

MANITOBA CLEAN ENVIRONMENT COMMISSION

HEARING

VIVIAN SILICA SAND EXTRACTION PROJECT

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Transcript of Proceedings
Held at Mennonite Heritage
Village

Steinbach, Manitoba

Thursday, March 09, 2023

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Terry Johnson - Commissioner
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Christine Hutlet - CAO, Regional Municipality of Tache
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Reporter: Arfana Mulla, Shania Chen, and Nidia Romero

1 THURSDAY, MARCH 09, 2023

2 UPON COMMENCING AT 09:30 A.M.

3

4 THE CHAIRMAN: Good morning. It's
5 9:25, we'll start in five minutes, please.

6

7 (LONG PAUSE)

8

9 THE CHAIRMAN: Chair. I recognize
10 it is 9:30. We're just trying to work through a technical
11 issue here, so bear with us for a minute. We're trying to
12 get Ms. Boryskavich a microphone because I feel it's
13 important she have the same opportunity that Mr. Williams
14 did yesterday to direct, and nudge, and draw attention to.

15

16 (LONG PAUSE)

17

18 THE CHAIRMAN: Chair. For those of
19 you that are wondering what we're doing, we have a
20 participant participating by Zoom, so we're trying to
21 endeavour to work out the audio exchange.

22

23 (LONG PAUSE)

24

25 THE CHAIRMAN: Chair. Good morning,

1 everyone, and welcome to our last day in Steinbach at the
2 Mennonite Heritage Village. It's been great being here,
3 but tomorrow we'll move to Anola.

4

5 MSSAC has the floor today, so to speak.
6 So, in the interest of understanding how this is going to
7 unfold, I invite Ms. Boryskavich to give me a little bit
8 of a rundown of what their witness testimony is going to
9 look like, please.

10

11 MR. BORYSKAVICH: Good morning. Krista
12 Boryskavich on behalf of MSSAC. Our first witness will be
13 Mayor Poirier representing MSSAC's municipalities,
14 following which we will have KGS present their expert
15 report. And we defer to the Commission as to whether you
16 would like questioning to occur after each witness
17 presents or whether you would like all questioning to
18 occur at the end.

19

20 THE CHAIRMAN: Chair. I think I'd
21 ask that you proceed with your full testimony and then we
22 will proceed with -- with questions.

23

24 MS. BORYSKAVICH: Thank you. So, with
25 that, Mr. Crocker, we'll proceed with Mayor Poirier.

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SECRETARY: Secretary. Can you state your name and spell it for the record, please?

MR. POIRIER: My name is Armand Poirier --
A-R-M-A-N-D P-O-I-R-I-E-R.

SECRETARY: Secretary. Do you, Armand, solemnly affirm that the evidence to be given by you shall be the truth, the whole truth, and nothing but the truth?

MR. POIRIER: Poirier. Yes, I do,

SECRETARY: Secretary. Thank you.

THE CHAIRMAN: Chair. Please proceed.

MS. BORYSKAVICH: Okay. Thank you. Boryskavich speaking. Mayor Poirier, what is your current job title?

MR. POIRIER: Poirier. My current job title is Mayor RM of Tache.

1 MS. BORYSKAVICH: Thank
2 Boryskavich. And how long have you been the mayor of the
3 RM of Tache?

4
5 MR. POIRIER: Poirier. I was elected in
6 October 2022.

7
8 MS. BORYSKAVICH: Boryskavich. And you
9 were a counselor before that?

10
11 MR. POIRIER: Poirier. That's correct. I
12 was a councillor for two terms before that, eight years,
13 beginning in 2014.

14
15 MS. BORYSKAVICH: Boryskavich. So,
16 you're very familiar with the municipal issues within the
17 RM of Tache, then?

18
19 MR. POIRIER: Poirier. I would have to say
20 yes, I do believe that.

21
22 MS. BORYSKAVICH: Boryskavich. And how
23 would you describe your role as a public official?

24
25 MR. POIRIER: Poirier. Well, here's how I

1 view it as mayor. I'm an individual that was chosen by
2 the ratepayers, the public, the people I represent, and I
3 see myself as being the custodian of the RM of Tache. I'm
4 in passage and in -- in the process, I'm there to ensure
5 that the decisions that are taken, are taken with the --
6 with my successors -- in mind -- our children and our
7 grandchildren, what we're going to leave to them. So, I
8 view my role as a very seriously as someone who is
9 responsible for what will occur during my tenure as mayor,
10 because my tenure basically is a preparation for those
11 coming after us.

12

13 MS. BORYSKAVICH: Thank you.
14 Boryskavich. And the RM of Tache is a member of MSSAC,
15 correct?

16

17 MR. POIRIER: Poirier. That's correct, yes.

18

19 MS. BORYSKAVICH: Boryskavich. And
20 through MSSAC, and through the RM's membership, you're
21 aware of the issues that have been expressed by other
22 municipal MSSAC members and their ratepayers with respect
23 to the project?

