishing operators. Part of that training is you have a good understanding of the frequency and voltage used on the electrofishing**

equipment, such that injury to fish is minimized. This is a requirement of the permit holder.

Q. And do you have any concept of what the cost would be for the crew per day? Is it so many acres per crew per day, depending upon the size of the flood?

I mean, how many -- how many personnel would you have, you know, walking the edges of this large reservoir looking for fish that may be on the edges? I'm just wondering in terms of number of people.

A. MS. AUCOIN: Again, Mr. Chairman, this depends on the size of the flood, the magnitude of the flood, and the amount of volume of water that's getting diverted.

The amount of water that is diverted into the reservoir will dictate how many crew members are required for the event.

Q. If it was a design flood, do you know how many crew members would be required?

A. MS. AUCOIN: Just one moment, Mr. Chair.

Thank you, Mr. Chair and Mr. Secord. I was just double-checking something with my colleagues.

We haven't provided a cost of the electrofishing programs or I guess -- sorry, my apologies -- the fish rescue programs. But in our draft plan, we included a potential staff count on a design flood, and that was

approximately 30 people that would be required.

Q. That would include the overseeing biologist?

A. MS. AUCOIN: Correct.

Q. So 30 people plus. What would be the going rate of the biologist overseeing the project on a daily basis?

A. MR. WOOD: Mr. Chairman, I believe the rates of the biologist would be subject to the economics at the time. These things do vary quite a bit.

Q. And then am I correct, there is no budget for fish rescue in Exhibit 159?

MR. FITCH: Mr. Chair, it's Gavin Fitch. I think the witnesses have already explained that there's no budget or no cost, because of course it will depend on how large the flood event is. Presumably a large flood will cost more, in terms of fish rescue, and a smaller flood will cost less.

So I think the answer is there is no budget because it's too -- it's premature.

MR. SECORD: Thank you, Mr. Fitch. And Mr. Chair, I believe those are all of my questions, but could I just have one minute to just check with my clients; is that agreeable?

THE CHAIR: Yeah, go ahead, yeah, yes.

MR. SECORD: Thank you. Thank you very much, Mr. Chair, so just one last follow-up question.

Q. MR. SECORD: In Exhibit 159, PDF page 231, Table 49, we don't need to turn this up, AT have included estimated flood maintenance costs in their budget.

And so my question is given that -- can you explain, if you have included estimated flood maintenance costs in the budget, including debris clean-up, why haven't you also included costs of fish rescue?

A. MR. HEBERT: One moment, Mr. Chair. Mr. Chairman, I believe the costs that Mr. Secord has referred to relate to the operation of the -- or sorry, the maintenance of the physical infrastructure.

The fish rescue plan would be part of the operational costs of the project, which would be under the responsibility of AEP as -- as the operator. And as we've referenced this morning, the operational costs will be established at a point of operation. And then particular costs that would relate to something like a fish rescue plan would be -- would be set and would be established in response to the actual extent or size of the operation that will be required at time of flood event.

MR. SECORD: Thank you, thank you, Mr. Hebert. Thank you, Mr. Chair, and if you deem it appropriate,

I'm sorry I've gone a bit over, but by all means subtract from the next session. Thank you.

THE CHAIR: Thank you, Mr. Secord. I believe that -- and thank you, panel, for that.

Mr. Williams with Calalta I believe may have a couple questions on cross. Mr. Williams, are you online?

MR. WILLIAMS: Yes, I am. Can you hear me?

THE CHAIR: Yes, we can, we'll just give Mr. Wiebe you one second to get you up on the screen. There we are. Perfect, just try that again for your volume.

MR. WILLIAMS: Yeah, it's Bob. I can turn my volume up I think.

THE CHAIR: That's pretty good, thank you.

MR. WILLIAMS CROSS-EXAMINES THE PANEL:

Q. I have a couple questions for fish, with regards to fish, believe it or not.

For those that don't know, Calalta, Calaway Park has a live trout pond, which we're the only one who believed in the amusement park industry which people can catch fish. And we had a situation off the Elbow River that I'd like to talk -- ask a few questions to whoever's appropriate, with a fish biologist. Is there somebody?

A. MS. AUCOIN: **Yeah, that is Lacey AuCoin here. I can -- I can take the first stab at your questions.**

Q. Sure, okay, thank you.

When -- post the flood of 2013, was there -- was any research completed on the impact to the fish population, to fish disease or anything that -- that happened subsequent of the 2013 flood on the Elbow or the Bow?

A. MS. AUCOIN: **Just one moment, please.**

Hi, thank you, Mr. Chair and Mr. Williams. This is Lacey AuCoin again.

In the process of our environmental assessment, it does not appear from all of our research that there are any published studies on the effects to fish as a result of the 2013 flood.

However, there is some anecdotal information on what happened to fish in -- in the 2013 flood. And a good -- a good example of this is actually in the AEP fisheries management letter that was filed to the NRCB. It was attached to the EIA completeness letter.

Mr. Paul Christensen states in this letter that following the 2013 flood, a lot of fish, I don't think he specifies whether it's the Elbow or the Bow, but he states that a lot of fish were trapped in isolated pools or I think -- I think he's even implying maybe

even dugouts.

But in the process of the flood, a lot of fish got trapped in all these urban areas and required rescue following the flood.

And I believe the Calgary group that provided evidence in the first couple of days also had a couple of slides that indicated that some fish were trapped in basements and stuff like that.

Q. And was there any evidence or any research done on the sediment impact of a flood and the correlation or the impact it has on fish?

So the sediment gets stirred up in a flood; correct? And so my question I'm asking is -- and this is a reach -- and let me lead to you why I'm asking this question.

Are you aware of post-2013 flood, and it was a three- to four-year period afterwards, but the Elbow had whirling disease?

A. MS. AUCOIN: Yes, correct.

Q. And are you aware that -- like, the impact on us was that our fish pond license was held back then for a two-year period from Alberta Environment until we could prove our pond did not have whirling.

Now, we're six kilometres inland, but the -- the impact on us was that we needed a biologist from

Alberta Environment to take samples from our pond because the water came from the Elbow River, and therefore, we could have whirling in -- in our pond.

And so I guess my question was is there any correlation to whirling disease and possibly the stirring up of sediment or sediment impact from a flood?

A. **MS. AUCOIN: Thanks, Mr. Williams. That's a great question.**

With respect to -- I'm going to answer -- I'm going to partially answer your question. With respect to the effects of TSS on fish, there are a lot of studies that show the effects of sediment on fish, but there were no published studies on how TSS affected fish following the 2013 flood.

We do have some material in our -- in our filed documents that demonstrate what happens -- or what the possible effects of TSS are on fish, but there were no published studies related to 2013.

And subject to check, I don't think -- just one moment. I'm not aware of any link between the concentration of sediment and its relationship to whirling disease. I don't know if there's necessarily been a link that's been demonstrated.

Q. And what is the cause of whirling disease?

A. MS. AUCOIN: Whirling disease is a parasite that's found in the watershed. So if you go to the province of Alberta website, there is -- there is a whole page dedicated to information on whirling disease, and it shows which watersheds have the parasite and which ones don't.

It's a really hardy parasite. It can -- it can survive in dry conditions for up to 24 hours. So what happens is it's easily spread through, like, your weighting boots or your fishing equipment, and it's also spread by boats. So similar to how like zebra mussels can be spread. It's the same idea where it's such a hardy little -- hardy little parasite that it can carry from watershed to watershed usually by -- usually by fishing.

Q. Okay, that's good to know, and that answers my -- I just was wondering if there was any correlation between flood or sediment, the stirring of sediment and whirling disease itself. And so -- because we don't want to have that post-flood impact us again, not saying it was the flood that caused that, but...

A. MS. AUCOIN: Yeah, no, it's a great question.

Q. Yeah, okay. No, that's -- would be all my questions, thank you.

A. MS. AUCOIN: Thank you, Mr. Williams.

MR. WILLIAMS: Thank you, Mr. Chair and Ms. AuCoin.

THE CHAIR: Thank you, Mr. Williams. Mr. Wagner, did you have questions for the panel?

MR. WAGNER: Is Mr. Wagner online? He had indicated that he had short cross.

MS. FRIEND: Peter, this is Laura, and he did send me an email saying he -- yesterday or Monday saying he would have none for this section.

THE CHAIR: Okay. Thank you, Ms. Friend. So Board staff and Panel members. Ms. Vance, do you have questions for Transportation panel.

MS. VANCE: Thank you, Mr. Chair. I just have a couple. Maybe I'll start with the fish because that's where we are currently.

MS. VANCE QUESTIONS THE PANEL:

Q. So my question relates to the summer of 2020 fieldwork for the fish survey. And I wonder if document manager could bring up Exhibit 157, page -- PDF page 23. Maybe just a little larger if you could, please. Perfect, and then just down to below the 1.4.

So on the bottom of page 23 and to the top of 24, it -- this discussion talks about baseline, including summer of 2020 and talks about bull trout occurrences, and it seems that there were very few captured. And,

this is a roundabout way of asking.

I understand that this work was done -- the capture, at least, of the bull trout was done in August of 2020, and I'm wondering why August?

A. **MS. AUCOIN: Yes, Mr. Chair, this is Lacey AuCoin speaking again.**

The survey was timed to align with the opening in the restricted activity periods of the Elbow River. So as with most large watercourses in Alberta, restricted activity periods are scheduled times when it's expected that disturbance in the river is low. Like, electrofishing would not occur within a restricted activity period unless there's a really good reason to do so.

It's -- it overlaps with sensitive times for certain fish species, and the restricted activity period of the Elbow is quite long. It kicks in on September 16th, I believe, and it extends until April. And then there's a small opening in April, and then the restricted window kicks in again, May up until July 15th I think.

So there's -- for the majority of the year, activity in the Elbow, including electrofishing, would be limited. This is to respect the fall spawning species and the spring spawning species and the

overwintering period of eggs. So it really leaves a very low window of when you can get in. And electrofishing in April isn't desirable because, oftentimes, the river is still covered with ice, or even the low temperatures can make electrofishing fairly inefficient.

And then in the summer window, water levels in the Elbow River are still really high in mid-July, so you want to wait until the water levels are a little lower and a little safer to access by foot.

Q. Okay, that helps me.

I guess my other question relates to hydrogeology. And for this one, actually it's still -- document manager, it's still 157, so actually we can stay there, PDF page 13. Maybe just make it a little smaller. Is this -- yes. And it is the drawing on the right that I am most interested in, but we can leave the page as is for now. Thank you.

So I understand that -- actually, if you could just scroll down just a tad 'cause I want to see the titles of these. Thank you, that's perfect.

So I understand that the drawing on the right shows -- well, they both show changes in head for -- based on increased hydraulic conductivity.

So during dry operations, did Alberta

Transportation quantify -- so this is talking about groundwater quantity as opposed to quality. Did Alberta Transportation quantify the drawdown and the percent change available head at each of the domestic water wells that are shown on this figure?

A. **MR. YOSHISAKA: Mr. Chairman, it's Dan Yoshisaka speaking here. I can speak to this figure.**

Yes, so the figure, indeed, indicates areas of potential drawdown in water levels and then the mechanism for that in this case is related to incision of that channel into -- into the land surface. So that tends to -- because the channel is free-flowing, it basically sets up a seepage face through which groundwater can then discharge into the channel, and that effect being some reductions of groundwater levels.

Now, it's also indicated in this figure are the blue dots, and they represent well locations that fall within that area of effect.

We have reviewed the available head figures for those blue dots that are there. We can confirm that for all but one of those well locations, there is sufficient available head remaining in the well to accommodate these -- these drawdowns.

The one well that is an exception is within the

footprint of the PDA, and as such, you know, should this project be approved and constructed, that well would be decommissioned and taken out of service.

Q. Just as a follow-up, Mr. Yoshisaka. When you say "sufficient," that doesn't really answer my question about whether you quantify what that change would be.

Are there numbers -- can you be more specific about what you mean when you say "sufficient"?

A. MR. YOSHISAKA: Sure. As you can see, the drawdown figures are shown there. They range, depending on how close you are to the channel. So values close to the diversion channel are higher up to about 9 metres. And as you move upwards, those drawdown values decrease with increasing distance away from the channel.

I believe that the available head numbers for those wells was -- was reported as well. Generally, there's -- there's more than 10 metres of available head remaining.

So in relation to the drawdowns that are anticipated, the drawdowns are less than the remaining available head, aside from the one record that I mentioned.

Q. Okay, I think that answers my question.

MS. VANCE: And, Mr. Chair, I don't think I

have further questions on this topic. Thank you.

THE CHAIR: Thank you, Ms. Vance.

Document manager, I think you can take that down now, the exhibit, thank you.

Mr. -- or Dr. Heaney, do you have questions for the panel?

MR. HEANEY: Yes, I have a fish question to start, so probably for Ms. AuCoin.

MR. HEANEY QUESTIONS THE PANEL:

Q. Ms. AuCoin, you've previously alluded to Exhibit 187, which is the AEP letter, so I'm assuming you're familiar with it from Paul Christensen.

A. MS. AUCOIN: Yes, I am.

Q. So would you agree that the substance of his letter is that the 2020 fish survey methodology did not adequately account for adult fish?

A. MS. AUCOIN: Mr. Chairman, there's a number of items in this letter that -- sorry, there's a number of items that are identified in this letter, and for the most part, the claims around the fieldwork -- the fieldwork was -- the fieldwork was done in the most appropriate manner at the time of -- at the time of the field survey.

Field conditions of the Elbow River dictated that backpack electrofishers were the most appropriate

equipment at the time for safety reasons.

So I'm not sure if that answers your question.

Q. Well, I guess my subsequent question would be did your choice of methodology in the -- in order to keep your -- keep your people safe end up that you did not recover adult fish, as outlined by Mr. Christensen?

A. MS. AUCOIN: So the fish population survey required the use of backpack electrofishers, and we acknowledged that this can introduce some sampling bias. We've acknowledged the potential sampling bias in our population report which was attached to I'll get -- I'll get the exhibit number in a second.

So we've outlined the uncertainties in our population estimate. The driver -- or I guess the objective of the fish population survey was to obtain reasonable insight into the abundance and distribution of fish species such that we could estimate potential fish loss as a result of construction or operation of the project.

So there -- there is potential that there is some sampling bias in our results.

I would argue that any type of fishing equipment could introduce some sampling bias, and this isn't exclusive to the use of backpack electrofishers. So --

But for the most part, Mr. Chair, the population

estimates that have been derived from our survey provide a reasonable insight into the Elbow River fish community for the purposes of predicting effects.

Q. Thank you, Mr. Chair. That's my questions.

THE CHAIR: Mr. Ceroici?

MR. CEROICI: Yes, maybe I'll start with a fish question as well.

THE CHAIR: You're just a little soft, Mr. Ceroici. Just speak up a bit. We can hear you, but it's a little soft.

MR. CEROICI: Okay, is that better?

THE CHAIR: That's a little better. Thank you.

MR. CEROICI QUESTIONS THE PANEL:

Q. So I have a question about the low-level outlet. After a flood -- you know, I understand that the majority -- as stated, the majority of fish will be migrating through the outlet down the Unnamed Creek to the Elbow, but would this lead to a concentration of fish at the confluence of the outlet creek and the Elbow, and if so, what action will be taken to prevent any harvesting -- illegal harvesting of those fish?

A. MS. AUCOIN: Just one moment, Mr. Chair. Thank you for your patience, Mr. Chair.

So I can answer this question. When the water

levels recede from the reservoir and are being discharged through the low-level outlet back to the Elbow River, you're correct in that fish will be making their way down back to the confluence of the Elbow River.

At this time, it's expected that the water levels in the Elbow River are still relatively high such that if fish are making their way down the creek back to the Elbow, it's not -- it's not expected that they would be in a position where they become very easy to capture because they have -- they have the opportunity to find refuge upon entering the Elbow River. They're -- the water levels are still relatively high.

Q. Yeah. I was speaking more in the Unnamed Creek just before it reaches the Elbow, because I imagine it would be a lot -- much more narrow than the Elbow at that point.

Okay. My next question is on hydrogeology. Just a question -- AT, yesterday, was mentioning that they found no evidence of fracturing in the clay units, the lacustrine and the till units. And I heard no fracturing or no fracturing except in the upper two metres. And I was just wondering, what is that based on? Is it based on -- 'cause I imagine there was some auger rig used which generates disturbed cuttings

which will be difficult to identify fractures.

So was there any coring done to visually look at the presence of fracturing or not?

A. **MR. YOSHISAKA: This is -- sorry, Mr. Back, you can start.**

A. **MR. BACK: This is Dan Back, the geotechnical engineer.**

Yes, you're correct. Most of the boreholes were advanced with an auger rig. There's a sonic rig used for a few.

We didn't do any undisturbed coring of the soil per se, but what we did do was undisturbed sampling, and we did standard penetration tests or SPT sampling that gives us a very good view of the soil in a relatively undisturbed state.

So while it's true that we could have done a more extensive -- and looking only for fractures, we were trying to, you know, capture a wide variety of information from the sampling. And so I think if there had been fractures that had passed through the soil while we were drilling, we would have seen it.

In addition to that, there were a number of test pits that were open. Those were largely concentrated in Unnamed Creek because the geology was a little bit more difficult to follow there. But there were several

that were opened in the upland areas under the footprint of the dam. And those, in the process, exposed a very large area of the soil for visual observation.

Q. Okay, thank you.

MR. CEROICI: And that's all my questions, Mr. Chair.

THE CHAIR: Thank you, Mr. Ceroici.

Ms. Roberts?

MS. ROBERTS: I have no more questions. Thank you.

THE CHAIR: Well, thank you. And I have no further questions for the panel. So with that, I'd like to thank you.

(PANEL STANDS DOWN)

Mr. Barbero, Mr. Fitch, does Alberta Transportation have any redirect on direct -- or, sorry, on your evidence?

MR. BARBERO: Mr. Chair, it's Michael Barbero. Alberta Transportation has no redirect, sir.

THE CHAIR: Okay. So given that we're right close to 12 o'clock, I think it's appropriate time for a break.

Ms. Senek, are you ready to go after lunch for your City of Calgary direct?

MS. SENEK: Yes, sir, we'll be ready to go

right after lunch.

THE CHAIR: Okay, so one o'clock return for City of Calgary direct. Thank you.

(PROCEEDINGS ADJOURNED AT 11:52 A.M.)

PROCEEDINGS ADJOURNED TO 1:00 P.M.

Volume 7
March 30, 2021
P.M. Session

(PROCEEDINGS COMMENCED AT 1:00 P.M.)

THE CHAIR: I think we've got everyone here. Mr. Kruhlak, Ms. Senek, are you both online?

MS. SENEK: Yes, this is Ms. Senek. I'm here.

MR. KRUHLAK: It's Ron Kruhlak, sir. I'm here.

THE CHAIR: Okay. Thank you.

I think just before we start, Ms. Senek, with the City of Calgary direct, I'd like to address, if you're ready, if you have a response in terms of the questions that the Panel posed this morning and then I'll give an opportunity for other parties to weigh in if you have any other submissions or comments to make, and then we could move on to the direct by Calgary, but then the Board would be in a position, or the Panel, to make a decision and let parties know tomorrow.

So Mr. Kruhlak?

MR. KRUHLAK: Sure, sir. So I'm responding to the questions that we received in written form from Mr. Kennedy this morning. And the first question was whether Alberta Transportation can confirm that the benefits measured through damage avoidance for SR1 are

completely attributable to the operation of SR1.

And, Mr. Chairman, Alberta Transportation can confirm that the benefits, which are the damages averted, were completely attributable to the operation of SR1.

The results were constrained to benefits within Calgary between the Glenmore Reservoir and the Bow River with no influence from operations such as those that might be referred to between TransAlta and Alberta Environment and Parks.