24

25 MR. POIRIER: Poirier. Yes, that's correct.

1 I'm intimately aware of the issues that have been raised
2 surrounding this topic.

3

4 MS. BORYSKAVICH: Thank you.
5 Boryskavich. And Mayor Poirier, I just want to explore
6 the mandate of MSSAC a little bit. Can you confirm that
7 MSSAC was set up with the mandate to collect and review
8 information with respect to this proposal, specifically
9 focusing on certain issues of importance to the
10 municipalities in their ratepayers?

11

12 MR. POIRIER: Poirier. Yes, that's exactly
13 true -- exactly correct.

14

15 MS. BORYSKAVICH: Boryskavich. And can
16 you confirm that one of those issues is water quality and
17 effects on the aquifer?

18

19 MR. POIRIER: Poirier. Yes, again, that's
20 correct, that's definitely one of the major ones.

21

22 MS. BORYSKAVICH: Okay, Boryskavich.
23 And Mayor Poirier, can you tell us -- and in non-technical
24 terms, because we'll be hearing from the technical expert
25 shortly, can you tell us about MSSAC's concerns or issues

1 with respect to the projects potential impact on water
2 quality and effects on the aquifer?

3

4 MR. POIRIER: Well, that has a huge impact
5 of course, and it's something that is highly important
6 because, as you know, on the soils of the RM of Tache,
7 there are 13,000 residents, and those 13,000 people need
8 water to live. And it's our responsibility, and mine
9 specifically, to ensure that that water supply remains
10 safe and abundant.

11

12 MS. BORYSKAVICH: Thank you.
13 Boryskavich. And would you say that that is the same
14 concern that your fellow MSSAC members share?

15

16 MR. POIRIER: Poirier. Yes, that's exactly
17 correct.

18

19 MS. BORYSKAVICH: Okay. And Mayor
20 Poirier, can you confirm that another issue of importance
21 to MSSAC members is the project's impact on municipal
22 infrastructure?

23

24 MR. POIRIER: Poirier. Yes, again, that's
25 extremely important. It's one of the -- the things that I

1 personally, and as an elected official, feel is highly
2 important because when we talk about environment, it -- it
3 encompasses soil quality, water quality, air quality, but
4 more than that, the environment we live in, which is our
5 quality of life and our standards of living. And are we
6 going to imperil the standards, or are we going to impose
7 on the citizens things that they don't want to? So,
8 having said that, it's -- it's incumbent on me, on us, as
9 elected officials, to ensure that the proposals that are
10 brought before us are safe and acceptable. And on a -- on
11 the infrastructure side, it gets a little deeper than that
12 as well because if we introduce services in the RM that
13 would cause us to have to double down, for example, on
14 protective services, on our fire department, on our
15 policing, on our -- on our equipment, our -- our
16 maintenance equipment because we've had, for example, in
17 mining project that was brought into our territory, who's
18 going to pay for that? Will it be the ratepayers? Or are
19 the proponents prepared to ante up and help us supply some
20 of those services?

21

22 MS. BORYSKAVICH: Boryskavich. Thank
23 you for that. And you're aware that this licence
24 application is for a four to five year period covering the
25 initial project area, correct?

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MR. POIRIER: Poirier. Yes, I am.

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MR. POIRIER: Poirier. Yes, that's correct.

1 I think that -- that would be an important component to
2 help reassure the people that there's a certain sincerity
3 about reviewing the operations after they've been
4 introduced. And I think that that's not expecting
5 anything unusual. In the conditional use process, at
6 least, in the municipality that I represent, most
7 conditional use permits are required to be revisited after
8 a certain amount of time. An analogy I like to use is
9 chickens. If you want to keep some chickens in the RM of
10 Tache, you have to come and appear before -- before the
11 Council. So, we'll give you permission to have the six
12 chickens in the yard, and with that, as long as the
13 neighbours are okay, usually we'll put a condition, or
14 recommendation, saying but you'll come back in a couple of
15 years. We want to hear from the neighbors. If the
16 complaints come back that there was roosters crowing all
17 night and the -- and the hens weren't kept in the -- in
18 the cage, well, we're going to have to reconsider our
19 decision. So, if we're applying rules, it's not only
20 rules, those are bylaws, such as this one to our own
21 private citizens, I think that it only -- it's only
22 reasonable that for any operation, large or small, there
23 should be a review process after a given time.

24

25

MS. BORYSKAVICH: Thank you.

1 Boryskavich. From your perspective as an MSSAC member
2 then, is it also important that any long term project
3 monitoring committee include municipal representation from
4 all impacted municipalities?