The second question that the Panel posed was whether it's correct in its understanding that Alberta Transportation indicates it has no knowledge and has not considered the TransAlta government of Alberta operating agreement in preparation of the EIA, including cost benefit analysis.

And I would say there that -- I think Mr. Hebert did mention briefly yesterday that there's some general awareness of the existence of the agreement, but that the costs and benefits were calculated completely independent of any operating parameters that might be considered for the TransAlta/government of Alberta operations.

There were two further sub questions about, regardless of the operating parameters for the

Ghost Reservoir, is it Alberta Transportation's position that the costs and benefits of SR1 are calculated -- as calculated are completely independent of those operating parameters.

And Alberta Transportation, sir, would confirm that they are; that is, the costs and benefits are completely independent of those operating parameters.

And finally, there was -- the enquiry of the Panel was, if there could be impacts on the EIA from the Ghost Reservoir, are these impacts expected to be significant.

And, again, Alberta Transportation would simply reaffirm that there are no impacts from any of the Bow River concepts that would have any impact on the EIA for Springbank or SR1.

THE CHAIR: Thank you, Mr. Kruhlak.

Ms. Senek, would City of Calgary have anything further?

MS. SENEK: Thank you, Mr. Chair. In response to the first question as to whether the City of Calgary can confirm that benefits measured through damage avoidance for SR1 are completely attributable to SR1, the City can confirm that. The presented benefit of SR1 in the City of Calgary cost benefit analysis is completely attributable to SR1.

THE CHAIR: Thank you.

Mr. Rae or Ms. Louden, did you have anything further to add in terms of the motion that you asked the Board to undertake?

MR. RAE: It's Mr. Rae, sir.

THE CHAIR: Good afternoon.

MR. RAE: No, Mr. Chair, I don't think we have anything to add. And I might mention, I appreciate the Board putting those questions to the participants. Thank you very much.

THE CHAIR: Thank you, Mr. Rae.

MR. KENNEDY: Can I just perhaps -- it's Bill Kennedy -- jump in?

Mr. Rae, do you still want the motion considered by the Board, having now heard the response from Alberta Transportation and the City of Calgary?

MR. RAE: If I might, Mr. Chair. There's no need for the question that I posed, given the responses of both Alberta and the City of Calgary.

As I hear it, both of them are saying that the management of the Ghost Reservoir pursuant to the 2016 agreement bears no relationship to the SR1 project and flood control in the City of Calgary. Begs the question, of course, what then is the purpose of the 2016 agreement?

But, Mr. Chair, I readily acknowledge that is beyond the purview of the terms of reference of the Board at this point in time.

THE CHAIR: Thank you, Mr. Rae. Thanks, Mr. Kennedy. Great question.

So the Board will not need to make any further rulings on the motion.

Any parties objecting?

Hearing none. The matter is settled then. Thank you very much.

Ms. Senek, City of Calgary direct evidence, you're up.

F. FRIGO (For City of Calgary), previously sworn

MS. SENEK EXAMINES THE WITNESS:

Q. My mute button keeps disappearing. Thank you.

Mr. Frigo, I see you're there. Can I ask you to confirm, please, that you're still under oath?

A. Confirmed.

Q. Thank you. And I understand you have a presentation again prepared for Topic 4 and it is Exhibit 351. And I think it's starting on Slide 20; is that correct?

A. That is correct.

Q. Perfect.

Document manager, if you could please load that

PowerPoint presentation. Perfect.

Okay, Mr. Frigo, please go ahead.

A. Thank you, document manager. Can we advance to the next slide, please? Thank you.

Mr. Chairman, as noted throughout proceedings, SR1's off-stream design means that it will have minimal impact on the Elbow Basin's fluvial system other than during the intermittent and relatively brief proportion of time during and immediately following major flood events.

As such, pre-project relationships between catchment run-off, alluvial aquifer dynamics, in-stream morphology, and water quality will largely persist.

When SR1 is filled, the City understands that changes to groundwater levels in the reservoir area will be limited due to the low permeability of the soil strata in the reservoir area.

Evaporative loss from the area is also limited due to the relatively brief period that the reservoir will hold water following floods.

Since the wettable footprint of the reservoir is expected to have passive, open-space land uses when not in flood storage mode, the City does not anticipate that mechanisms which could negatively impact source water, quality or quantity in the Elbow River are

likely.

Further, as noted with regard to representations offered during Topic 3, the City expects that it will, in addition to continuing with its own water quality and water quantity monitoring, assessment and management programs, be invited to participate within information sharing, seasonal and event planning, and operations coordination committees.

As discussed during Topic 3, the City sees information sharing as a critical aspect of informed water resources stewardship, but has no expectation that this would be unduly challenging to sustain with SR1's operators.

Next slide, please, document manager.

Throughout proceedings, Mr. Chairman, the question of long-term water supply has been addressed in a few instances. The City supplies potable water to almost 25 percent of Alberta's population, including to Calgary and a number of regional partners.

As is perhaps evident, not only from Exhibit 345, the "One Water" document that's been referred to, but from other initiatives like our "30-in-30" water efficiency target, our YardSmart, universal metering and toilet rebate programs, the City takes long-term water sustainability for Calgary, the region, and the

Bow and Elbow River water basins very seriously.

Calgary presently is delivering a multi-hundred million dollar series of investments to wastewater treatment facilities to continue to ensure that the water that is returned to the basin, which averages over 85 percent of that withdrawn is of the high quality that is necessary to support irrigation, environmental and other water management objectives downstream.

As is evident from Exhibit 345, the one water document, the City maintains and continually refines long-term water treatment and supply infrastructure plans as well looking 50 to 70 years into the future in order to manage the appreciable infrastructure, technology, financial, and environmental elements related to supply.

The City also recognizes that the surface waters of the Bow and the Elbow River are susceptible to various risks that include quantity and quality aspects, whether from natural or anthropogenic causes. It, therefore, has built a water supply system using two major water treatment plants on separate catchments and incorporates an internal storage and distribution network that can, at least intermittently and for given durations, continue to supply water with major

components disabled or with interruptions in source quantity or quality that prevent use of either source basin for some time.

That being said, the City recognizes that further water supply security for the basin would be ameliorated at least partly by the development of incremental water storage capability.

As discussed during Topic 3, the City of Calgary, within its long-term plans, identifies the Bow River as the more efficient and responsible choice for such consideration, largely due to some of the very same physiographic, hydrologic, and meteorologic characteristics that give the Bow and the Elbow their respective flood generation dynamics.

To put it simply, the Bow River catchment is about six times larger than the Elbow, contains a much higher percentage of high elevation alpine terrain, which not only receives greater annual precipitation, but retains more permanent snowfield and glacier.

The Bow also has a greater net volume of controlled storage distributed throughout the basin at existing hydro power storage reservoirs like the Kananaskis, Barrier, Spray, Cascade, Ghost, and Bearspaw Reservoirs. Accordingly, long-term infrastructure, licensing, and distribution system

design choices recognize the Bow River as the more appropriate focal point for evolving water supply needs as water reuse, water efficiency, population and even climate change dynamics unfold.

Next slide, please, document manager.

Perhaps, again, I can stress that SR1 offers a modest source water benefit in that it may allow some refinement of Glenmore's operation to store water that would otherwise be passed downstream to optimize flood attenuation potential seasonally or ahead of a forecasted, but not materialized, flood event.

I'll also add that incremental storage on the Bow River is not needed to make SR1 beneficial in terms of flood mitigation, though perhaps, that's somewhat extraneous to the topic of -- focus area of Topic 4.

Again, the City's baseline cost-benefit scenarios used to understand the flood benefits of SR1 did not assume that incremental storage on the Bow exists, and we carefully, if not conservatively, isolated the benefits of SR1.

Still, due to both regional water supply and flood mitigation potential merits, the City does support the government of Alberta's investigation of Bow River reservoir options.

Next and final slide, please, document manager.

Focusing now on post-flood releases, Mr. Chairman, the City reiterates it expects water quality changes in the Elbow to be intermittent, of short duration, and reversible.

Some of the key aspects of the City's review have been around water temperature and nutrient dynamics. The degree of mixing with the Elbow River flows will be significant since floods large enough to trigger the use of SR1 will almost invariably be followed by extended baseflow recession periods, a shallow groundwater returns to the river, and normal seasonal rainfall in July and August generate additional natural run-off.

Again, it is noted that the City has attempted to develop a resilient water supply system such that reduction or even periods of curtailment of treatment could be sustained at Glenmore, along with intentional operation of Glenmore Reservoir itself.

Though we don't anticipate we'd need to, Mr. Chairman, the City, if engaged in communicating with SR1's operators and other water stakeholders in the basin, could lower or raise Glenmore's level in response to unexpected water quality and water quality conditions.

So if a water quality incident did occur, water

supply operations could likely be adapted to either pass, dilute, or sequester water either at SR1 or at Glenmore. This is one illustration of the flexibility inherent in the infrastructure and the value inherent in a coordinated, collaborative data and operational information-sharing framework that the City expects to participate in with the project's operators.

The City considers that the glacial valley being assessed as SR1's reservoir footprint presents a geographic and hydrologic opportunity. Nature has left a glacial valley close to a flood-vulnerable major population centre at the right elevations to permit diversion of the Elbow River by gravity flow, a valley that also happens to be underlain by low permeability soils that make for favourable reservoir, hydrogeology, and water quality conditions.

In summary, the City has conducted reviews of SR1 and its potential range of effects on hydrology and water quality of the Elbow River and does not anticipate significant or enduring negative impacts.

This concludes the City's direct evidence for Topic 4.

MS. SENEK: Thank you, Mr. Frigo.

THE CHAIR: Thank you, Mr. Frigo.

Is that your full direct, then?

MS. SENEK: Yes. That would be all for the City's direct, thank you.

THE CHAIR: All right. So thank you very much.

Calgary River Communities Action Group, Mr. Cusano, do you have any cross?

MR. CUSANO: No, thank you, sir.

THE CHAIR: And Mr. Kruhlak, Alberta Transportation?

MR. BARBERO: Mr. Chair, it's Michael Barbero, sir. No cross here, sir.

THE CHAIR: Thank you. And Mr. Rae of Stoney Nakoda.

MR. RAE: Yes, sir, if I might, a couple of questions.

MR. RAE CROSS-EXAMINES THE WITNESS:

Q. Mr. Frigo, I find it ironic that no sooner does the City of Calgary respond to the questions posed by the Chairman this morning in regard to the Bow River and water supplies to the Bow River, no sooner do you say that it's not relevant to SR1, and then you proceed to make a statement on what sort of water supplies the City support of upstream Bow River water storage and how that relates to water quality issues.

Can you help me by reconciling the evidence you

keep giving in regard to the Bow River, and while at the same time, the City states that what happens on the Bow River is not relevant to the SR1 project or the projected benefits from it?

A. Yes, good afternoon, Mr. Rae.

My understanding throughout the proceedings was that there were a number of questions around water supply potential along the Elbow River.

To assist the Board, it was the intention of the City to make it very clear that its water supply and treatment operations consider the Bow the more appropriate source for a number of reasons just outlined, and that is fundamentally the reason this was included as a component for consideration by the Board.

Q. Is it fair to say that the City is adducing the evidence in regard to Bow River water supplies and water quality simply to show in the City's mind or the City's view that the merits of the SR1 project are not related to that evidence on water supplies and water quality?

A. As I stated in the preceding response, Mr. Rae, I would say that, again, in the sense of total water benefit, which has been a component of the discussion throughout the proceedings, we're aiming to make it very clear that long-term development of water supply would be

appropriate from the City's perspective to occur from the Bow River Basin.

MR. RAE: Mr. Chairman, I have no further questions.

THE CHAIR: Thank you, Mr. Rae.

Mr. Secord, I don't believe you had entered, if I have that right, or requested time for cross of Calgary. Do I have right?

MR. SECORD: You are right, sir. And if you ask me, I would say I have no cross-examination in any event. Thank you.

THE CHAIR: Thank you.

Mr. Williams?

MR. WILLIAMS: Yeah, we have no questions for cross.

THE CHAIR: And Mr. Wagner?

MR. WAGNER: No questions for cross.

THE CHAIR: Thank you.

Mr. Kennedy?

MR. KENNEDY: Mr. Chair, thank you. I have no questions.

THE CHAIR: Ms. Vance?

MS. VANCE: I have no questions, sir, thank you.

THE CHAIR: And Mr. Ceroici?

MR. CEROICI: I have no questions, thank you.
THE CHAIR: Ms. Roberts?
MS. ROBERTS: I have no questions, thank you.
THE CHAIR: Dr. Heaney?
MR. HEANEY: I just would like Mr. Frigo to clarify.

MR. HEANEY QUESTIONS THE WITNESS:

Q. In his direct, he said sequester water at SR1 in relation to water quality incidents. If he could just clarify what he meant by "sequester" at SR1?

A. So through the Chair, what I was referring to was that we recognize, and certainly City of Calgary have dealt with, a number of water quality elements in the past, incidents that have occurred.

A couple of years ago, there was a forest fire over part of the Ghost River basin and fire suppression materials that could impact water quality. There was some potential for that to travel downstream.

So recognizing that SR1 would be in similar place in an upstream part of the basin, there would be the possibility to potentially retain water if the water could have negative environmental or water supply impacts.

Again, this would be for an unforeseen type of condition beyond normal operations, but that was

exactly what I was referring to.

Similarly, the same kind of thing could be done in the Glenmore Reservoir. So, for instance, if there were issues with water temperature, by having that water mix with the Glenmore Reservoir, we could have flows passing downstream that could be a better temperature for better environmental outcomes.

Those are a couple of examples of the type of management flexibility that the City understands to be inherent, again, in the infrastructure design and operations that we anticipate associated with SR1, very similar to how we are operating, but in an extended way to how we are operating Glenmore Reservoir, for instance, presently.

Q. So, this would be sequestration for water quality following a flood?

A. Potentially. Again, if during a flood event there was some associated water quality incident, some form of release, some form of other -- other impact that might cause an unexpected impact to the water quality.

But by having SR1 in place, again, there would be the management ability to, in a controlled manner, either sustain that water, keep that water for a longer period in SR1, or pass it downstream in a very controlled manner, again, to -- with consideration of

the mixing and the dynamics that would occur not only within the river but also within the Glenmore Reservoir further downstream.

MR. HEANEY: Okay. Thank you.

THE CHAIR: Thank you, Mr. Frigo. And I have no further questions.

So, Ms. Senek, did you have any redirect?

MS. SENEK: Thank you, Mr. Chair. We don't have any redirect.

THE CHAIR: Okay. Thank you very much.

(WITNESS STANDS DOWN)

THE CHAIR: Mr. Cusano, I don't believe you requested time for direct here. Is that still the case?

MR. CUSANO: Yes, sir, it is, thank you.

THE CHAIR: Mr. Rae, Stoney Nakoda, are you ready to proceed with your direct?

MR. RAE: Yes, we are, sir. The Stoney Nakoda do have a witness panel this afternoon. I hope -- Mr. Bill Snow, I hope you're available and online.

The witness panel will consist of Mr. Snow, consultation manager for the Stoney Tribal Administration, and Ms. Leslie Beckmann, an environmental scientist contracted by the Stoney Nakoda

as part of the review of the SR1 project application. And the two of them constitute the Stoney Nakoda witness panel for Topic 4.

Mr. Snow appeared last week as part of the Stoney Nakoda's witness panel on Topic 2 and was affirmed by way of a prayer from Stoney Nakoda elder at that time.

And Mr. Snow has requested that Stoney Nakoda elder, Mr. Henry Holloway, perform a prayer this afternoon ahead of Mr. Snow's testimony on this topic. And we would ask, Mr. Chair, if again that is acceptable to the Board to introduce the panel this way.

THE CHAIR: It is acceptable. Thank you, Mr. Rae, and please proceed.

MR. RAE: Mr. Snow and Elder Holloway, I'd invite you to perform the prayer.

MR. W. SNOW: Good day. Henry, Elder Henry, are you available?

THE CHAIR: Perhaps wait just one minute, see if Mr. Wiebe can locate Elder Henry.

MR. RAE: Mr. Chair and Mr. Snow, perhaps while we're waiting for Elder Holloway, perhaps it would be appropriate to swear or affirm Ms. Beckmann while we're waiting for Elder Holloway to appear.

Would that be appropriate, Mr. Chair?

THE CHAIR: Yes, please proceed. Ms. Vespa.

W. SNOW, L. BECKMANN (For Stoney Nakoda Nations), affirmed, affirmed by prayer

MR. RAE EXAMINES THE PANEL:

MR. RAE: Mr. Chair, I see that we've lost Mr. Snow as well.

With your indulgence, we can wait a few more seconds for Elder Holloway.

THE CHAIR: Yes. No problem.

A. MR. SNOW: Good day. I've just been informed that Mr. Holloway is still out at lunch. So once he returns, I imagine that we can get started.

But I would say maybe we can begin with Leslie Beckmann's presentation. Would that be suitable?

MR. RAE: Mr. Chair, if that's suitable to you, we can start.

THE CHAIR: That's fine.

Was Mr. Snow going to be providing evidence? He was sworn before, but he just may need to confirm that he's still under oath, if we haven't done that already. Or is he not providing --

MR. RAE: Mr. Snow, would you be prepared to

have the court reporter confirm your -- and affirm your previous under oath affirmation?

MR. W. SNOW: Yeah, I can confirm that.

(DISCUSSION OFF THE RECORD)

Q. MR. RAE: Ms. Beckmann, good afternoon. Your curriculum vitae is on the record as Exhibit Number 342. Can you confirm that your CV is accurate?

A. MS. BECKMANN: I can confirm that, yes.

Q. And can you confirm that you were contracted by the Stoney Nakoda, by the individual Stoney Nakoda Nations to complete assessments related to aquatic ecology of the SR1 project?

A. MS. BECKMANN: Yes, I can.

Q. And can you provide a summary of your education and experience?

A. MS. BECKMANN: Absolutely. And if you'll forgive me, my notes are on this screen which is why I'm not looking at all of you that way.

Mr. Chair, Panel members and participants (OTHER LANGUAGE SPOKEN). Hello.

As you know, my name is Leslie Beckmann. I'm joining you today from (OTHER LANGUAGE SPOKEN) or, in English, Indian Arm, which is the eastern boundary of North Vancouver in the traditional territory of the

Tsleil-Waututh, Squamish and Musqueam Nations. And it is just past lunchtime here.

I have been an environmental scientist for almost 30 years. I completed an undergraduate degree from Queen's in biology in 1988. I completed my master's degree from the University of Toronto in environmental studies and political science in 1991. And I'm a member of the International Association of Impact Assessors, or IAIA. And my focus has been on these science-for-decision-making and its formalization in impact assessment methods as well as their application.

I'm currently a senior environmental consultant at PGL. I joined PGL in 2006. And over the course of the past decade, my practice with PGL has been on how to make the goals and techniques of IA more responsive to the needs of Indigenous communities.

In addition to all of that, I'm a mother of a 21-year-old daughter who's soldiering through a geosciences degree online as a result of the pandemic; a mentor to STEM students and young environmental professionals; a published writer with commitment to excellence in science communication; and, also, the owner of an exceptionally old dog who has occasionally trouble with stairs and doors. So if I suddenly disappear, I'm dealing with him.

Q. Thank you, Ms. Beckmann.

Can you explain what your role was in preparing the evidence of the Stoney Nakoda Nations regarding the SR1 project?

A. MS. BECKMANN: Absolutely.

COURT REPORTER: Ms. Beckmann -- Ms. Beckmann, I'm just going to ask if you can slow down, please. This is the court reporter.

A. Oh, sorry, will do. That's nerves for you.

So speaking to the current assignment, PGL, along with our associate Derek McCoy at Boreal Water Resources, was retained in early February 2021 by Stoney to help them evaluate the sufficiency of the EIS to address and resolve their concerns.

Further to Bill Snow's comments on March 25th, my understanding is that Stoney was only provided with capacity relatively recently. We were given two weeks to review the EIS, and the assignment was scoped tightly to allow the work to be completed in that timeline. So that's my -- that was the assignment.

Q. Mr. Snow, could I turn it over to you to begin the presentation of Stoney Nakoda evidence on this topic.

A. MR. SNOW: Good day. I still don't have contact here with Elder Holloway, but I think at some point, I would like to have that -- the prayer done as

soon as Mr. Holloway is present. And I'm -- as I understand it, he's on his way, and should be -- should be available soon. But I'm fine to present as well.

THE CHAIR: Let's proceed, then, Mr. Snow. That works for the Panel. Thank you.

A. MR. W. SNOW: (OTHER LANGUAGE SPOKEN) day. Thank you to the Board and the Chair for hearing the presentation for Stoney Nakoda today presenting on water-related issues for SR1.

Today I will be speaking about the traditional understanding of water. I will also be speaking briefly about traditional fish capture as well as Stoney water rights and the 2016 hydrology funding request for this project.

With regards to the traditional understanding of water, for the Stoney Nakoda, water is life. To illustrate the traditional understanding of water, I will be presenting portions of the book, "These Mountains Are Sacred Places" by Chief John Snow.

This material for the book was submitted as part of Stoney Nakoda's evidence for this project.

On page 106: (as read)

"The sacred waters, the hot springs that we use for healing and cleansing were to become tourist resorts. Our sacred

mountains were to become ski areas and parks where we no longer have the right to pursue our religious practice. The pipe stones that we got from the mountains, and the natural earth paints that we used in our religious ceremonies and for other special occasions were bulldozed over and concrete now covers them."

And a further -- another quote is on page 212: (as read)

"My people say, 'If you destroy nature and the environment, you are destroying yourself. But if you protect the environment and safeguard the water, ultimately, you are protecting yourself.' Wisdom, harnessed with technology, can go a long way in creating a better social order, a world in which all creation can survive and enjoy life to the fullest."

The understanding of the traditional views of water are non-existent in the current environmental impact statement and draft environmental assessment for the project.

The traditional Stoney names for the Elbow River (verbatim), Nothna Wapta (phonetic), and that is translated as Crackling River, or Winchispa Waptan (phonetic) as Elbow River. These descriptions are not in any of the project reports. These descriptions come from the Chiniki Place Names Report that has also been submitted as evidence for this project.

Many of the cultural stories of the Stoney Nakoda Nations that are also described in the Chiniki Place Names Report are not included in either of the environmental impact statement nor the draft environmental assessments.

The long-term impact of this proposed project on existing water sources for humans and wildlife is unknown.

The culturally important wildlife that graze, migrate, and utilize lands within the proposed project area will be impacted by this project for many years to come.

With regards to Stoney water rights, the Stoney Nakoda Nations have not surrendered nor ceded the use of waters originating and flowing in Stoney Nakoda traditional territory, including the bed and banks of those waters since time immemorial.

The Stoney Nakoda have enjoyed continuous use of

water in the traditional lands to facilitate hunting, fishing, and trapping as well as camping, gathering, and other cultural and spiritual activities.

Since 1911, the Stoney Nakoda have been one of the oldest producers of hydropower in Alberta. The water rentals that have been paid by the Calgary Power Company, now TransAlta, every year since 1911 are a testament to the Stoney Nakoda leadership that fought for our Stoney Nakoda water rights in the 20th and 21st centuries.

Stoney water rights are embedded in the Natural Transfer of Resources Agreement between Canada and the province of Alberta.

With regards to hydrology funding in 2016, in a letter to Alberta Transportation and the Canadian Environmental Assessment Agency, the Stoney Nakoda requested funding for a hydrological study of the project area and that this funding request was denied by Alberta Transportation.

This morning, we heard questions on the Alberta Transportation fish rescue plan, and I would note to the Chair and the Board that the Stoney Nakoda have traditional ways of capturing fish and that these traditional ways do not pose a high mortality to the fish being transported or captured until the fish are

ready to be harvested.

With regards to the fish rescue plan and the fish being moved, alternate methods of fish capture, like the Stoney Nakoda traditional fish capture ways, have not been considered in the current fish rescue plan.

In summary, the traditional understanding of water, the traditional fish capture methods, the Stoney water rights, all of those understandings are non-existent in the reviews of this project.

The denial of the hydro funding -- the hydrology funding speaks to the narrow and pre-determined nature of how the project appears in its reporting. A narrow and pre-determined view is not how we should be proceeding for a project that may impact the landscape for 100 years or more.

For these reasons, the NRCB should dismiss this project. These are my comments for today.

Q. Mr. Snow and Mr. Chairman, I note that Elder Holloway is now online. Would it be appropriate to have him conduct a prayer?

A. MR. W. SNOW: Yes. Well, excuse me. Sorry. Elder Henry, are you there?

THE CHAIR: Elder Henry is on mute.

A. MR. W. SNOW: There. (OTHER LANGUAGE SPOKEN.)

A. ELDER HOLLOWAY: (OTHER LANGUAGE SPOKEN.)

We were hoping that you could have done a prayer today, but maybe we can do a closing prayer because I just finished the presentation. But would you be willing to do a prayer for us today, Elder Henry?

A. ELDER HOLLOWAY: **Sure. Hi Duck. (OTHER LANGUAGE SPOKEN.)**

MR. RAE: Mr. Snow, are you suggesting that Elder Holloway stay online and, at the conclusion of your and Ms. Beckmann's evidence, that he then do his prayer?

A. MR. W. SNOW: **I would suggest Elder Henry do a prayer now and then do a closing prayer when we conclude our -- when we're at the end of our session, if that's agreeable.**

THE CHAIR: Please proceed. Go ahead. Thank you.

A. ELDER HOLLOWAY: **(OTHER LANGUAGE SPOKEN.)**

MR. RAE: Mr. Chair, as long as its appropriate with you, I'd now invite Ms. Beckmann to provide her direct evidence to the Panel.

THE CHAIR: Please proceed. Thank you.

Q. MR. RAE: Leslie, you can proceed.

A. MS. BECKMANN: **Perfect. Yes, I can. I'm just making sure my sound system is working properly.**

To the court reporters, if I speed up, please let

me know to slow down and with everyone's forbearance, thank you, Mr. Chair, Panel members. Everyone.

I will be speaking to the memo PGL prepared for Stoney that is on reference -- I don't have the reference number, but I don't believe it needs to be pulled up.

As mentioned, the memo was a joint effort. My testimony today will focus on portions of what has been referred to in that memo, and also to portions of Alberta Transportation's response to it provided in Appendix L to the reply submission of Alberta Transportation to the interveners and hearing participants opposed to the Springbank Off-Stream Reservoir Project dated March 12th.

Specifically, I'll be speaking to you about what PGL and Boreal were tasked with doing, the context in which our task was executed, the findings related to aquatic ecology, and our advice to Stoney.

I will not be able to speak to matters in the memo related specifically to hydrology; these portions were, as I said, prepared by Derek McCoy, and Derek is unable to be here.

Since I'm not qualified to speak to those issues, I will note any questions that you have about the material, and I believe on advice of counsel, we can

undertake to provide you with a reply.

At the outset, I'm going to scoop myself doing the very unscientific thing of beginning with my conclusions so you know where we're going to end, and that is that there are several key pieces of information that should have been in the EIS that are not or are not presented in sufficient detail to be able to allay Stoney's concerns regarding the potential impacts of the SR1 project on the components of the aquatic environment that they rely on for them to be able to determine the project's impacts to their Indigenous and Treaty rights and whether their members can live with whatever those impacts might be.

So that gives you a sense of where we're headed.

I'll start with why PGL was retained. We're committed above all else doing good science in the service of answering questions for our clients. In the case of our assignment for Stoney, we were tasked with understanding their concerns about the project and reviewing sections of the EIS to see if the EIS contained information to defensively allay those concerns. So this is essentially a question about decision-making.

And our view is that the EIS or at least the sections we reviewed is insufficient to ensure that the

best possible project, the project that adequately protects for all reasonable flood scenarios, including those that may, pardon the pun, be precipitated by climate change without compromising the biophysical components of the environment on which Stoney's exercise of constitutionally protected rights is based.

The point here is that impact assessment as a discipline is specifically designed to do these things, but in this case, it hasn't. To explain why, forgive me, I'm going to digress and do the littlest recap of what other members of the panel already know about impact assessment, and that was mentioned briefly in Mr. Hebert's presentation yesterday in his introductory remarks.

To that end, I'm wondering if I can reference my aid to testimony. I believe it was submitted, it's a one-pager. I don't have an exhibit number for it.

THE CHAIR: Ms. Friend, was that advanced to you or Mr. Kennedy?

MR. RAE: Mr. Chair --

MS. FRIEND: Yes, we have it, and here it comes.

THE CHAIR: Okay, thank you.

A. MS. BECKMANN: Thank you very much. It's very simple.

And so as Iman (phonetic) noted earlier, Mr. Hebert mentioned this, an impact assessment, as a discipline, is a predictive decision-making tool used to identify and evaluate the potential effects of a project. Since its first use in the US in the 1970s, a deep body of accepted best practices has been developed, and basically the topographic shows you how it works.

In brief, you start with the project description; you identify the possible effects. You study how things now are in a pair of defined areas, and those defined areas are one where there are likely to be direct effects and then a second larger one where there may be cumulative effects of the project in conjunction with other activities.

Then you arrive at the box identified by Arrow A where you predict, to the best of your ability, how the defined project will affect the existing conditions. With an understanding of the potential effects, you then explore mitigation, anything from design changes to habitat restoration that will reduce or eliminate your unwanted effects.

Then, with an understanding of how the mitigations will specifically reduce impacts, you reassess the remaining or residual effects.

Since it's very challenging in reality to eliminate all effects, it's generally considered possible to reduce those effects to the level that's acceptable, and acceptability is determined on the basis of both biological realities and socioeconomic needs.

Because acceptability represents a value judgment, decision-makers require that EAs give them the best information possible about the things they care about in order to make an informed decision about what usually environmental capital is being spent to gain some usually social benefit.

The point that's critical is that the progression from A to B to C requires that enough information about the mitigation at B be available to understand how it will reduce an A level effect to a C level residual effect. In the absence of sufficient information about B and how it reduces A, an impact assessment requires conservatively that impacts at C are considered materially the same as impacts at A.

So that's the first graphic.

The second graphic addresses the final box of the first flowchart. What's left at C moves forward to be considered in conjunction with other projects. Doing this properly requires that all existing and reasonably

foreseeable projects, and the term "reasonably foreseeable" is important, reasonably foreseeable projects that are likely to interact with a project in question to be considered.

So that's -- brings me finally -- and thank you very much for your patience -- to the reason why we can't yet allay Stoney's concerns regarding impacts and why it's not a decision-making tool that is useful for them completely.

We can't do this for two reasons: First, there's insufficient information about B to understand what remains at C with respect to fish habitat; and second, the scoping of cumulative impacts omits consideration of impacts to other fish habitat on which Stoney also relies. So there's no clear way to advise Stoney about the longer term impacts of the resources underpinning their rights.

And I should say that neither of these is a reflection on the practitioners who did the work. It's a reflection on the scope that was advanced and directed by the proponent. So I'm not trying to throw any practitioners under the bus here.

With respect to not understanding B, Alberta Transportation has made it very clear in their response in Appendix L, and I think we're finished with that

graphic. So if it's helpful to take it down, that's fine.

So in Appendix L, Alberta Transportation has made it clear that the project will be applying for an authorization under the *Fisheries Act* and that: (as read)

"Offsetting is required for temporary and permanent HADD..."

Or habitat alteration...something, and destruction. Someone can fill me in. We all say HADD: (as read)

"...associated with construction and operation of the project and death of fish associated with operation of the project."

And that's the Appendix L response to Section 4.2.2.

Alberta Transportation has also made it clear that it is, quote, "developing an offsetting measures plan" and that options were presented to Stoney on January 26, 2021.

These options include building replacement habitat on the Bow River for habitat lost on the Elbow River, ostensibly, for fish in general, but not necessarily for the Elbow River populations.

In the case of an application to alter or destroy fish habitat, Fisheries and Oceans Canada or "DFO"

requires that a proponent prepare both mitigation, which is reducing the adverse effects, and then, where residual effects can't be avoided, offsetting those such that there is no net loss of habitat. And offsetting, as many of you are familiar with, includes creating habitat, building habitat.

In order to evaluate mitigation and offsetting, DFO requires some very detailed information, and it's identified clearly in DFO's applicant's guide.

But this is the information they require to make a decision about the appropriateness of granting an application to harmfully alter or destroy fish habitat. They need to understand the geographic coordinates of the location; a site plan; a detailed description of the measures, usually conceptual engineering drawings that go with habitat offsetting; contingency measures in the event that it doesn't work; general costing; and a bond for that work. So there's quite a bit of information that DFO requires in order to make an informed decision.

It's our view that if the proponent understands the habitat impacts and understands that offsetting is already required, it's reasonable to require that the offsetting be sufficiently advanced prior to project approval so that its efficiency or efficacy can be evaluated by this Board and also by Stoney.

It's further our contention that the minister of Fisheries and Oceans requires -- if the minister of Fisheries and Oceans requires this level of information, the level of detail should be presented in the application itself. And given that the flood of record to which the project is designed and occurred in 2013 or eight years ago, it seems that there should have been ample time to do this work.

In the absence of that detailed information, it's not possible to make a determination whether Stoney's specific concerns, whether fish and fish habitat in the Elbow River will be functionally unharmed by the end of the project. This piece of information is critical to address the overlying issue, which they have to address for themselves as whether the Indigenous and Treaty rights they rely on -- or those rights that rely on the continuing health of those biophysical components are affected.

So that's the order of considering the various pieces.

With respect to cumulative impacts, the issues above are compounded. The application doesn't speak to issues where that represents a concern for Stoney with respect to cumulative impacts; specifically, Stoney is concerned that the works on the Elbow River are not in

and of themselves sufficient to protect Calgary from another flood equivalent to the 2013 flood of record and that additional works with unknown additional effects will also affect their interests.

Nor is this concern unfounded. Alberta Transportation has responded in Appendix L as follows: (as read)

> "The government of Alberta, GoA, is pursuing flood mitigation projects on both the Bow River and the Elbow River. The SR1 is the selected project for the Elbow River currently undergoing regulatory review."

This is the crux of a methodologically common error that all decision-makers, including Panel members, should be concerned about because it means that you may not be considering evidence that dramatically underestimates cumulative impacts and may result in making recommendations regarding works that will have unintended regional consequences.

It's an error that can be rectified in this case in one of two ways: Either by assessing both the Elbow and Bow works together, since it's understood to be the plan for full protection of the city of Calgary, or by including future works on the Bow River as one of the

projects to be considered in assessing the combined or cumulative effects of the SR1 project with the future Bow project.

Neither of these is unreasonable. The former, which is a single assessment of a large-scale infrastructure project, is considered to be more robust and more efficient, and it's been done in many, many places around the world.

Failing that, the latter consideration of Bow River works in the cumulative assessment of the SR1 project is a requirement. A cumulative effects assessment must consider the effects of the project under assessment in conjunction with all reasonably foreseeable projects. And given that Alberta Transportation has stated that the government is pursuing flood mitigation projects on both the Bow and Elbow, it suggests that the works are more than reasonably foreseeable; they're expected.

In the absence of either inclusion of the Bow River works in the cumulative effects assessment or a comprehensive assessment of both Elbow and Bow River works together, the EIS contains insufficient information for us to be able to provide a confident opinion that the SR1 project, in concert with other projects, will not cause significant cumulative effects on fish and fish habitat with a resulting impact on

Stoney's rights.

Specifically, we can't say if the promised offsetting, some of which is proposed to be built on the Bow River, will meet the biophysical needs of fish populations on the Elbow River yet because we haven't seen it. We can't say if future Bow River works will result in destruction of the habitat constructed on the Bow River to offset the Elbow River impacts, or how much additional fish habitat will be affected by the Bow River works, and Stoney is interested in a comprehensive understanding of all the impacts that will come from the obvious need and requirement to protect the City of Calgary.

So the absence of the information on these combined effects to the biophysical underpinnings means that EIS doesn't serve Stoney well as a tool for making a decision about impacts to their rights.

And that is what I have, Mr. Rae, and Panel members and Mr. Chairman.

THE CHAIR: Mr. Rae.

MR. RAE: Thank you, Ms. Beckmann.

Mr. Chair, Ms. Beckmann and Mr. Snow are now available for cross-examination.

THE CHAIR: Okay. Thank you. Thank you, Ms. Beckmann, Mr. Snow.

Mr. Secord?

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

THE CHAIR: Thank you. Mr. Williams? I don't believe he's on.

Mr. Wagner.

MR. WAGNER: No questions, Mr. Chair.

THE CHAIR: Thank you, Mr. Wagner.

Ms. Senek, City of Calgary.

MS. SENEK: No questions. Thank you.

THE CHAIR: And Mr. Cusano.

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

THE CHAIR: Mr. Barbero.

MR. BARBERO: Mr. Chairman, sir --

MR. KRUHLAK: Mr. Chairman, it's Ron Kruhlak. I might first have a couple of questions of Mr. Snow prior to my friend Mr. Barbero following up with a few additional questions, if I could.

THE CHAIR: Your call. Please proceed.

MR. KRUHLAK CROSS-EXAMINES THE PANEL:

Q. Mr. Snow, I don't see you up on the screen.

THE CHAIR: One second. As long as he's still there, Mr. Wiebe will be getting him up.

Mr. Snow?

A. MR. W. SNOW: Hello. Good day. I'm available.

Q. MR. KRUHLAK: Mr. Snow, thank you. You've been

consultation manager for Stoney Nakoda Nations since -- at least since 2014. Do I have that right?

A. MR. W. SNOW: 2012.

Q. 2012. And you certainly would have been involved from the start of the Springbank project, the SR1 project in dealing with Alberta Transportation since 2014; correct?

A. MR. W. SNOW: Yes.

Q. And you would have likely been dealing with Mr. Dallas Maynard of DEMA. You're aware of Mr. Maynard?

A. MR. W. SNOW: Yes.

Q. And you probably dealt with him on a variety of projects with respect to consultation?

A. MR. W. SNOW: Yes.

Q. And you're aware that Mr. Maynard passed away last year?

A. MR. W. SNOW: Yes.

Q. And I wanted to just follow up on one of the points you've raised with the Board, and that is, as I understand it, you indicated that a request was made for funding for a hydrology report, 2016, and that was denied. Did I get that right?

A. MR. W. SNOW: Yes.

Q. Are you referring to a letter or a direction from

Alberta Transportation where they said they will not fund a hydrology report for the Stoney Nakoda Nations?

A. MR. W. SNOW: Well, I'm referring to the letter from 2016 where we had -- it went to both agencies, Alberta Transportation and the Canadian Environmental Assessment Agency.

Q. I'm aware of your letter, sir, but I just want to make sure I understand.

You're not suggesting there's any letter from Alberta Transportation which rejects the Stoney Nakoda Nations' request for a hydrology report?

A. MR. W. SNOW: No, I'm not referring to a letter response from Alberta Transportation.

Q. Right. Mr. Snow, did you happen to review the response that Alberta Transportation prepared in response to the Stoney Nakoda Nations' submission that reviewed the consultation history?

A. MR. W. SNOW: I have reviewed many letters, many pieces of correspondence over the years, but there's a lot of material, and I'm dealing with a lot of projects. I can't recall specifically, but I do get directed to many documents.