5
6 MR. POIRIER: Poirier. Well, again,
7 absolutely. Who knows how long I will be in office? How
8 -- who knows how long the mayor of Reynolds, or
9 Springfield, or any other municipality, will be in office
10 and how long their councils will be there. So, while we
11 can commit today, we have no idea what's awaiting us in
12 the future, and we can't just assume that in ten years'
13 time the world's going to be operated the way it is today.
14 Certainly the -- the world we see today is not what it was
15 five years ago. And for that reason, I think that that
16 would be very important.

17
18 MS. BORYSKAVICH: Thank you.
19 Boryskavich. And one final question for you, Mayor
20 Poirier. After hearing all of the evidence presented so
21 far, what are your -- what is your opinion, or what is
22 your thoughts on the project?

23
24 MR. POIRIER: My thoughts haven't changed.
25 I'm watching the process. I'm listening carefully. I

1 have people that have varying opinions on this. I think
2 it was the first day of the hearing, there was a young man
3 from the RM of Tache who showed up here, and he was 100
4 percent for this -- unconditionally. He said, 'You know
5 what, you've got to let this happen.' On the flip side, I
6 had a granny that phoned me last night, and her view was
7 the opposite, and said -- she said, 'Armand, you got to go
8 to bat for us, you got to this, you got to that.' So, my
9 view personally hasn't changed. As an elected official,
10 I'm here to do what's best for the people of the RM, to
11 ensure that the decisions that are going to be made are
12 going to be led in order that we can guarantee that
13 whatever happens, there will be minimal impacts. And that
14 it'll be for the -- the good of the whole.

15

16 MS. BORYSKAVICH: Boryskavich. Thank
17 you, Mayor Poirier. That's all the questions that I have
18 for you, and I believe we're moving straight into the KGS
19 presentation?

20

21 THE CHAIRMAN: Chair. Mr. Secretary,
22 is that correct? Okay, so we just need a second here to
23 work with the technology.

24

25 MR. POIRIER: Poirier. Thank you.

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THE CHAIRMAN: Chair. Yes, thank you
very much, Mr. Poirier.

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SECRETARY: Secretary. Bert from KGS, can
you hear us? Secretary. Great, we can hear you as well.
I think we're okay here. Hold on a second. Secretary.
Could I get the one in person here to state their name and
spell their name for the record please?

MR. MANN: Good morning, my name is Jason
Mann -- J-A-S-O-N M-A-N-N.

SECRETARY: Secretary. Jason, do you
solemnly affirm that the evidence to be given by you shall
be the truth, the whole truth, and nothing but the truth?

MR. MANN: Yes, I do. Mann.

SECRETARY: Secretary. Bert, online, can
you state and spell your name for the record, please?

MR. SMITH: (inaudible).

SECRETARY: Bert, thank you. Bert, do you

1 solemnly affirm that the evidence to be given by you shall
2 be the truth, the whole truth, and nothing but the truth?

3

4 MR. SMITH: Yes, I do.

5

6 SECRETARY: Thank you.

7

8 THE CHAIRMAN: Chair. Mr. Mann, Mr.
9 Smith, please proceed.

10

11 MR. MANN: Jason Mann here. Thank you,
12 Chair. Thank you all present. Panels from -- from
13 earlier this week. One small note of housekeeping.
14 You'll probably note in your printed version of our
15 presentation there's a couple of blank pages. I wish I
16 had an answer on why that happened, but there's 19 slides
17 of content. The back page is Page 20. They're numbered.
18 I believe they're all there. So, those blank slots could
19 perhaps be for sketches or notes, and I apologize for --
20 for that printing that I wasn't able to solve. So, just a
21 note on that.

22

23 And I think procedurally here, I'll largely
24 run through the presentation. Bert -- and also
25 appreciate, Chair, panel, all -- all here that -- the

1 availability to have Bert on remotely. He's been part of
2 this project, part of the work that we've been doing on --
3 on behalf of MSSAC. Bert, for your context, on the lead-
4 in here, I'll let you introduce your background, and
5 history, and experience and then I'll largely roll through
6 the -- the deck. And I guess if there's something Bert,
7 that you felt you would wish to jump in on, you know, give
8 that a go. We'll manage it and go from there if that
9 makes sense.

10

11 MR. SMITH: (inaudible).

12

13 MR. MANN: So, Mann speaking. Again,
14 just to highlight the individuals involved in the work
15 here, in terms of the lion's share of the things that
16 we've been doing on behalf of MSSAC, Bert Smith, who's
17 here with us remotely, myself obviously, and as well on
18 the back end on a -- on a few bits and pieces, Tim
19 Packulak, who is just cleaning up his back end of his PhD
20 at Queen's. He's P.Eng., P.Geo., works with us and has
21 been working with us and he's in the world of geotech rock
22 mechanics. So, Tim is not participating live here but he
23 is a -- a portion of our team. And I would say then, in
24 general, that Bert would be on the geotech and groundwater
25 side, I'm in the geology groundwater, dabbling on the

1 geotech side, and -- and as mentioned Tim was our -- more
2 on the geotech rock mechanics side. So, Bert, on that,
3 I'll -- I'll let you introduce yourself perhaps, and run
4 through your background and -- and history for the -- for
5 the panel, and the participants here, and the proponent.
6 Thank you.