Q. Fair enough. SR1 was one of many projects that was crossing your desk over the last several years. Is that fair?

A. MR. W. SNOW: Yes.

Q. Perhaps it might just help so we can try to clear this up.

Could I ask the document manager to pull up Exhibit 324?

MS. FRIEND: Mr. Chair, this is Laura. It looks like her screen may be frozen. We do have a backup document share and she could see if she can open it.

THE CHAIR: And who is that? Ms. Decosemo --

MS. FRIEND: Carolyn is the backup.

THE CHAIR: Let's see if we can get that up.

Q. MR. KRUHLAK: Could I ask you just to scroll forward in this first appendice to paragraph 7?

And to assist you -- thank you, document manager -- to assist you, Mr. Snow, what I'm referring you here to is paragraph 7 of this Appendix J to the response submissions by Alberta Transportation, which reviews the various meetings and discussions.

And I just wanted to take you to this particular entry in paragraph 7 and 8 to see if that helps refresh your memory on some of the history that's transpired here.

It indicates: (as read)

"A further meeting was held on

September 13th, 2018 between Alberta Transportation and Stoney Nakoda Nation with the purpose to discuss and plan a strategy to complete work on the Springbank SR1 that the Stoney Nakoda, Bearspaw, Chiniki, Wesley nations had identified and the resources to complete that work."

And it refers to an email sent September 11, 2018. (as read)

"At this meeting, AT enquired on the status of the TUS report and if Stoney Nakoda Nations still wished to undertake further site visits. Stoney Nakoda Nation committed to providing a budget for additional work Stoney Nakoda Nations wished to complete for the SR1 project. During the September 13, 2018 meeting, Stoney Nakoda Nation requested the hydrology information from the EIA but did not make a request for a hydrology study."

Do you see that, Mr. Snow?

A. MR. W. SNOW: **Yes.**

Q. And -- and we could move on to then paragraph 8. (as read)

"AT requested the budget for additional work Stoney Nakoda Nations committed to provide at the September 13, 2018 meeting via emails on October 24, 2018; December 18, 2018; January 9; 2019; January 11, 2019, as well as in person on December 19, 2018."

And it indicates here, no budget from Stoney Nakoda Nation was received.

Does that coincide with your recollection, Mr. Snow, that Stoney Nakoda Nation never provided any budget in support of any request for a hydrology study?

A. **MR. W. SNOW: Yes. I would say that's correct, and I would also point out that, along that timeline, in May 6 of 2019 is when our leadership issued the objection letter to the project.**

Q. Well, I appreciate that, Mr. Snow, but you had a clear understanding of the arrangements with respect to resources that the Stoney Nakoda Nations needed that the practice on this project, as I assume others, is that a budget -- if the request is made for resources, the nations submit a budget and that budget then would be -- if approved, the work would be proceeded with in

the normal fashion. Is that the fair process of the description?

A. **MR. W. SNOW: DEMA Land was facilitating the on-site field work alongside Alberta Transportation, and the work that was remaining to be finished -- the reporting that was remaining to be finished was concerning these communications from DEMA Land to Stoney. Those were all concerning -- in my mind, those were all concerning the completion of the cultural assessment.**

One of the things that's not captured in here that I may have alluded to in the -- in the previous topic is the -- the way in which -- or the process that we would use to confront some of the -- the field issues that we had experienced in 2016.

We really had no way to address those concerning the treatment of elders. At that time of the project, our -- our -- there was no real way forward since 2016 to -- to rectify those field issues in a suitable manner -- no way that I could see concerning how to raise these issues with a regulator and then try to -- try to resolve them.

So that was one of the sort of underlying issues during that time.

Q. I appreciate that, Mr. Snow. I believe you addressed

that earlier during the Crown consultation topic and confirmed that at no time did you or Mr. Goodstoney ever communicate those issues to Alberta Transportation or, for that matter, to DEMA as we can see here in the subsequent meetings and collection of correspondence. I think you both confirmed that there was no letter that was issued?

A. MR. W. SNOW: Yes.

Q. And I thought it was also important, if I could simply touch on the issue of the -- the environmental impact assessment.

Sir, you recall that the draft traditional land use and resource use sections of the EIA were shared and submitted to the Stoney Nakoda Nations prior to them being finalized?

A. MR. W. SNOW: Yes.

Q. And no feedback was provided by Stoney Nakoda with respect to reviewing those draft sections of the TLRU?

A. MR. W. SNOW: No. No feedback was provided until we had -- again, I would come back to one of the issues that I had spoken to in Topic 2, and that is that, our availability or the availability of capacity to review those projects really did not come about until December of 2020.

Q. I think you were referring to the federal funding that

you indicated --

A. MR. W. SNOW: Yes.

Q. -- was addressed then?

A. MR. W. SNOW: Yes.

Q. But you also recall, I assume, that there was still available funding available -- there was still available funding to Stoney Nakoda to complete its traditional land use assessment and, in fact, that was offered to the Stoney Nakoda Nations, that they still had approximately $10,000 of the 40,000 budget that was not yet distributed to them that was available to complete their TLU.

A. MR. W. SNOW: Yes, I agree that was available, that funding was available, but we did not access it for the reasons of the treatment of our personnel and elders during that time.

MR. KRUHLAK: Thank you, Mr. Snow. Those are my questions. I believe my colleague, Mr. Barbero, has a few additional questions.

MR. BARBERO: Yes I do, Mr. Chair, if that's agreeable, sir.

THE CHAIR: Yes, please proceed, Mr. Barbero.

MR. BARBERO CROSS-EXAMINES THE PANEL:

Q. And my questions are to be directed to Ms. Beckmann. Ms. Beckmann, are you there? I don't have you on

my screen.

A. **MS. BECKMANN: I am here.**

Q. Good afternoon.

A. **MS. BECKMANN: Good afternoon.**

Q. As you probably gathered, I'm one of the lawyers representing Alberta Transportation, and I just have a you few questions arising from your evidence a few moments ago.

The first thing I wanted to ask you, though, was have you been monitoring this proceeding? Last week in particular?

A. **MS. BECKMANN: I reviewed the transcript from last week and have been auditing, if you like, since yesterday morning.**

Can I just make a quick statement? I was not aware of Mr. Maynard, Dallas Maynard's passing, and I just wanted to extend my condolences to any of those people who knew and worked with him. I had occasion to work with him, as well, and I hadn't known, and I'm quite sorry to hear the news.

So sorry, just an aside.

Q. Thank you, ma'am. I can tell you there are some of those folks in this room with me right now, and I'm sure they appreciate that.

You had said in your earlier evidence that you are

a senior environmental consultant. Did I get that right?

A. MS. BECKMANN: Correct, mm-hmm.

Q. And I just want to confirm, do you have any professional designation in the province of Alberta?

A. MS. BECKMANN: I do not.

Q. No. And you'd agree with me, ma'am, you're not a professional biologist, are you?

A. MS. BECKMANN: I am not a professional biologist. I'm an unaccredited professional biologist in the way that some consulting engineers are not professional engineers; correct.

Q. And ma'am, you're also not a hydrologist?

A. MS. BECKMANN: No, I am not a hydrologist.

Q. And to be fair to you, I think you made a comment at the outset regarding the aspects of the materials that you were here to speak to and that others had prepared some of the more technical aspects.

But you did mention one organization; was it the IAIA membership?

A. MS. BECKMANN: Correct.

Q. Right. And of course you'd agree with me that that's about impact assessments; correct?

A. MS. BECKMANN: Correct.

Q. Right. It's not about aquatics or hydrology; you'd

agree with that, ma'am?

A. MS. BECKMANN: Not entirely, no.

Q. What would you dispute about that statement?

A. MS. BECKMANN: Can you repeat the statement for me, please?

Q. Yes, you have a membership in the IAIA?

A. MS. BECKMANN: Correct.

Q. Which I put to you, ma'am, means recognition in an institute that focuses on practices with impact assessments?

A. MS. BECKMANN: Correct.

Q. Right. It's not about experience with technical aspects of projects like aquatics or hydrology; correct?

A. MS. BECKMANN: Impact assessment is a very specific discipline and in much the same way that law has very important procedural elements in order for the delivery of justice, so to speak. Impact assessment has very specific methodologies which must be followed in order for the ultimate impact assessment to be defensible.

And this is a roundabout way of answering your question. It is true that I am neither a hydrologist nor a fisheries biologist. I do, however, work with a very significantly deep team of technical experts. And

PGL was retained, not just me.

The question was I was in effect given the material to triage, and that is, was there enough information about habitat offsetting that it could be forwarded to a fisheries biologist, an expert, to evaluate for sufficiency. Was this a workable offsetting plan.

There is no offsetting plan, and therefore, my a argument is that the methods of impact assessment don't yield enough information to say anything technically about fish habitat.

Q. Ma'am, let me just get to the point.

A. MS. BECKMANN: Sure.

Q. Are you even qualified to triage this document or these materials, to use your word?

A. MS. BECKMANN: I would ask you on what grounds you think I'm not qualified?

Q. Well, I'm pretty sure you told me you're not a professional biologist?

A. MS. BECKMANN: I am an impact assessor, sir.

Q. Yes, ma'am, you focus on process?

A. MS. BECKMANN: You're not suggesting that because the members of the Board or the Chairman have no professional biology designations, that they are not suitably equipped to make decisions about those

matters? You're not suggesting that, are you?

Q. Ma'am, with all due respect, I'm here to ask you questions, and I would appreciate if we could do that so that we can go through this material efficiently.

A. MS. BECKMANN: Sure.

Q. In your resume, you have set out select experience; we don't have to turn it up, but it's page 2. One of the things that I noted there was this entry, second bullet point: (as read)

> "Supporting Stoney Nakoda First Nation in reviewing the habitat offsetting provisions for the SR1 project."

That's what has you here today; correct?

A. MS. BECKMANN: Mm-hmm.

Q. Very good. Further down the page, I note another entry: (as read)

> "Project manager for independent third party review of the SR1 flood control project near Calgary on behalf of the Tsuut'ina Nation 2017/2018."

Do you recall that engagement?

A. MS. BECKMANN: Yes, I do.

Q. And just so that I'm clear, so that is, you'll acknowledge, the same project?

A. MS. BECKMANN: Yes, it is. Different sections,

different sections for review.

Q. That's what I wanted to ask you. What was that engagement about?

A. MS. BECKMANN: That engagement was, again, about impact assessment methodology, and it was about working with our technical staff, supporting our technical staff to look at the hydrogeological material.

And I am sure that Dan will remember working with Christina Trotter in our office about the technical elements of the hydrogeological assessment. In that capacity, I was supporting a technical review providing administrative support to a technical team, and I was not speaking to hydrogeology.

Q. That's analogous to what you're doing here, is it not?

A. MS. BECKMANN: No. The question here is about process. The argument is that the process isn't sufficient for Stoney's needs.

Q. Based on the status of the technical material you and your team were able to review?

A. MS. BECKMANN: Based on the absence of an offsetting plan.

Q. All right. Ma'am, you spoke to an aid to direct; it was a one page.

Mr. Chair, sir, I don't believe we ever entered that as an exhibit or if we did, I missed it. If I

could just have some direction, sir, on whether that was entered, and if not, could we enter it?

THE CHAIR: Ms. Beckmann, was that sent to -- or Mr. Secord -- sorry, not Mr. Secord, Mr. Rae, was that sent to other counsels, do you know, beforehand?

MR. BARBERO: Mr. Chairman, I can advise that I did receive an advance copy of it, yes.

THE CHAIR: You did?

MR. BARBERO: Yes.

THE CHAIR: So Ms. Friend, has that been entered already as an exhibit?

MS. FRIEND: Mr. Chair, I'm sorry I'm not clear what document is being referred to.

MR. BARBERO: Mr. Chair, it's Michael Barbero. Ms. Friend, I'm referring to the one-page document that Ms. Beckmann used or was referring to during her opening remarks. It's entitled at the top, "Aids to Testimony - L. Beckmann for SNN."

MS. FRIEND: Yes, yes. That's her PowerPoint presentation, and I have that on file. But we don't have an exhibit number on it yet.

MR. BARBERO: Mr. Chairman, sir, I would suggest we mark it as an exhibit, if that's agreeable to all.

THE CHAIR: Yes. What number are we at, Ms. Friend?

MS. FRIEND: The next number would be 382.
MR. SECORD: Just on that point, Mr. Chair, is the PowerPoint just the one page? I thought that was an aid to your --
A. MS. BECKMANN: That's correct. That's correct.
MR. SECORD: That's what the PowerPoint is. Thank you.
A. MS. BECKMANN: It's just a one-pager just to give people an indication of sort of the general procedure.
THE CHAIR: Thank you. So that is now entered as Exhibit 382. Thank you.

EXHIBIT 382 - POWERPOINT DOCUMENT ENTITLED, "AIDS TO TESTIMONY - L. BECKMANN FOR SNN"

Q. MR. BARBERO: Mr. Secord was anticipating where I was going with this because I wanted to ask you about a February 25, 2021, memo exhibited 289. Document manager, perhaps we could bring that up. Again, that's Exhibit 289. Were?
THE CHAIR: Ms. Decosemo, it may be your machine again. Is it Ms. Taylor or Ms. Decosemo right now trying to get the document up?
MS. FRIEND: I believe it's Ms. Decosemo, but we could ask Ms. Taylor to take over.
THE CHAIR: Yeah, we'll check on the break.

There seems to be some glitch going on there.

So Ms. Taylor, if you could screen share and get Exhibit -- it was 289; is that right, Mr. Barbero? Do I have that?

MR. BARBERO: Correct, Mr. Chair, 289.

THE CHAIR: Thank you.

MR. WIEBE: This Justin Wiebe speaking. May I suggest that she restarts the computer during the break? That should probably fix it.

THE CHAIR: Ms. Taylor, if you could stay online for now then, and Ms. Decosemo, you could actually then just restart now, thanks.

Please proceed, sorry about the interruption. Thank you.

MR. BARBERO: No problem, sir. Thank you.

Q. MR. BARBERO: So, Ms. Beckmann, my question to you, just so that I'm clear, in terms of the material that you have filed in this proceeding and are speaking to, there is this document, 289, a technical memorandum or a technical review, dated February 25, 2021; is that correct?

A. MS. BECKMANN: Correct. I'm looking at my own version here.

Q. And as we were looking at Exhibit 382, those are the only documents that you've put forward to speak to;

correct?

A. **MS. BECKMANN: Correct.**

Q. Very good. And, ma'am -- sorry, document manager, if we just scroll down to Section 2 of this first page. And ma'am, if you need a moment to read it please take it.

But my question for you is I just want to confirm, this technical review only relates to hydrology and aquatic ecosystems.

A. **MS. BECKMANN: Aquatic ecology, yes.**

Q. Right. Well, I see "Ecosystems" in the re line, but, yes, I see ecology, as you just pointed out.

And, ma'am, you are listed as an author. Again, if we go to the top of the page you'll see that?

A. **MS. BECKMANN: Mm-hmm.**

Q. And just so that I'm clear, did you have a hand in drafting this document?

A. **MS. BECKMANN: Yes, I did.**

Q. But as per your earlier evidence, you did not draft any of the technical aspects; correct?

A. **MS. BECKMANN: Perhaps you could help me understand which section you're questioning my ability to speak to. I'm just confused. If you could help me.**

Q. Ma'am, I'm not questioning your ability at all. I'm just wondering if I have it right that you did not

draft the technical portions -- wherever the document may be technical in nature. So, for example, the aquatic ecology section at 4.2 or the species assessed at 4.23.

A. MS. BECKMANN: I see your point. I drafted section 4.2, which was senior reviewed by Matt Hammond, as you see from the "from" list at the top of the memo.

Q. So you drafted section 4.2, but it was senior reviewed by Mr. Hammond?

A. MS. BECKMANN: Correct.

Q. Very good. 4.1.6. So that would be page -- I believe page 4.

A. MS. BECKMANN: I'm going to have to stop you there just because I can't speak to 4.1.6 because that was produced by Mr. McCoy.

Q. Oh, but I think you can. It's a very basic question.

It says there in the last sentence, actually, that: (as read)

"These will be discussed at greater length in revisions to this memo to be delivered no later than March 3rd, 2021."

Do you have any information about a further revision of this memo?

A. MS. BECKMANN: Can I -- we have -- I'm going to

ask, Doug, if you can speak to that because we've been doing some work with our client.

Q. Well, ma'am, and Mr. Rae, sir, I think --

MR. RAE: Mr. Chairman, it's Mr. Rae. I can help in that regard.

Mr. Chairman, you'll recall that the federal impact assessment agency has a deadline later this month, early next month, in regard to further comments on their draft environmental impact assessment. The Stoney Nakoda and, of course, its consultants continue to develop work product and comments in that regard.

So what has been filed with the Board is the work done to date, but it is a work in progress as the Stoney Nakoda Nations intend to submit detailed sort of comments to the federal agency. And that is the explanation why what has been filed before this Board is, as I say, a work in progress. I hope that helps.

MR. BARBERO: Mr. Rae, that is helpful. Thank you, sir.

So, Ms. Beckmann, is it fair, then, to say that this is actually a document, Exhibit 289, that was written primarily for submission in the IAAC process?

A. MS. BECKMANN: This version was intended to meet the NRCB deadline.

Q. Ma'am I'd like to ask you a few questions, if I can,

about your -- your Exhibit 382, which is your one pager?

A. **MS. BECKMANN: Mm-hmm.**

Q. And just because I was curious, you mentioned Bragg Creek and Rocky View master drainage plan. And I don't think you spoke to that. Why did you do that?

A. **MS. BECKMANN: Right. What I was trying to illustrate with that is that, in looking at the EIS document, I was trying to ascertain which projects had been included in the cumulative effects assessment component to see if any of the planned works on the Bow River had been included in the cumulative impact assessment.**

They had not, but both the Bragg Creek piece -- let me just grab the document -- but both the Bragg Creek and Rocky View master drainage plans were included for consideration in the cumulative impact assessment. So the project was considered in terms -- in the context of those other two works but not in the context of future works on the Bow River.

Q. Okay. That's helpful.

MR. BARBERO: Mr. Chairman, if I could have one or two minutes to consult with my client.

THE CHAIR: Yes, please proceed.

MR. BARBERO: Mr. Chair, it's Michael Barbero,

Alberta Transportation again, sir.

THE CHAIR: Thank you.

MR. BARBERO: No, thank you. Appreciate having that time to review my notes.

We have no further questions for this witness. Thank you, sir.

Ms. Beckmann, thank you for your time today.

A. MS. BECKMANN: Thank you very much.

THE CHAIR: Thank you, Ms. Beckmann. Thank you, Mr. Barbero.

Ms. Vance do you have any questions?

MS. VANCE: I do have one, and it may be coming from a place of curiosity as much as anything.

MS. VANCE QUESTIONS THE PANEL:

Q. The question I have is for Mr. Snow. I'm going to pull up my notes. This may not be exactly what you said.

But you spoke a bit about fish rescue and that the Stoney Nakoda Nations have traditional ways of capturing fish that don't pose a high mortality to fish. And you said "alternative methods of fish capture had not been considered."

I wonder if you can tell me a little bit about those methods because I'm kind of interested.

A. MR. W. SNOW: Yes. I think we use -- I can't really speak to the -- the exact method, but I can say

that the methods are still used in our communities, and used natural materials from the landscape, and are ways that we capture fish and then where we can utilize them until -- until we're ready to harvest them and where we can actually select the ones that we want to harvest, not just harvest all together.

And the reason why I had mentioned this was because many times during the electrolyte fishing process, that can cause a high mortality to fish that are trying to be preserved or moved to another location or for whatever -- for testing or other purposes.

And so I wanted to just note that, from the discussion this morning, that one method that Stoney Nakoda utilized to capture fish is -- doesn't cause that mortality.

Q. And that method of capture, as I understand you saying, it would be ultimately for harvest as opposed to transporting the fish. Would that be accurate to say? Or could you use those methods also to transport fish?

A. **MR. W. SNOW: In my understanding, those methods are used to harvest, but presumably, I believe that those methods could also be used -- utilized towards transport. And these are -- I think these are some of the areas of our study.**

Had we been able to properly conduct and complete

our study for the project area, I think these are the things that eventually we would have got to in our -- in our report, which is why our report is labelled as an interim report.

Q. Okay. Thank you. Thank you so much. That was the only question I had.

THE CHAIR: Thank you, Ms. Vance.

Mr. Kennedy?

MR. KENNEDY: I have a couple of questions, I think, for Ms. Beckmann.

MR. KENNEDY QUESTIONS THE PANEL:

Q. They relate to cumulative effects. Just wait for Ms. Beckmann to come up on the --

A. MS. BECKMANN: Hi. I'm here, yeah.

Q. I think I heard you advocating that in this project, in terms of its reviews, should consider cumulative effects of a Bow River flood control project?

A. MS. BECKMANN: Without it, it's not possible to give -- for Stoney to understand how their treaty rights will be affected, yes.

Q. So in terms of impact assessment generally -- I mean this is an issue that arises to regulators all the time.

Right now, we have a single application related to project, flood control -- largely flood control for the

City -- to protect the City of Calgary, and everything that could or may happen on the Bow River in the future has perhaps a similar large picture objective but projects that would operate independently. So I don't think there's a suggestion that these two projects need to operate in concert with each other. Is that your understanding?

A. MS. BECKMANN: That is my understanding. And can I speak a little bit to cumulative effects? I don't know if you just wanted the one answer.

Q. I have further questions, so perhaps let me kind of carry down the road --

A. MS. BECKMANN: Sure.

Q. -- and I'll give you an opportunity at the end if you want to provide some further comments.

And in terms of understanding cumulative effects, is there some magic to the fact that we would have the same proponent for these two projects? And I ask that in the context, there might be a whole bunch of other developments that could impact the Stoney Nakoda Nations' constitutional and treaty rights that aren't before -- would never come before this Board, and may come before a variety of different regulators, many of which probably wouldn't undergo an environmental impact assessment. And where does that take you in terms of

cumulative effects assessment?

A. **MS. BECKMANN: Mm-hmm. It's a very -- it's an excellent question, for starters.**

It's -- as I'm sure you can appreciate, because you see so many different projects that interact. It's a very complicated thing, and that's why there have been efforts to change federal law regarding impact assessment, to start allowing strategic and group assessments so that we can start looking at suites of projects.

And the examples -- there are examples in other places in the world, and I'd be happy to share references, where a number of related projects that have related functions that don't necessarily work in concert, but how the impacts in the same general area dealing with the same ecological subsystem can be assessed together.

The concern at this point is that the expected works on the Bow were not even referenced in the assessment, so the question then becomes for Stoney, what is going to happen with that?

If some understanding of the scoping of that work, which is presumably underway, were carried forward to this, the entire document would be better for decision-making so that you, as decision-makers, would

know what the overall set of potential impacts around the region might be.

Does that answer your question?

Q. Well, in part. What you dealt with was the geographic relationship, I think between various projects, but you didn't deal with the temporal piece. And the question arises, here we are, we're by the end of this process, we will have a very good understanding of the environmental impacts and the effects on the Stoney Nakoda Nations from this project. But what we couldn't have, because the work has not been done, is an understanding of the effects from any other -- a project on the Bow River because that work has not been done.

So, in terms of timing, so here we are in 2021, near the end of what has been a very long process, and the Bow -- any project that might come forward on the Bow River, in terms of being in the same position, is years away.

A. **MS. BECKMANN: I see your point. The way in which various pieces of legislation are written, they speak to, including in the scope of the cumulative effects assessment, reasonably foreseeable projects. And because this is a predicted exercise, the goal is to look forward to projects that are reasonably**

foreseeable and to the best of practitioners' ability -- and there are quite a few very skilled engineers and hydrogeologists on the technical team -- and predict what works on the Bow might do in concert presuming that that project is reasonably foreseeable.

And the point that we were just making is that works on the Bow are reasonably foreseeable because of the material that Alberta Transportation put forward. That is the works are expected on the Bow, therefore, reasonably foreseeable.

Q. Well, in terms of being reasonably foreseeable, I think it's well established on the record that we have is that there may be a number of potential alternative projects on the Bow River if they choose to proceed with any of them. So there's uncertainty as to whether they'll proceed with any of them, and there's uncertainty as to what projects they might proceed with.

And that puts you in a very difficult position as a regulator if we accept what you're putting forward is does cumulative effects assessment say we need to paralyze the regulatory process until we can get a grasp on projects that may come forward many years into the future?

A. MS. BECKMANN: I hear what you're saying, and I

don't think the intent is to paralyze the system. I think the intent is to create a better predictive tool such that -- I mean if you're telling me that Alberta Transportation has no plans to construct something on the Bow River, then they have no plans.

I'm just responding to the material provided by Alberta Transportation in which they said, "We have other works in the works for the Bow River. This is the SR1 project, and there are other works for the Bow."

So I'm just responding to the methodology there. I'm not suggesting that -- I don't think anyone is suggesting that Calgary should be exposed to floods. I have family and friends, and I know the concerns about flooding in Calgary.

I think that we're just trying to provide decision-makers with a better predictive tool and provide you with the context, which is additional works around the city in the event that the SR1 project is not sufficient to protect the city.

Q. Ms. Beckmann, I suggested that after I had finished questions, my questions, I'd give you an opportunity. This is your opportunity.

A. MS. BECKMANN: I think I've shared it. It's a really important discussion, and I agree that it's a

very tough place.

I think, though, that in the interest of using this as a decision-making tool, at least understanding that there are a ring of projects related to water management, all of which could impact Stoney is the context that's relevant.

Q. Perhaps one more question.

A. MS. BECKMANN: Sure.

Q. And I promise to end there.

So in terms of addressing cumulative effects, it's much easier to do with the next -- when you're assessing the next project when the previous projects' effects are not only forecast, but perhaps they're better understood through actual operations because they exist. So you can truth the projections and understand those effects when you're then looking at a new project that is distinct and separate?

A. MS. BECKMANN: Yes.

Q. It seems obvious.

A. MS. BECKMANN: It does, except that then you start with a different baseline. And you have not -- you are -- depending on how you have scoped your new project, you may result in incremental -- the "death-by-a-thousand-cuts" argument.

Q. Well, so, again, one more question. This project will

not get an approval from this Board unless they determine it's in the public interest. Having regard for the very effects that I think you're identifying are important to be included in good EIA practice.

Now, that said, the "death by a thousand cuts" is -- this project, if it gets an approval, would be determined to be in the public interest.

It would be the next project, in terms of cumulative effects, that if death is something that is going to be a result, it would be assessed at that stage from the future projects, not -- not the project that is determined to be acceptable. Fair?

A. MS. BECKMANN: I think the challenge is that we have no threshold established. And, generally, when you're looking at cumulative impacts, you also have the concept of threshold of the "when is enough enough" argument.

So, ideally, we would have gone into this process with an understanding of how much the systems that contribute to flooding in the Calgary region can withstand in terms of human alteration before they no longer function the way they once did or no longer function in the way that humans want them to. Because we have no threshold, it's very difficult to say which project puts it over the edge.

So if you approve this one in the public interest, we still don't know whether it's gone past that tipping point.

MR. KENNEDY: Ms. Beckmann, those are my questions, thank you.

A. MS. BECKMANN: Thank you very much.

THE CHAIR: Thank you, Mr. Kennedy.

Ms. Roberts, do you have any questions?

MS. ROBERTS: I have no questions.

THE CHAIR: Mr. Ceroici?

MR. CEROICI: I have no questions, thank you.

THE CHAIR: And Dr. Heaney, do you have any questions?

MR. HEANEY: Just a question for Mr. Snow.

THE CHAIR: Yes.

MR. HEANEY QUESTIONS THE PANEL:

Q. And it's a follow-up on Ms. Vance's question, Mr. Snow.

Without getting into the particulars of the traditional methods, at some point, you would have to be a little more forthcoming about these methods, I imagine, in order for them to be included in a fish rescue program. And under that context, would Stoney Nakoda be -- be open to being more detailed about methodologies you discussed?

A. MR. W. SNOW: I think that would depend on a few

other things happening. Number one, that our Stoney Nakoda leadership is in agreement with such a process. Right now, it's our opposition that is -- that is in place to the project. So community leadership -- leadership of Stoney Nakoda Nation would -- would need to be -- some agreement there would need to happen.

I only pointed out the traditional fish capture method as I know that there is a high mortality rate with the -- with the current electro-fishing process.

So there is -- there are alternative methods out there. That was my -- the point of my relaying of those -- of that traditional capture method.

MR. HEANEY: Okay. Thank you, Mr. Snow.

THE CHAIR QUESTIONS THE PANEL:

Q. Mr. Snow, I just have one question.

You mentioned a number of times sort of the position of Stoney Nakoda is based on the Stoney Nakoda leadership, and you also referred to a number of times on questions from Alberta Transportation, in terms of sort of pulling back from some of the activities of consultation with SR1, that those resulted because of the -- your assertions about mistreatment of elders, and you didn't go back to Alberta Transportation with that concern.

Was that because the leadership was consulted, in terms of what was happening at that time and they recommended that you didn't go back and express your concerns to Alberta Transportation, perhaps some senior -- at the senior level in terms of those concerns or how did that all play out?

Because the Board is in a bit of a tough spot in terms of assessing this area of the consultation. So I'm just curious about how that decision was made in terms of sort of drawing back from the process, to some extent, and why it is that -- or who made the decision not to express those concerns to Alberta Transportation?

A. MR. W. SNOW: I think sort of two things are going on, two parallel processes: One is that the consultation process where we came up -- where we came to this impasse regarding fieldwork. So that was sort of one cycle that was happening that started in 2016.

And we -- basically we still don't have any kind of resolution, aside from, you know, a public hearing process to go through, but I think you'll appreciate that not all of our projects are in a public hearing process.

So it's sort of an open question that we have I think in terms of how do we move forward when we have

an impasse with a proponent, especially when that proponent is the regulator. So that situation exists today and will likely come up -- I'm not saying it will come up again, but it's likely that it may come up again.

And then the second process is the Stoney Nakoda leadership. Stoney Nakoda leadership, as I understand it, is involved in -- with various government departments and their own discussions on various issues.

So I really can't comment on that process because I'm not privy to all of that. But when we do give -- as a consultation department, we do give updates to our leadership about program -- many programs, many processes that are happening, whether they be the government-led proponents or industry-led or whatever.

Q. So when that, you know, misstep from your perspective was taken at the site visits, then, it was then your decision not to get back to Alberta Transportation, or was that information relaid to your leadership team and then it was left with them?

A. MR. W. SNOW: It was -- it was consultation's position that because we couldn't -- we didn't have a path forward to really move on this issue of continuing the fieldwork.

The danger I guess is what we were trying to weigh is that sort of treatment that happened previously, is that going to happen again, and would we -- would we be risking something, you know, somebody reacting negatively out in the field if that did happen again.

So those are the kind of issues we were trying to weigh in our mind during that time, and we just didn't come to a resolution to continue until we've had -- and basically just -- we didn't have a way forward.

Q. Okay. Thank you.

THE CHAIR: Mr. Rae, those are my questions, thank you.

Mr. Rae, do you have any redirect?

MR. RAE: Yes, sir, I have one question on redirect for Mr. Snow, and it pertains to the questions my friend Mr. Kruhlak was posing.

MR. RAE RE-EXAMINES THE PANEL:

Q. Mr. Snow, in regard to flood control projects on both the Elbow and Bow Rivers and the hydrology and hydrogeological studies related thereto, are there currently outstanding any budget requests from the Stoney Nakoda to the government of Alberta that, as I say, are outstanding and have not been responded to?

MR. KRUHLAK: Mr. Rae, it's Ron Kruhlak. I guess if you're raising this question in response to a

question I raised, I, of course, did not raise any questions with respect to the Bow.

As I understood it, Mr. Snow's comments I assumed related to hydrology as it pertained to the Springbank project. So guess if -- I just want to make sure we're clear on a distinction between the respective projects.

MR. RAE: Well, Mr. Chairman, I guess that's partly the point. We've heard lots of evidence on both the Bow and the Elbow and the distinction between the two, and it has been clarified somewhat.

My question of Mr. Snow, since Mr. Kruhlak raised the issue of outstanding funding, my question of Mr. Snow concerns any outstanding requests that pertain to either or both of the two river systems because, as you've just heard this afternoon, that has been the way that the Stoney Nakoda have been approaching these issues.

MR. KRUHLAK: Well -- it's Ron Kruhlak again. I guess I'd just say, with respect to redirect, I certainly recognize that your entitlement to redirect on an issue that's been raised that wasn't contemplated. And I guess my comment is I had raised no questions with respect to the Bow project.

So if -- as I understood it, and the questions I dealt with were pertaining solely to the Springbank

project.

MR. RAE: Mr. Chair, I'm not going to press the point. If my friend, Mr. Kruhlak, truly objects to the question, we can accept that.

THE CHAIR: Okay. Thank you. Anything further?

MR. RAE: No, sir, I have no further questions on redirect.

And perhaps this might be an appropriate time for Elder Holloway to do a closing prayer?

THE CHAIR: Yes, thank you. Yes, please proceed.

MR. RAE: Mr. Snow, is that appropriate at this point in time?

A. MR. W. SNOW: Yes, I believe Elder Henry is now available or is available to do our closing. I'll just confer with my colleague.

(OTHER LANGUAGE SPOKEN)

A. MR. W. SNOW: Oh, Henry. Thank you. We're ready to do a closing prayer, if you could give us a closing prayer for today.

A. ELDER HOLLOWAY: Yes, thank you.

I'd like to thank all your Panel and Mr. Chairman, and I would like to put the prayer for you people for today, and I'd like to thank everyone that's

participated in this project. Thank you.

(OTHER LANGUAGE SPOKEN.)

THE CHAIR: You're on mute there, Mr. Snow.

A. MR. W. SNOW: Thank you, Elder Henry. Thank you to the Board for our presentations today, and thank you to everyone for participating.

THE CHAIR: Thank you. And thank you, Elder Henry, for the two prayers. Thank you.

(PANEL STANDS DOWN)

THE CHAIR: Let's break now. Mr. Secord, you are ready for direct when we return?

MR. SECORD: Yeah, we're ready to go, sir. So what time would you like us back?

THE CHAIR: At 25 after 3, please. See you then, everybody.

(ADJOURNMENT)

THE CHAIR: Okay, Mr. Wiebe, I think we can get started. In fact, I think I might be a minute late, so my apologies, everyone.

Can everybody hear me? I'm not hearing audio right now. Mr. Secord, can you hear me?

MR. SECORD: Loud and clear.

THE CHAIR: Perfect. Okay, good. So Mr. Wiebe, we can probably have sort of regular screen back up now. Thank you, thank you very much.

Okay, so Mr. Secord, you are ready to go and your panel?

MR. SECORD: Yes. So this is SCLG Panel 4, and we will -- we have three witnesses. We will start with Mr. Locke. He will be followed by Dr. Klepacki, and then Dr. Fennell.

So if we could start, could I have the court reporter please swear or affirm Mr. Allan Locke.

Thank you, Ms. Vespa.

A. LOCKE (For SCLG), affirmed

MR. SECORD EXAMINES THE WITNESS:

Q. Good afternoon, Mr. Locke. I know Mr. Kennedy will know Mr. Locke from a previous appearance in front of the Natural Resources Conservation Board relating to a dam project in the past.

Mr. Locke is a registered professional biologist. After some encouragement from me, and perhaps with a slight underestimate of the amount of material involved, Mr. Locke reviewed Alberta Transportation's project's impacts on fish populations, fish habitat, migration, and breeding grounds in the Elbow River. And I am very grateful to Mr. Locke that he took this matter on for my clients.

Mr. Locke, I'm referring you to your curriculum

vitae which was filed as Exhibit 267, your report dated February 2021 filed as Exhibit 266. Were these documents prepared by you or under your direction and control?

A. MR. LOCKE: Yes.

Q. Are there any changes that you would like to make to these documents at this time?

A. MR. LOCKE: No, I do not wish to make any changes.

Q. Are these documents accurate, to the best of your knowledge and belief?

A. MR. LOCKE: Yes.

Q. Do you adopt your report as part of your evidence in these proceedings?

A. MR. LOCKE: Yes.

Q. And Mr. Locke, do you acknowledge that you have a duty to provide opinion evidence to the Natural Resources Conservation Board that is fair, objective, and non-partisan?

A. MR. LOCKE: Yes, I do.

Q. Would you please provide the Board with a brief summary of your professional qualifications and experience?

A. MR. LOCKE: I'm a member of the British Columbia College of Applied Biology and the Alberta Society of Professional Biologists. I have

worked as a biologist since the late '70s.

I worked for two years in the fisheries branch of the Ontario government. I then worked for a conservation authority in Ontario for a couple of years.

Following that, I worked as the provincial aquatic habitat protection biologist in the Alberta fish and wildlife division from 1981 to 2013. During that time, I dealt with many aspects of aquatic habitat issues.

From 1981 to sometime around 2002, one of my duties was to be the Fish and Wildlife Division representative and chairman of the Alberta Fishways Working Group.

This group was comprised of biologists, hydrologists, and engineers from Fish and Wildlife, Alberta Environment, Alberta Transportation, and Fisheries and Oceans Canada. We were tasked with reviewing proposed projects and designing government weir and culvert projects where fish passage was required. The group also addressed fish exclusion and fish return systems at headwork structures.

From 1991 to 2001, I was a member of the fisheries and recreation enhancement working group. The group was a partnership among Trout Unlimited Canada, TransAlta Utilities, Parks Canada, Fisheries and Oceans

Canada, Alberta Environment, and the Fish and Wildlife Division.

The group was formed to examine options for improving fish habitat and recreational opportunities for reservoirs and rivers affected by hydroelectric operations in Alberta. The primary focus of the group was on the Kananaskis river system.

When I left the Alberta Fish and Wildlife Division, I started a consulting company working primarily on environmental flow issues for governments, NGOs, in the private sector.

I've also provided regulatory advice for water sourcing and for oil and gas projects in British Columbia and Alberta.

Q. Thank you. Would you please provide the Panel with an overview of your findings and analysis in this matter?

MR. KENNEDY: Mr. Secord, I'm wondering if we could swear in your witness, please.

MR. SECORD: I thought we did that already, Mr. Kennedy.

MR. KENNEDY: Maybe I missed it.

A. MR. LOCKE: Am I good?

THE CHAIR: You're sworn; is that correct?

MR. SECORD: I think we're good, Mr. Locke.

THE CHAIR: Ms. Vespa?

Yes, we're good.

Q. MR. SECORD: So, Mr. Locke, would you please provide the Panel with an overview of your findings and analysis in this matter?

A. MR. LOCKE: Yes. As stated in my report, I believe the work done by the proponent addressed much of the inherent uncertainty when carrying out studies to address potential impacts to fish and fish habitat. The response to my report by the proponent is well taken, and I appreciate the clarification.

As stated in my report, the method used for ensuring fish passage during low flows is reasonable. I do suggest that it would be beneficial, especially for the public, to highlight the fact the fish passage structure will not be the critical reach in terms of velocities and depths of low flows.

With respect to fish entrainment and possible deterrence to fish entering the diversion channel, it is understood the proponent is willing to look at all potential solutions.

In response to the proponent's question regarding other alternatives, in the past, physical structures have been investigated. We looked into a louvre system which would be attached to a debris deflector to keep fish in the river.

Given the information provided by the proponent and what is known for other headwork structures in Alberta, all that is possible should be done to, first, keep fish out of the diversion channel; secondly, return fish during lower flow diversions where it is feasible; and thirdly, have a comprehensive fish rescue plan.

With respect to the release of water back to the Elbow River, it is acknowledged the decision was made to model the two bookend release scenarios to understand the boundaries of the potential effects of the project on sediment and fish and fish habitat.

It is further stated the adaptive management approach in response to findings in the monitoring plan would be a better place to understand and evaluate the potential effects of the project than additional modelling.

The point about adaptive management is well taken. It is also well taken that monitoring data collected during operations can be used to potentially update the models with the observed data.

However, it has been my experience that it is better to incorporate environmental considerations as best as possible before final design comparing to going back in after the fact to make changes.

For example, the fishway on the Bow River was refitted quite a number of years ago, and while the data collection and modelling to determine a more efficient fishway was challenging, it was an even greater challenge to secure funding and move the project along.

Similarly, my recommendation to consider alternative release scenarios is it is better to consider all reasonable flow release scenarios now so that the findings can be incorporated into the final design.

The reason I recommend modelling scenarios using the 10 percent and 15 percent increase flow criteria above instantaneous is because they are common criteria in terms of level of protection in the field of environmental flow science and will provide useful benchmarks relative to the early and late release scenarios.

As has already been determined, it is unlikely all aquatic environmental parameters will be met by any one release scenario. Tradeoffs between parameters will be necessary. Carrying out a tradeoff analysis for a range of flow scenarios, which should include flow scenarios that are meant to provide a high level of protection, would incorporate all the modelled aquatic

environmental parameters and would show whether or not changing the release flow quantity and timing would have a small, large, negative or positive effect.

Included the aquatic tradeoff analysis would be the potential of effecting egg incubation periods for species that have spawned in the fall, and the analysis would ultimately include all the other parameters that have been considered to date; for example, to name a few, wildlife, dust management, and cost.

With respect to collecting pre-project baseline data, my experience has been there is always the potential to miss something. By way of example, in the years leading up to the construction of the Oldman River Dam, a lot of data was collected, and a lot of modelling was carried out.

The temperature modelling led to selecting brown trout as the primary management species. Over time, it has become evident that while brown trout persist, there are now more rainbow trout below the dam than the brown trout.

But the biggest revelation was to discover bull trout congregating at the base of the dam trying to move upstream. This happened for such numbers for a few years, they were captured and relocated upstream. All the pre-project data and modelling did not point to

bull trout as a management species.

Finally, I wish to suggest that spending more time upfront would be better than spending more time later reacting to possible unintended outcomes. Making sure all reasonable alternatives have been identified as best as possible and have been investigated should be done before final design.

Out of all the water management projects that have been carried out in Alberta where I was involved, the lower Athabasca water management planning process was the best in that every attempt was made to not discount unknowns, and the structured tradeoff analysis provided the opportunity for everyone to understand the increases and decreases for all interests over a reasonable range of flow scenarios.

I wish to thank the Chairman and the other Panel members for this opportunity to participate.

Q. Thank you, Mr. Locke.

I would now like to turn to Dr. David Klepacki.

And, Mr. Chair, as you will know from Dr. Klepacki's involvement in SCLG Panel 3, he is a retired geophysicist, a resident of Bragg Creek, and an active conservationist.

And just to refresh your memory, he has already had -- he's already adopted his curriculum vitae and

his two reports, Exhibits 263 and 264.

And I think what we've done in the past is I think it's agreeable if we just have Dr. Klepacki confirm that he has previously been affirmed and considers himself under oath or under affirmation?

THE CHAIR: Yes. Ms. Vespa?

D. KLEPACKI (For SCLG), previously affirmed

Q. So I think we don't have to really go through the examination in chief if you did before with my partner Ms. Okoye, that's already on the record. So I think we can cut to the chase here.

Your evidence in Topic Block 4, water, is covered in Exhibits 263 and 264. Would you please provide the Board with an overview of your concerns under this topic block?

A. MR. KLEPACKI: Yes, sir. And thank you very much, Mr. Chair and the Panel and the other participants.

Can you hear me well enough, Court Reporter?

MR. SECORD: Yes. She's nodding her head.

A. MR. KLEPACKI: Okay. That's great.

Could we -- document manager, could you please bring up Exhibit 263, PDF 1. Thanks. Just on the top there is fine.

Okay. This report summarizes my concerns over the flood frequency analysis that's been done on the Elbow River thus far. I have three different points that I would like to cover along these lines.

And the first point is that, the statistics are dependent on the input data set, which certainly seems like common sense, and -- but I think it's particularly important to note that the unusual events on the tails of any distribution end up being really important, as we'll talk about here.

Secondly, I would like to suggest that best practices are not ignoring these large events on the tails, and it's better and safer to try and include them in some way. I know that the USGS report 17C has a methodology for including them. What I've done here is I've tried a bit of a different way of including them.

And then, finally, the third point is I'd like to go back to the climate change issues, and, in particular, the climate drivers, the Pacific Decadal Oscillation and the El Niño southern oscillation in driving our climates.

Now, if I can start with a quick little anecdote. My own interest in distributions actually started when I was finishing my master's work at the University of

British Columbia, and I was employed as a consultant by B.C. Hydro to go up to the Meager mountain area and help with a partner in Geotek's Consulting in mapping out the landslide distributions in the volcanic rocks there.

And what we did was we pulled out pieces of wood that were involved in these ancient avalanche deposits and had them either dated with dendrochronology or with Carbon 14 methods.

And really interestingly, these land slides all seemed to come, you know, within the accuracy we had, of about 300 years ago. And to move forward, it now appears that they all fell down during a very large earthquake that occurred along the Fraser River valley, again, about 3 years ago -- or 300 years ago -- hopefully, not 3 years ago. And with the recognition of the actual fault zone in some of the gravel pits in the Surrey area, that led to a whole rewrite for the seismic protection design programs for the City of Vancouver.

What I'm getting to with all of this is, you know, it's really important to look to these unusual events that we have bits and pieces of in our past.

And pertinent to the subject at hand, of course, is this picture right here, which is from the 1897

flood and it's from the area of what's now Reconciliation Bridge looking north across the Bow River.

The 1897 flood, of course, as this historian here quotes, is one of the three worst floods before the 2013 flood. The 1879 being the other one, and the 1902 flood. If we can scroll down.

So in this diagram, this is one that we've seen before, and I'm sure many of the other panelists -- or the other people in these hearings are very familiar with, it's the Bow River floods that occurred.

And you can see again, on the left-hand part of this figure is the 1879, the 1897 and then the 1902 flood. As I'd like to say my friend Matt Wood has pointed out several times, there's no good numbers for these -- for these floods in terms of quantity.

The quantity for the 1897 flood is guesstimated by the height that it was on the CP Rail bridge at that time. 1902 has a bit better definition. The 1897 is all anecdotal evidence about how high the water was relative to Fort Calgary at that time.

So if we can just scroll down to the next paragraph, please, document -- yes, that's fine.

I just want to point out here the relationship between the input data and the final determination of

frequency analysis.

You know, again, it's a whole subject of mathematics that looks at distributions in the past and then uses those distributions to identify the probabilities that these events will occur in the future.

So, you know, to start off with, I acknowledge that, on the Elbow River, we have no quantitative information for these early events, and the way that I attempted to take a look at these events was to try and get some kind of ratio relative to the events on the Bow.

Now, there's uncertainty built into this too, because following basically 1910, there was a -- to 1963, there was a series of dams constructed on the Bow, so you don't get -- you don't get a full indication of the uncontrolled release of water down the Bow River.

Having said that, nonetheless, if we could go to the next page, please, PDF 3, at the bottom of the page, please. Thank you.

I went ahead and tried to create a ratio through the years, which you can see here, between flows on the Elbow which, of course, are dependent on the information I had on the Elbow to flood events on the

Bow.

Like I mentioned, there's uncertainty in here, but what you can see is generally they're about -- they're somewhere on the order of 60 percent. Generally, the Elbow flows have about 60 percent of the Bow River flows over the time interval presented here which was 1950 to the present time.

So if we can continue to the next page, please.

So what I did with that ratio is I created values for flow on the Elbow River relative to the Bow River, which, again I used 50 percent, and you can see what those flows are.

Now, I'm aware of the Golder Associates report of December 2020 which looked at this data and used, you know, a more commonly used statistical analysis technique which is called the "Log-Pearson Type III plot."

I wanted to look at these flows or at this data in another way. I'm very familiar with -- it's called cumulative frequency or ogive plot, and it's what we in the oil and gas industry use often to try and understand the field size distribution of oilfields in a developing oil and gas play to understand, again, what you're -- how much money you might make in the course of drilling up all of the different

pools -- pool targets in that field.

So if we can go to the next page, please.

Q. And maybe, Dr. Klepacki, if you could refer to the PDF page number at the top, it would make it easier when reviewing the transcript. So this is PDF page 5.

A. **MR. KLEPACKI: Thank you so much, Richard. My apologies.**

So here -- here is this ogive plot of looking at the flood data along the Elbow River from 1879 to 2018 in this created format that I've spoken about earlier, which is taking the ratio of the flows.

The Y axis is the number of flood events, and the X axis is the flow range in metres cubed per second, and they're called "bins," flow bins when you create this type of graph.

And, of course, you can see what you might expect is that the bulk of flood events are -- are small and -- but the ones that we're most concerned about in doing property damage are, again, these ones that are at the upper tail of this distribution, which would be the ones on the right-hand side, which are from 1100 to 1200 metres per second.

And that bin is populated by floods of 1879, 1897, 1902 and 2013, and they comprise about 4 percent of the population, which, when we look into reoccurrence --

when we translate that to recurrence intervals, because it's 4 percent, it's about 25 percent of the recurrence time. It's actually a bit less than that statistically. It's something like about 3.7 is I believe -- was the exact number.

So this is a much different answer than the 1 to 200 calculation that Stantec is using, and actually Golder is using as well.

So is this a difference of the statistical technique the ogive versus the Log-Pearson Type III analysis, or what could have caused this?

Well, in my own reading of -- of the flood event of 2013, and remembering Golder's work, I remember the work that John Pomeroy had done, and looked at the fringe of the -- what Frank Frigo called the centroid of rainfall on the north side up in Banff.

Can we go to the next plot, please? The PDF which is 6 of 9?

And perhaps we can increase this a little bit. There we go. Perfect. Thank you very much, document manager.

So this is the Golder Log-Pearson Type III flood frequency analysis of the 2013 at Banff using the 1911 to 2015 data set. So this does not include those larger events in Banff.

And what you can see is the dot on the right-hand side of the graph in the upper right-hand corner is actually the 2013 event and it comes in at about -- it comes in at about 1 to 200.

Document handler, can we go to PDF 7 of -- so, and maybe we need to go down just a little bit. Yeah.

So this was the analysis that was published in Pomeroy, Stewart and Whitfield. It is also a Log-Pearson Type III plot. It includes the 2013 event, but it also includes the 1897 and 1902 events, and the 2013 event is actually that third little open square from the right-hand side.

And what you can see in this analysis of geographically the same area and, temporally, the same flood event, but the difference is the data input into this analysis. This data is from 1884 to 2013, as you can read in the caption underneath the figure here.

So, in this event, the authors calculated about a 1 in 40 recurrence interval for this event here.

Now, again, I realize that this is on the northern edge of the centrum for the 2013 precipitation bull's eye, but that's not the point. The point is using the same data, you get a much different -- sorry, using a different data set with a larger sample size that happened to catch some of these major events, you get a

much different return interval for the flood, which is 1 in 40.

Okay, document handler, could we please go to PDF 8.

So let's go back to the controversial paleodendrology, tree ring data for three different -- sorry, for four different watersheds in Alberta. Now, this is taken from Ravizi et al. in 2016 in their analysis of drought events in Alberta, drought and flood events.

What -- the point that I make in my report for this diagram is if you look closely -- maybe we need to zoom in just a little bit more, document handler. Thank you so much.

So you can see about a quarter of the way from the right is the 1900 axis, the 1900 year throughout Alberta. And it is what we've been calling so far in these hearings a "wet spell" in the climate.

And in the past, you know a wet spell doesn't mean floods. In this case, this wet spell meant floods because we have the historical eyewitness accounts to these floods. So these large floods, you know, occurred in this wet spell.

Now, I'll just finish my analysis here by saying I'm a resident of Bragg Creek, and one of the things we

Bragg Creekers talk about, especially since 2018, is wildfires here. Actually Bragg Creek is -- and Whitecourt are the two riskiest places to live in the province of Alberta for wildfires.

So it seems to me that the wildfire people or the fire recurrence people are ahead of where we are flood frequencies, because there was an abundance of professional papers that were published in -- starting around 2004, all the way through to, you know, to the current day.

But there was an abundance 2004 to about 2015 where they related the drought episodes and the wet episodes to what are the two climate drivers for us, which are the Pacific Decadal Oscillation and the El Niño Southern Oscillation.

Now, I'm -- not being an adept climatologist, I can't offer anything significant for this, other than to say these forest fire people recognize that episode as being a wet time, and 2013 was also a wet time where both the PDO and the ENSO were in a negative phase, which is -- negative phase is a wet phase, which is -- which is good for heavy precipitation events. And of course, we are witness to that 2013 event.

So, Board members, I'd like to kind of reaffirm something that, again, my friend Matt Wood has said

several times, and that's there is some uncertainty in how we calculate flood frequencies. And I'm taking it a step farther and saying I think that that uncertainty is very significant and that an analysis that would include these earlier events would create a much shorter recurrence interval for these kinds of floods.

The big question we have is when is the next time when we have concatenation is the word of both the PDO in its very wet phase and the El Niño Southern Oscillation and its wet phase that would put us at risk for another design flood for the Springbank Off-Stream Reservoir.

And with that, I believe I've made the three principal points I'm trying to make, and especially regarding the need to better consider a flood frequency analysis for those of us who live near the Elbow and Bow Rivers.

Thank you very much.

Q. Thank you. Thank you, Dr. Klepacki, well done.

And Mr. Chair, just to refresh your memory, Dr. Klepacki will be available to be -- to be asked questions about both Exhibit 263, the first nine pages of Exhibit 263, and of course, Exhibit 264, which was the erosion and riverbed integrity at the low-level outlet for the SORP, which he spoke to in Topic

Block 3.

And so with that, I will turn to our final witness for Topic Block 4, and that is Dr. Fennell.

And if we could, Ms. Vespa, would you please swear or affirm Dr. Jon Fennell, please.

THE COURT REPORTER: My understanding is Dr. Jon Fennell was sworn before, or no?

MR. FENNELL: No, I wasn't.

THE COURT REPORTER: Okay, thank you.

MR. SECORD: No, not when I was around, I don't think.

J. FENNELL (For SCLG), affirmed

MR. SECORD: Dr. Fennell is a hydrogeologist, a geologist, and a geochemist, and he has also given expert evidence on climate change matters as recently as November, I believe, of 2020 in the joint review panel hearing into the Benga Mining-Grassy Mountain project and other proceedings as well.

Dr. Fennell, I'm referring you to your curriculum vitae which was filed as Exhibit 262; your report dated February 21 -- sorry, February 2021 filed as Exhibit 261; an errata to Exhibit 261 that you have submitted that corrects typographical errors; and a spreadsheet calculation error related to snowpack

readings; and your PowerPoint presentation that has been pre-loaded.

Were all of these documents prepared by you or under your direction and control?

A. MR. FENNELL: Yes, they were.

Q. Are these documents accurate, to the best of your knowledge and belief?

A. MR. FENNELL: Yes, they are.

Q. Do you adopt the information in these documents as part of your evidence in these proceedings?

A. MR. FENNELL: I certainly do.

Q. Dr. Fennell, do you acknowledge you have a duty to provide opinion evidence to the Board that is fair, objective, and non-partisan?

A. MR. FENNELL: Yes, I do.

Q. And in what capacity did you participate in this proceeding?

A. MR. FENNELL: I was engaged to review the climate change, the geology and hydrogeology and the geochemistry and water quality aspects of this particular project, the SR1.

Q. Would you please provide the Board with a brief summary of your professional qualifications and experience?

A. MR. FENNELL: I certainly will.

Yes, good afternoon, Mr. Chair, respected Panel

members, and hearing participants.

You do have a copy of my CV as been provided in the SCLG submission made to the Board, which you can review at your leisure, but I will provide a very brief overview.

I'm a professional with over 30 years' experience in the natural resources and environmental assessment sectors. I hold a bachelor's degree in geology, which I obtained in 1985; a master's degree in physical and chemical hydrogeology with a specialization in isotope geochemistry, which I obtained in 1994; and a doctorate degree in geochemistry with a specialization in trace elements, which I obtained in 2008.

I am a member in good standing with a number of professional engineering and geoscience organizations here in Canada, including APEGA, and I've worked on a variety of projects in British Columbia, Alberta, Saskatchewan, Manitoba, and the Northwest Territories. Some of this work has actually been done here in the Rocky View County in Calgary area.

My clients have included various energy and mining companies, municipalities, watershed stewardship groups, government agencies, academic institutions, and research groups, including universities.

I've also supported a number of citizen groups and

non-governmental organizations to address concerns relating to resource development projects and the implications for surface and groundwater quantity and quality.

And as Mr. Secord pointed out, one of the recent interactions was with the Grassy Mountain Coal Project and even more recently, the Mountain Ash Summit Pit hearing at Rocky View County council for a gravel pit to be placed in the headwaters of Big Hill Springs. And I was actually supporting the Friends of Big Hill Springs Creek Provincial Park on that as a private citizen.

Outside of Canada, I've worked internationally in countries such as Australia, Belize, Colombia, Ecuador, Guyana, Mexico, parts of the United States, and Yemen, where I've provided support and assistance on hydrogeological and water resource management challenges for both industry and government.

This has included the analysis of climate change modelling output and the development of adaptation strategies most recently for a project that I did with the United Nations in the Caribbean basin, and that was for Belize and Guyana doing national adaptation plans.

During the course of my work, I've applied various types of emote sensing, non-intrusive and intrusive

geophysical techniques, and I've conducted numerous field investigations and drilling programs to obtain and analyze soil and water samples.

This work has included the installation of monitoring wells; completion of aquifer tests; measurements of springs and stream flows; completion of groundwater/surface water interaction evaluations; the development of monitoring and management programs applying statistical methods; the application of environmental forensics, including the use of trace elements and isotopes, both stable and radiogenic to identify source waters and subsurface processes; the assessment of climate variability and climate change; and risk assessments.

I've held adjunct positions at both the University of Alberta and the University of Lethbridge relating to provincial scale water projects, and I'm currently a program advisor at the Southern Alberta Institute of Technology assisting with the development and delivery of their new integrated water management program.

I have sat on a number of boards and panels to provide support on water and climate-related issues and have appeared a number of times before panels such as this, both on the industry and public side, providing evidence and testimony to assist with project

decisions.

Q. Thank you.

Document manager, would you please pull up the PowerPoint presentation of Dr. Fennell. And Dr. Fennell, if you would please proceed with an overview of your findings and analysis in this matter.

A. MR. FENNELL: Certainly. And I apologize if I'm looking away because I'm looking at a bigger screen here, so I'm still paying attention, obviously.

But I will give you a quick overview of my submission. I know Dr. Klepacki has touched on some of this, so I won't belabour the information that he has provided so far.

But I will be talking about the climate change aspects, the concerns there, as well as the hydrogeology, geochemistry, and water quality.

So if we could advance to the next slide, document host, please, Slide 2.

So I've identified a number of concerns with respect to the SR1 project.

With respect to climate change, this includes the impacts from extreme flood and drought conditions and how that might affect the safe and efficient operation of the reservoir and the works itself.

The second is the knowledge of the hydrogeological

regime and its influence on the success of SR1 achieving its goals.

Thirdly, we have the efficacy of the groundwater modelling to allow an informed decision to be made regarding whether or not to approve this particular project.

And lastly, the review of the geochemical and water quality issues that could arise if SR1 is constructed and operated as planned.

So those are the four areas I'm going to cover.

Next slide, please. This will be Slide Number 3.

So with respect to climate change, which I'll deal with first and get that out of the way, SR1 design has not considered the likely magnitudes of floods that have occurred in the past due to protracted flow records for the Elbow River. Dr. Klepacki has pointed this out, and it's obvious that this is a major concern.

Secondly, the design does not consider the magnitude of floods that are likely to occur in the future. And I know that the statement was made by Mr. Wood that, you know, it's difficult to predict, but it's -- you have to anticipate, and sometimes using the past as an indicator of the future can be very, very useful. And so with an intensifying hydroclimate, we

need to keep this in mind.

The SR1 does not consider the risk that the structure poses from extended drought conditions. And I'll explain that as I get into this.

And then the SR1 does not increase the water security for the Calgary of City (verbatim) contrary to what others have said as stated by Alberta Transportation and -- and the City of Calgary.

Next slide, please. PDF 4.

I won't belabour this. Dr. Klepacki did a very, very good job of pointing this out. What I'd like to say is that there is some similarity in the periods of record for the Elbow and the Bow despite the fact that the earlier high magnitude floods were not captured by the Bow. So when you look at the years when the floods occur, they're very similar for both rivers. So there is similarity and that's important.

And I think the thing to keep in mind is just because high magnitude floods that predate the record have not been captured in the record, this does not necessarily mean they haven't occurred. And precautionary principle does dictate that we need to realize that and keep that in mind when we're trying to assess the efficacy of a project like this.

And so comparisons are important and so when we do

these comparisons, we do know that, in the period of record, the flood flows may not have been as high magnitude as the Bow but they could be higher, two times or more greater, depending on how you do the math.

And, of course, there's a lot of intricacies around there, and we've heard about centroids of storms and things like that, but we can't get so transfixed on being so focused on that particular aspect. And I do believe we have to take a broader view.

Next slide, please. Slide 5.

There has been the discussion about the use of tree rings and trying to understand the broader scale events in the past. And we do know, as Dr. Klepacki pointed out, that in the record, there have been extended wet periods and extended dry periods.

And on the left-hand side of this slide, I'm showing you tree ring results from a tree core from the Wildcat Hills taking us back quite a few hundreds of years. And I've put it on this plot, a 90th percentile and a 10th percentile. And usually when you're looking at extremes, looking at things that fall above the 90th percentile and below the 10th percentile is where you start getting indications of higher magnitude events, as Dave said, on the outer ends of the tail of the bell

curve.

And so what you can see is there have been some extended periods of wet in the particular study area, as well as some very long extended periods of dry, some of these lasting several years to even across decades.

Now, I understand that this does not speak to individual flood events, and that's not what the intent of a slide like this is meant to give an impression. What it is meant to say is that -- and you have to agree that floods are more likely to happen in wet periods than extended dry periods. It only makes common sense.

And so this is meant to indicate that this has occurred in the past, and we can expect it to occur in the future. This is just how the cycles of nature work.

And then when we throw climate change on top of that, it starts to get maybe a little bit more complicated and maybe amplified. But it's important to keep in mind that the past is an indication of the future.

And on the right-hand side is a slide from Sauchyn and Ilich from 2017, just showing how variable the flow has been around the average over an extended period of time. And you can see that, again, you have high

magnitude events, sometimes back to back, that have been occurring in the past, as well as very extended periods of deficit leading to low-flow conditions.

So what's important to keep in mind in here, is that when we're looking at data like this, with variability like this, we cannot be focused on anything like the average. We need to understand the deviation -- the variants, the deviation from the standard, and focus on those outer tails on the distribution curve.

Next slide, please.

And this next slide, Slide 6, basically does show that. On the left left-hand side I'm showing you the bell curves under normal conditions and under shifted conditions, both for the mean, the variability and the symmetry.

And so what happens? Well, as the earth warms, the mean of the temperatures shift. So it shifts to the right, and what happens is that the area under the 90th percentile and higher becomes larger. That means more probability of events, more events occurring.

The same thing happens when the variability shifts. And as you can see in the panel next to that to the right, the variability has broadened out so that means the variability has moderated to a bit, but it is

amplified at the end. So your extremes become more probable. That's your floods, your droughts.

And then, lastly, the symmetry shifting. And, again, you get a similar effect on the upper 90th percentile tail.

So it's important to know that the climate is not static, it's changing, it's always changing. It is a manifestation of the data that we collect, whether it's instrumental records or it's paleo records, which are equally as useful, although you may be using resolution, but they're still important.

Equally, and we look at, you know, the intensity, duration and the frequency or the IDF curves with respect to particular storm events, whether it be rainfall or snow or whatever. We can see that some work by Kuo et al. in 2015 looking at how these IDF curves are anticipated to shift in the future.

And what they found is that the IDF curves are expected to shift upward because of increased air temperature and precipitable water that's in the atmosphere.

With every degree of Celsius increase, the atmosphere can hold about 7 percent more moisture. That's the Clausius-Clapeyron relationship, and some of that will be precipitable water, of course.

So it just goes to the physics of it, hope, that in the future as we get warmer, we can expect to have more moisture in the atmosphere and it has to come down somewhere and it does like to fall in mountains because of the orographic effect.

So what is expected to occur is a change in about 2.9 or about 3 degrees Celsius in the province here over the next -- in this decade, and about 29 percent increase in these IDF curves. So the images at the top basically show that.

What happens is you have a recurrence interval of T equals 50 years. In the future, that's expected to shift to a 25-year event, and, equally, a 25 event shifting to a 10-year event. And so this is what happens when the climate shifts. The return periods change.

And as Dr. Klepacki pointed out, return periods are only a factor of the data that you have. They're constantly changing. Every next storm adds to that dataset that changes that, so they're not static.

When you hear of a 100-year floodplain, that's using today's data. What is a 1-in-100 floodplain tomorrow, in the future? A 1 in 200, a 1 in 500, and that's something you have to keep in mind because this is not -- this is a dynamic process.

Next slide, please. Slide 7.

So this is using -- I've taken some data from the climate atlas of Canada, which is an information portal for climate model information that's available to the public.

So this is -- no one actually -- I don't do climate modelling; the climate modelers do that. Alberta Transportation doesn't do climate modelling. They use the data that climate modelers use or generate. So we're using the same information and we're trying to understand what it means in our area of interest.

So on a left-hand side what I'm showing is the projections going forward in time into this century for two different climate scenarios or what we call representative concentration pathways.

RCP 4.5 is kind of a middle-of-the-road projection, and RCP 8.5 is an extreme case with no CO_2 mitigation going on. So it would be, arguably, the worst-case scenario.

So what you see here is the shift in seasonality of precipitation that's projected for the study area, and particularly in the mountain watersheds.

You can see that I've got a dotted line at 0 percent. So this is a shift from the baseline period

of 1975 to 2005. You can see that, in both cases, RCP 4.5 and RCP 8.5, that they shift up, upwards of 30 percent or more compared to that baseline period, and so that's an increase in the amount of precipitation that is expected to fall in that period of time.

It is also expected to occur earlier in the year. Because of the warming conditions and the shortening of the winter period, this is expected to fall earlier, in some cases, a couple of weeks, perhaps to a month, depending.

Next what you can see is as we move through the year into the summer period, we see a decrease in precipitation of upwards of 25 percent.

So what you're seeing is a front-loading of all the precipitation into the earlier part of the year, rather than being spread across the year more equally, and that's what can generate flood conditions, having more of that precipitation piled up in the earlier part of the year.

If we shift our attention to the graph on the right-hand side. This is some work from David Sauchyn and a number of his colleagues back in 2011, looking at mountain watersheds on the front ranges on the eastern slopes of the Rockies, and looking at a number of

different climate scenarios, hotter weather, warmer weather, all of that. And what I'm showing here is just the various scenarios and the implications -- the model implications that has both the change in percent of stream flow.

Now, what I'm showing is the dotted line at 100 is the 1961 to 1990 baseline period. And what you're seeing is, in all cases, all climate scenarios, you see a shift in stream flow, the percent increase in stream flow.

In the most extreme case, we see an increase of upwards of 225 percent in the earlier part of the year. And so you can see it's lower in different types of scenarios. Pick the one you want, but in general, they're all an increase. Equally, in the latter part of the year, we're seeing as much as a 50 percent decrease in baseflow conditions in the streams.

Now, this speaks to water security when you're talking about having extended periods of less precipitation and less stream flow or baseflow contribution for longer periods of the year. That speaks to water security risk. And so we see that, from this information, it can be anticipated there can be larger floods and there can be longer low-flow periods.

Next slide, please. It will be Slide 8.

So I wanted to talk a little bit about this shifting and flood frequency. And I know we had discussed this, Dr. Luzi had questioned what I was attempting to do here and this is not a sleight of hand. This is simply taking information and trying to tease out a signal, much like Dr. Klepacki was doing. We're trying to understand what are the implications in weather periods for flood frequency.

So what I've done is I've taken the record, the instrumental record of average daily maximum discharge from the Elbow River that is readily available on the Water Survey of Canada website -- this is all publicly available data -- and I've taken that data for the entire period of record, and I've separated out the wet faces. And, as Dr. Klepacki pointed out, I used the Pacific Decadal Oscillation, which is a climate phenomenon that has a 25 to 35-year return period, cycle, and it goes through wet phases, it goes through dry phases.

I took out the data from the wet phases and I did a separate set of flood statistics on it because, remember, we're expecting to be wetter in the future. So this is a reasonable way of looking at it.

What you see here -- so the wet data are the blue

symbols and I've regressed the line through them. And the red symbols are just all of the data together and I've regressed the line through them. And as you can see right up in the top in the brown symbol, that's the 2013 flood. It was anomalous, of course.

But I've only regressed through the other data. I haven't looked at that one because it just pulls the line higher and it makes things look even worse. So it's somewhat of an outlier.

But what's important to take away from this is you see, as that line shifts into wetter phases, a 1 in 100-return period becomes a 1 in 60-return period. So that actually shifts to earlier. Similarly, a 1 in 200 becomes a 1 in 100, and a 1 in 500 becomes about a 1 in 220- or 230-year event.

So you can be thinking you're designing to 1 in 200 event, when in actual fact you're under-designing when you're not considering a wetter future and looking at the statistics this way.

What I've done is tried to exemplify it a little bit better with a percent chance of occurrence table here. So you might have heard Mr. Secord referring to this in cross yesterday, but it's really important to keep in mind because what happens is when these return periods shift, their percent chance of occurrence

increases.

So, for example, if you have -- over a period of 50 years, there's a 39 percent chance of a 1 in 100 event occurring. If that's a 1 in 200 event, it's 22.2 percent and 9.5 percent for a 1 in 500. But if a 1 in 500 becomes a 1 in 200, it actually doubles, more than doubles its percent chance of occurrence.

So that's important to know when you're designing these things. Are you designing them, that their robustness is there to deal with this type of percent chance of occurrence increase. You could be thinking you're designing properly, but you could -- you're not taking into account these high magnitude events that have occurred and are likely to occur in the near future.

Next slide, please. Slide 9.

Then there's a risk posed by prolonged drought. We've talked about windblown dust and the respiratory risks. We're going to have sediment in a very large area that's going to be subject to wind. This sediment is going to have contaminants associated on the surface. They're fine-grain sediments. They have high surface area; they're going to have things associated with them. This becomes an inhalation risk.

Similarly, accumulated water with nutrients, plus

seasonal warming can lead to algal blooms. There was some discussion about the risk of cyanobacteria which is a toxin; this could lead to more opportunities for insect breeding.

From what I understand about the design of SR1, there could be water that stays accumulated in there just from a rainfall event or whatever that won't be spilled; it can still accumulate in there and warm up. And we know there are some nutrients in the groundwater there, and it's obviously coming from the land. So the nutrients are there, so there's a risk around that.

We talked about ground cracking and the increased seepage risk in cross-examination. Extended drought is going to lead to a drop in the water table. We've seen this before in the paleo records. It's part of the reason why we have weathered till horizons that can extend down to 10 metres. This happened several thousands of years ago an epithermal period. And so if it happened in the past, it can happen again.

Fractures form, they can extend to depth, and when you crack clay, it's not a barrier anymore. And it can enhance seepage pathways.

And, lastly, as Dr. Klepacki pointed out, wildfire risk is a very, very real risk here. The hazard is high in the Elbow River watershed. And what happens

when you burn a landscape and you burn trees, you've obviously lost the cover, the canopy. So more moisture can actually fall on the ground and run off. Soils can become hydrophobic, they repel the water.

And so you get higher run-off coefficients, higher watershed yields, higher associated river flows, and degraded water quality because there's grain sediment with metals and organics and all kinds of things downstream into downstream-receiving bodies.

Q. Dr. Fennell, before you move from that slide, Mr. Frigo today said that the degraded water, degraded water quality from a forest fire in the catchment area, that all of that degraded water could be funneled into SR1 and held there in order to enhance the -- Calgary's water quality. Did you hear Mr. Frigo state that?

A. MR. FENNELL: I certainly did. And, frankly, I was quite surprised because I didn't think that was the intent of this structure.

Q. And in your review of the application, did AT -- my understanding is AT said they're not going to use the SR1 for storage of water. But did -- in your review of the application, was there any modelling done by AT to show what the effects might be of using SR1 to store degraded water that would be coming down the Elbow River as a result of a forest fire?

A. MR. FENNELL: No.

Q. Okay.

A. MR. FENNELL: I think that's the last slide for the climate.

If we could dispense the next slide, document host, please, Slide 10. So I'm going to talk about hydrogeology, geochemistry, and water quality. And I'll try to get through this as quickly as possible. I've identified a number of points here that I'd like to discuss.

The model setup in my opinion does not honour the geology of the site. I don't know how much more I can say that and how much more we'd have to belabour that. We went through it excruciatingly in the cross-examination, but it's pretty apparent that it doesn't.

There's a lack of hydraulic conductivity or K value measurements; there was three and one in the till, sorry, one in the clay. And this leads to concerns regarding the appropriateness of the results that have been modelled.

There appears to be some systemic bias, despite what has been said by the AT panel, which leads to concerns regarding the efficacy of the model in certain parts of the model domain. We have seepage estimates

that are considered -- that are way too low due to model-layering issues; this is my opinion; some geotech concerns related to pore pressures and the risk of shear-slip; and then we have the water quality assessment which is lacking with respect to any geochemical risk evaluation, in particular the mobilization of contaminants to local receptors, whether it's groundwater or surface water.

Next slide, please. Slide 11.

I won't belabour this. Mr. Secord did an excellent job of dealing with this. But the majority of the footprint underneath the SR1 reservoir is covered by lacustrine clay, upwards of 5 metres of the material. You can see that on the panel on the left-hand side, which is from Exhibit 110, PDF page 47.

And on the right-hand side, I'm showing you a slide view, which again, if you look closely enough, you can see the outline of the SR1 design and the reservoir with a brown swath coming through the middle. That is that lacustrine clay, and then it's flanked on either side by till. That particular image is from Exhibit 110, PDF page 50. So the majority of the area in the reservoir that's going to accumulate water is sitting overtop of lacustrine clay.

Next slide, please. Slide 12.

Well, I found this very interesting because there was a discrepancy in the geological configuration.

In the first quotation at the top, which is from Exhibit 327, PDF page 44, from Alberta Transportation's response to my submission, they seem to not believe that there are coarser textured units underneath the present SR1 PDA.

That completely conflicts with what was said in other submissions by Alberta Transportation. For example, Exhibit 159, PDF page 195, goes on to say: (as read)

"Unnamed Creek is an undersized river valley infilled with fluvial materials (sand and gravel) overlain by a glacial till."

Another exhibit, Exhibit 178, PDF page 16, goes on to say: (as read)

"Alluvial sand and gravel soils were encountered in the low-lying area of the Unnamed Creek near Station 23 plus 200 of the storage dam."

Next slide, please.

There's been some challenges with the reported model layer parameter values. I have to apologize. This particular table, which is from Exhibit 110, PDF

page 473, has now been superseded from another table from Exhibit 375, PDF page 48, that changes the values and actually makes them an order of magnitude or more lower.

But that still doesn't --

Q. Just for the record, that was the exhibit that was just newly entered yesterday afternoon?

A. MR. FENNELL: Correct, correct. It's just been surprising at how these things have been changing, hard to keep up with all these changes.

But despite that fact, it doesn't change the context around this data. And so I'm just going to carry on, because this is what I prepared.

So as I indicated, only three hydraulic conductivity field tests were conducted to give real data, not laboratory data, real data, real data that's giving you a better idea of a larger area around a borehole, as opposed to a small core that's confined in a laboratory and tested under controlled conditions. One of those was for the clay, and two were for the till.

Now, I would argue this is definitely not enough information to properly constrain a clay field.

What I found very interesting was their response that, "Well, we attempted to do a number of tests, but

there wasn't enough water or they were too slow." Well why didn't you report that? That's good information. That was not reported. All that was reported was three tests.

And as Mr. Secord pointed out, 16 monitoring wells in the unconsolidated deposits were successfully sampled for water quality, so they had to have water in them. Well, why weren't they tested, then? "Well, they're too slow," we get the response. "Well, that's still good information, isn't it?" I would say. Anyways...

Also there's been some very interesting configurations regarding K values. I draw your attention to the blue box, which is the till height conductivity north. We have an 8.3 times 10 to the minus 5; that's really, really high for a till.

What I think is important is a lot of these numbers have been changing, and that's very disconcerting.

Next slide, please.

This is Slide 14. So now I'm going to show you visually.

These are the five top model layers, there's seven layers in general. But what I'm showing, and in the larger image on the left-hand side, you can see that

purple area. That is the area of the clay. That's that lacustrine clay. And the more green-ish-blue or turquoise area is the flanking areas of the till that's underneath.

So what's interesting is the clay, which in the previous table was shown as having a hydraulic conductivity of 5.1 times 10 to the minus 6 metres per second in this image is shown as having 7.2 times 10 to the minus 8. That is an inconsistency. And we also see that that inconsistency carries on all the way down into the Layer 2 and Layer 3 and so on and so on.

So that's just an inconsistency. And that's going to affect the model results. When you have a lower hydraulic conductivity underneath, you're going to have less seepage, less leakage out of the bottom. This doesn't even take into account the possibility for the presence of fractures or other high permeability lenses within these units that would increase the hydraulic conductivity.

So they've just -- they've used a low value here.

Equally, as you saw in the previous slide, the presence of this sand and gravel has been substantiated by the geotechnical team; yet it is missing underneath the footprint of the SR1 reservoir. That's where the Unnamed Creek valley is. It's not there. It's totally

missing.

Where we were led yesterday I have no idea, and even this morning, we were led to areas outside of the reservoir. Well, I don't care about those. I really care about underneath the reservoir because this is where water is going to go.

Certainly I care about the diversion channel and the drawdown effects and the outlet channel equally; that needs to be considered. But the main player here is the reservoir, and we can see that we've got major discrepancies here.

Next slide, please.

THE CHAIR: Mr. Secord, sorry to interrupt Dr. Fennell. You had requested about an hour and we're approaching an hour and a half, which is not a big deal but we were hoping to adjourn around 5. Are you expecting to be done your direct around 5:00, or where are we at?

MR. SECORD: Yes, sir. And, as you know, we had expected Dr. Fennell to give a presentation in Topic Block 3 so he then moved so it's almost really like a combined, which is why -- I probably should have alerted you to the fact that, you know, we had this discrepancy in the process.

So, yes, we would be -- I mean, we've got ten

slides left and so, yes, we would be done before -- I'm hoping we'll be done by 5. And if we have to go maybe over a little bit, it would be nice if we could complete our panel, the examination-in-chief, and then my friends -- Mr. Fitch would have a complete record and then tomorrow morning we would come back for cross.

THE CHAIR: Agreed, and my apologies. No, we had talked about this and, for some reason, I just had in my head it was a cross; it was really on direct from Dr. Fennell as well. So my apologies.

But I would agree, if we can get that done today and allow Transportation to prepare, that would be perfect. So thank you very much.

MR. SECORD: Thank you.

A. MR. FENNELL: Thank you. I appreciate that and I will pick up the pace here. I know we've covered some of this ground so I won't belabour it.

THE CHAIR: Fair enough. But do not pick up the pace on your speaking. I think Ms. Vespa would appreciate that as well, so it's all good. Thank you.

A. MR. FENNELL: I will do that. Thank you, sir.

What we're looking at on this slide, which is slide 15, is model bias. And it is apparent Mr. Secord took Mr. Yoshisaka through this yesterday, but we do have a systemic bias. We have a 50 percent --

58 percent positive bias, and a lot of that positive bias is to the -- obviously to the east side of the structure, but what it does talk to is that there is bias in the model.

You were presented with a one-to-one line yesterday by Mr. Yoshisaka indicating that, while there was a good one-to-one correlation, but that's averaged across the entire model domain.

If you were to carve this model domain up into sectors, you would get very different results. So what it speaks to is the model is not performing well in certain parts of the domain compared to others. That's the point to take away from this, and so it does reduce the confidence.

Next slide, please.

MR. SECORD: Slide 16.

A. MR. FENNELL: Thank you. There is drawdown discrepancy. Again, I know that there's been an update to this particular image that I'm showing here which is from Exhibit 110, PDF page 141.

But what I find very interesting is that there's no drawdown along the outlet channel leading from the reservoir to the Elbow River.

Now, we have been told, and it is shown in Exhibit 110, PDF page 75, the image that I have up in

the top right-hand corner, that the water table is relatively close to surface, anywhere from a metre to 2 metres within the surface, below the surface of the land. And you can see that in the blue colours in the outlet leading down to the Elbow River.

Well, we do know that we're going to have an outlet channel and from the design in Exhibit 159, PDF page 206, but that channel is going to be excavated down upwards of 8 or 9 metres below the landscape. Well, that's 7 metres below the water table. And we also know that we have alluvial deposits in this area, alluvial sands and gravels, and we have the tills that will drain. There's going to be water that's going to be draining out of this material towards this excavation. And, of course, if it creates to surface flow, it's going to go into the Elbow River and it's going to take with it whatever it has.

Next slide, please. Slide 17.

This is looking at the modelled head increase and leakage estimates.

The image I'm showing here is from Exhibit 110, PDF page 149. It shows the depth of water that could be expected under a design like in the SR1 reservoir. So you can see upwards of 24 metres of head accumulated -- of water accumulated in this structure.

Now, I understand it thins out towards the northwest, but it's quite deep for a significant portion of the footprint, 12 metres. So 24 to 12 metres of water. When you have an increased head of that much and you have an elevated depth to groundwater, you're going to get greater leakage potential from the base. That's just the physics of it. And if it's really, really low conductivity, hydraulic conductivity material, you'll get less leakage; if it's a little bit higher hydraulic conductivity, you get more leakage. That's just the way it works.

So I struggled with the seepage estimates that Alberta Transportation has given us of 426 cubic metres per day when this structure is full.

When I actually use the hydraulic conductivity values that they have in their model for the clay, which was 5.1 times 10 to the minus 6, as a matter of fact, I took the geometric mean between the till, 7.2 times 10 to the minus 8, and the clay, 5.1 times 10 to the minus 6. I took the geometric mean, just to be fair. And when I did my math on the leakage from the base of this structure, I get over 100,000 cubic metres per day. And if you use the high conductivity till to the north, you get even higher values.

So I really don't know where they got this value, and it wasn't explained in the documentation or in the testimony.

So this is a big wild card here because, yes, if you don't want to have leakage out and have things flushed out of the till, just make it hydraulic conductivity and it won't happen.

Next slide, please. Slide 18.

Looking at mapped vertical flow gradients. We know that we have upward gradients in some parts of the model domain, or the study domain, particularly in the footprint of the reservoir, but it's weak, and I'll show you in the next slide.

We also have some steeper gradients under topographic highs, and that was pointed out in the cross-examination testimony. So that makes sense. I don't struggle with that.

But we also see in the panel to the -- so that particular image was Exhibit 110, PDF page 74, that was the left image.

The right image is showing the depth to water table again, from Exhibit 110, PDF page 75. And we can see that it's fairly shallow underneath the footprint of the Springbank reservoir -- Springbank off-stream reservoir, but it does extend, in some locations, 2 to

5 metres. So it can be anywhere from 2 to 5 metres, or within a metre. So it's variable. So that's going to dictate what those gradients are going to be like.

And so the depth of water table is generally greater than 1 metre and up to 10 metres or more in some locations, so you have to keep that in mind.

Next slide, please. Slide 19.

Well, what I'm showing you is what I just clipped out of the application documents. So on the left-hand side, we're showing from Exhibit 110, PDF pages 78 to 80. And I've just taken them, and I've overlain them, and I've aligned up the elevations.

So what we're showing on the top panel with the red star in it, and where that red star is indicated in the image underneath in the middle, that's where it's located. This is actual measured data. So what you see that, yes, okay, the bedrock does have a higher groundwater elevation than the clay and tills, but not always. Sometimes they cross over, sometimes they approach. And so this is talking about the dynamics of the vertical gradient. They're not consistently upward from the bedrock. They do have the possibility of shifting. And I think in this image you can see that they're getting pretty close to shifting.

Certainly on the right-hand side we've got a much

bigger separation, probably about a metre or so or more between the bedrock and the till with the gradient -- with the groundwater elevation and the bedrock higher than the till and clay. So, yes, that's clearly an upward gradient, but it's also on the outer edge of the reservoir itself.

So it really depends on where you are in the structure what the gradients are going to be, upward or downward, weak or strong.

Now, Mr. Secord did bring up in the cross-examination this hydrograph that I pulled from the Alberta Environment and Parks groundwater observation well. This well is located close to the Big Hill Springs Provincial Park. And what I've shown is the monitoring period that was assessed by Alberta Transportation. Those are those two little red lines.

You can see that that period does not capture, by any means, the variability that can be expected in the water tables. And so this can have a serious ramification for these gradients. You could have strong downward gradients if your water table increases substantially compared to your bedrock.

And so this is something that needs to be kept in mind for potential long-term sustained gradient reversals in future climates.

Next slide, please. Slide 20.

I wanted to bring up the geotechnical concerns because these are something that are extremely important and speak to the risk of the structure failure.

We know that a lot of geotechnical work has been done on sediments, and Mr. Back pointed that out quite a bit in his testimony cross-examine, but the question here is whether or not the interfaces between these particular formations were tested? Yes, you can test the materials but when you have one sediment sitting on top of a different type of sediment, that can be a point of weakness.

And we do know that when you put an external load on the ground, that the pore pressures have to respond in kind. So if the total stress increases, that's the loading -- the total stress, so that's the weight of the soil, the weight of the water increases, that increases the effective stress, which is the grain-to-grain contact between -- in the soil, increases that, and so then the pore pressures have to adjust accordingly, and they can go up.

So that's a concern for creating a shear slip situation.

And we also know that some of these deposits are

montmorillonite rich. This was in the Moran 1986 report. He's indicating there could be upwards of 40 or 50 percent montmorillonite in some of these deposits. Montmorillonite is a swelling clay. It's like bentonite. When it gets wet, it gets slippery, and it can slip.

So it's important that we understand that, and I guess the point that was made in Exhibit 327 and PDF page 45, and this was brought up in the cross-examination, is that the load was not placed on the till and the clay; it was placed directly on the underlying bedrock.

Well, we're not interested in that in this particular scenario; we're interested in what's going on at the interface between the clay and the tills and the bedrock. Not just the bedrock, not just the mud spills. Everything.

Next slide, please. I'm getting close.

I wanted to talk about the connectivity of the clays and tills in the bedrock. This slide is providing some chemical evidence of this. There is some physical evidence with the water levels but there is chemical evidence.

I'm showing you a Piper plot here, this trilateral -- or this triangular plot here on the left

side. This is from Exhibit 110 of PDF page 92.

What you see is some grey dots which are associated with the bedrock, and blue dots which are associated with the surficial deposit.

So this is showing the major ion composition, the calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride ions, and it's grouping them. And you expect waters with similar hydrochemical character to plot in the same area of these diagrams. And what you see is a lot of the surficial deposits have groundwater similar to the bedrock.

Now, what we heard the statement made was that there's a difference to the TDS. The average TDS of the bedrock is different than the average TDS of the tills and the clays. Well, if you're just looking at the average, you'd be fooled to believe that that's the case, but you have to look at standard deviations or variants around a median.

What I actually did is two statistical tests, I did a sign test and a Wilcoxon signed-rank test; they are not different, statistically different. This is how you have to compare data. You can't just say well, the averages are different. That's not good enough. A statistical test is required to validate that.

And what these statistical tests indicate is that

there is no difference. There is no statistically significant difference between the TDS and the tills, the clays, and the upper bedrock.

Next slide, please.

This is Slide 22. Talking about water quality and risk to connected systems.

So Alberta Transportation did do some baseline work on the water quality, and they did identify some constituents of concern, such as selenium and uranium. And these were above levels safe for human consumption and protection of aquatic life.

There was also some elevated nutrients identified in the groundwater in the form of organic nitrogen, and there was also some coliform form bacteria. So we know whatever has happened on this landscape over the past, that's got into the bedrock, sorry, into the groundwater and the tills. And that can get into the bedrock.

So there's this issue of the flushing that I talked about earlier of these contaminants from the clays and tills into the bedrock because they're connected; there is connectivity between them. And this flushing will occur, you know, whether the SR1 is full or partially full.

There's also the issue around mobilization of

additional constituents by oxygenated waters, enhanced reactions. Now, we know that no measurements were done for redox, so the assumption is made that they're oxygenated but how oxygenated? They could be partially reducing for all we know.

I attempted to dial it in by looking at some things and looking at some published redox ranges, but by no means am I a hundred percent right on. I would rather take some measurements or actually measure some redox couples chemically and do the calculation. But that has not been done, only assumption.

The other thing to keep in mind is when freshwater like water that will be coming in from a flood meets higher TDS waters in the till, certain things can happen. Certain chemical reactions can happen. There can be ion exchange reactions on surfaces of clays. They can bump off certain things. It's complicated; I'm not going to go there.

But what I can tell you is that absolutely no assessment of this was done. No assessment for the potential impact to groundwater quality, none of the actual redox state of the groundwater was identified, no geochemical reactions or fate transport characteristics were assessed. Only an assumption or a belief that the water quality will not be an issue.

So it remains unassessed and unresolved.

Next slide, please.

So the final considerations here. The SR1 does not address floods greater than the 2013 event. We know they have happened, likely have happened in the past and will likely happen in the future.

In my opinion, the MC -- McLean Creek 1 or MC1 is a superior option given its ability to manage higher magnitude floods up to the PMF, protect all downstream communities, store water for future drought mitigation, which is great for the city of Calgary, keeps ahead of water on the sediment so we don't have dust blowing. There's so many pluses there, but in my professional opinion, this is more in the public interest. But I know we're just looking at SR1 now.

SR1 will increase the risk to human and ecological health due to this flushing or leakage of water out, the accumulation of contaminants in there. It's going to be flushed into the underlying groundwater and connected systems, the groundwater, the bedrock water, the surface water in the outlet channel, dust inhalation from large open areas, and the accumulated sediments with associated contaminants is obviously a risk.

SR1 only provides additional water security for

the city of Calgary in flood years because, in my opinion, and this only just makes logical sense. During a prolonged drought condition, I don't think that the city is going to be dropping water levels in their reservoir if they don't have to because they're going to want to keep that water as much as they can.

And so -- and during a prolonged drought period, there is going to be a lower flood risk anyways because there's going to be a lack of precipitation likely including a snowpack. And so SR1 will not be needed at all.

So I have no idea how this increases the water security for the city of Calgary. That, to me, is just a gap in -- that's pretzel logic.

Next slide, please.

Alberta Transportation has not provided a sufficient level of assessment relating to the physical and chemical hazards and related risks posed to SR1. This is -- I hope I'm making this a clear point.

Alberta Transportation have assessed these hazards. If they would have assessed these hazards more fully and all the stakeholders had the information to understand the risks to the community and the environment, I think we would be in a much better position.

Alberta Transportation has relied on models to frame the hydrological and hydrogeological risk of SR1, but nothing has been done to address the geochemical risk. And I would even argue that the hydrogeological modelling from the physics is flawed.

And it's important to remember, and I do believe that it was either Mr. Wood or somebody pointed out that -- please back one slide -- that it's important to remember that models are only as good as the information used, understanding of the site, the skill of the modeler, your imagination. They are not unique and inherently inaccurate, but they are sometimes useful. And so it's not that they're totally useless; they guide us. They are meant to enhance human intelligence, not replace it.

Alberta Transportation has been relying on monitoring to assess the information gaps noted, and I argue that monitoring is not mitigation, and often times when you detect things, it can be too late, and it can be very difficult and sometimes impossible to remediate. So this is why we assess the worst-case scenario and I don't think that that's happened here.

Next slide, please.

This is the final slide.

So, again, I say many, if not all, of the issues

that I've raised today for SR1 would disappear if the MC1 option had been advanced, but, unfortunately, it has not.

And really at the very least, if this project is going to get approval, the proponent should be compelled to undertake more assessment work to provide the information necessary so the Board can make a good decision in the public interest.

So I thank you for the accommodation of this extra time, Mr. Chair, Panel members and participants. I'll end there, thank you.

MR. SECORD: Thank you, Dr. Fennell. And thank you, Mr. Chair, for letting us go over the usual 5:00 end point. And if I could as a housekeeping matter, I'm not sure Ms. Friend, if Dr. Fennell's errata sheet has been marked as an exhibit, and also if we could mark the PowerPoint as an exhibit.

THE CHAIR: Thank you. I was going to do that. So thank you, Mr. Secord, they do need to be marked. Ms. Friend?

MS. FRIEND: Okay. So the errata will be Number 383, and the PowerPoint will be Number 384.

EXHIBIT 383 - DR. FENNELL ERRATA SHEET

EXHIBIT 384 - DR. FENNEL POWERPOINT

PRESENTATION

MR. SECORD: Thank you, Ms. Friend. And Mr. Chair, with that my panel is available to answer any questions when the hearing resumes.

THE CHAIR: Right. And I think we'll start the cross tomorrow morning, for obvious reasons.

Real quickly, a couple of things: One, thank you to document managers today, Ms. Kaminski, Ms. Decosemo, and Ms. Taylor. A job well done.

And Ms. Vespa and Ms. DiPaolo, a lot of technical jargon to get down in transcripts, so we thank you very much. It's a tough job for sure.

We were asked about a break. I don't think we'll have much of a break, Mr. Secord. I mentioned I think your time forecast for finishing tomorrow was ambitious.

MR. SECORD: I think so.

THE CHAIR: I think it is. I would like to be -- it would be I think if we're finished Topic 5, all of the evidentiary portion, by end of Thursday, I think that would be pretty good. My estimation is that may not happen, actually.

I mean depends on what time we end up taking for sure, but based on what I've got on paper, it will be close.

However, so let's wait and see where that takes us, but the panel is open to not sitting on the Monday, Easter Monday. In particular, if we can -- if there is a little bit of evidentiary portion to be completed on the Tuesday, if we were to sit Tuesday, April 6th, and then have direct following that, that might work as well.

So we may also canvass over the next day or two, I might have Mr. Kennedy canvass, I've got some ideas in terms of time for direct, but he might canvass counsels about that as well, to see how that fits.

So we're open to not sitting on the Monday. I think we do need to wait until we see where we're at about noon on Thursday before anything final. But for now, let's assume that we'll be done close to Thursday or Tuesday morning and finals finished on Tuesday by 5:00 hopefully. So --

MR. SECORD: Thank you.

THE CHAIR: And thanks to your panel, much appreciated. It's been, you know, a good day I think, folks, but it is I think time to adjourn.

But are there any outstanding matters that anyone has before we close hearing today?

Hearing none, we're adjourned for the day. See you tomorrow morning, 7:45 sign-in, 8:30 start. Thank

you.

PROCEEDINGS ADJOURNED TO MARCH 31, 2021, AT 8:30 A.M.

Certificate of Transcript

We, the undersigned, hereby certify that the foregoing pages 1629 to 1888 are a complete and accurate transcript of the proceedings taken down by us in shorthand and transcribed from our shorthand notes to the best of our skill and ability.

Dated at the City of Calgary, Province of Alberta, on March 30, 2021.

"Lorelee Vespa"

Lorelee Vespa, CSR(A) RPR CRR
Official Court Reporter

"Deanna DiPaolo"

Deanna DiPaolo, CSR(A)
Official Court Reporter

- I N D E X -

VOLUME 7

M. HEBERT, M. SVENSON, W. SPELLER, D. BRESCIA, M. WOOD, J. MENNINGER, D. BACK, D. LUZI, D. YOSHISAKA, D. JOBSON, L. AUCOIN, T. NOBLE

(For Alberta Transportation)

F. FRIGO (For City of Calgary)

EXHIBITS

UNDERTAKINGS GIVEN

UNDERTAKING - TO ADVISE WHETHER THE PROPONENT SHALL PROVIDE, AS A CONDITION OF APPROVAL, RESOLUTIONS WITH LANDOWNERS DOWNSTREAM OF SR1 WHO ARE NOT ADEQUATELY PROTECTED BY THE PROJECT **(SEE TRANSCRIPT FOR FURTHER CONDITIONS)**		1696
UNDERTAKING - TO ADVISE WHETHER THE INDEPENDENT AGENCY OR BODY SHALL ENSURE THAT PROJECT REPORTING IS MADE AVAILABLE TO THE PUBLIC IN A FORMAT ACCEPTABLE TO THE PUBLIC AND THE SPRINGBANK COMMUNITY		1697
UNDERTAKING - TO ADVISE IF THE PROPONENT SHALL COMMIT TO REMEDIATE ALL ROADS, DRIVEWAYS, ACCESS ROADS THAT ARE IMPACTED BY SR1, INCLUDING CONSTRUCTION TRAFFIC AND ROADS FLOODED DOWNSTREAM OF THE SR1 OUTLET, AND THAT THESE SHOULD BE PROJECT COSTS AND SHOULD NOT BE BORNE BY ROCKY VIEW COUNTY TAXPAYERS		1698
UNDERTAKING - TO ADVISE WHETHER THE PROPONENT SHALL ESTABLISH A DETAILED PLAN AND PROCESS STEPS FOR SCHOOL BUS REROUTING DURING FLOOD EVENTS **(SEE TRANSCRIPT FOR FURTHER CONDITIONS)**		1700

UNDERTAKING - TO ADVISE, IF EVACUATIONS ARE RECOMMENDED OR MANDATED, WHETHER THE PROPONENT WILL EVACUATE RESIDENTS IN A TIMELY FASHION **(SEE TRANSCRIPT FOR FURTHER CONDITIONS)**	1700
UNDERTAKING - TO ADVISE WHETHER THE PROPONENT WILL AGREE TO NOT NAME THE SUBJECT STRUCTURE THE "SPRINGBANK OFF-STREAM RESERVOIR"	1701

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