7
8 MR. SMITH: (inaudible) development, such
9 as the Long Spruce site, northern Manitoba, the -- the
10 Limestone Generating Station in the Nelson River, and also
11 the Conowapa site in -- under study on the Nelson River.
12 Those are sites that had a lot of -- particularly bedrock
13 issues, stability, and excavation issues and the -- the
14 latter two included limestone and sedimentary sequence of
15 rocks. Also I had worked, prior to that, on the Nipawin
16 hydro project in Saskatchewan. Again, we worked with a
17 lot of tills there -- strength, stability of the -- of
18 the structures. These are projects that are in the, say
19 500, to a billion dollar range, just to give you a feel
20 for the scale. And I also worked on a -- on a full range
21 of smaller projects through the years. And I guess that
22 from the CEC experience, I was involved in the floodway
23 expansion CEC hearings with the -- in fact, Doug McNeil
24 was involved with that as well. The work there, I focused
25 largely -- well on both the geotechnical stability in the

1 -- in the clays and the tills, as well as the groundwater
2 issues. So, quite a -- I guess a -- a long term
3 experience in engineering and -- and then - I didn't
4 mention, but with several projects with rock mechanics,
5 tunneling jobs. I don't pretend to be a rock mechanic
6 modeller, but I do have a very practical and breadth of
7 experience in -- in geotechnical and geological issues
8 related to both soils and bedrock. And a lot of
9 experience from the numerous projects over the years. I
10 think that covers the key points there. Give you a bit of
11 a feel for my background.

12

13 MR. MANN: Mann here. Thank you, Bert.
14 I do think you covered the bases there. I'll speak
15 similarly for myself. Mann speaking. In my earliest
16 years of being a student at university, I worked with the
17 Manitoba Geological Survey. Back in those days, in the
18 early nineties, they ran diamond drilling programs for
19 various reasons here in the province -- stratigraphic
20 mapping, economic minerals, Precambrian geology, bunch of
21 things. Spent a -- a couple of seasons there -- 18-week
22 field seasons, hands-in as a rig hand, basically learning
23 the ropes of diamond drilling and everything that goes
24 with it -- handling core, working with geologists,
25 learning from them. Those were some of my earliest days.

1 And through time in doing that, I -- I did end up jumping
2 into a Master's program. Connections back to the
3 provincial geological survey at that time allowed me to
4 fill in for -- on a few programs where the Paleozoic
5 stratigrapher wasn't available to do the work and I
6 substituted in and -- and help with that because they had
7 familiarity with me. And even as -- still a Master's
8 student, gave me the opportunity to do that work. Still,
9 as a Master's student at the back end of writing my
10 thesis, I had a contract job with the Geological Survey of
11 Canada. That's the federal agency that does geological
12 work and governs all geological work in -- in this
13 country. That was a surficial mapping job in this
14 province -- not specifically related to what we're talking
15 about here on this project, but important because it's --
16 it's root -- what I call meat and potatoes, geological
17 work, understanding the systems, understanding what you're
18 looking at, collecting the data, having the rigour to --
19 to put those maps together, which have been published, or
20 out in the world. Subsequent to that, and graduating with
21 my Master's -- so, I mean coming out of my Master's
22 degree, I had probably the equivalent of at least nine
23 months of diamond drilling work and all the related things
24 that go with it, with a year and a half of working for the
25 GSC and was hired by Bert at KGS. So, that was in 1999,

1 and I've been there since. I've been mentored there and
2 worked there. Currently my roles are Department Head of
3 the Environmental Group at KGS Group, as well as a
4 principal of the enterprise as a whole.

5
6 And just a brief touch point on my history
7 with KGS and the projects that are related and relevant
8 here -- Bert's touched on a few of them. The Floodway
9 expansion was a big one -- instrumentation,
10 characterization, pumping tests, construction dewatering
11 design, all things groundwater related to what was going
12 on in terms of design and construction of that project. I
13 spent probably a decade between design and through
14 construction on that project -- included the development
15 of the three-dimensional groundwater model, which -- which
16 I did. The Conowapa site -- the future Conowapa site
17 Manitoba Hydro on the Nelson River is analogous -- it's a
18 limestone foundation. Similar geology to what we're
19 talking about here. Bedrock mapping, re-evaluating, test
20 excavation, mapping, instrumentation, both groundwater,
21 permafrost, soil stability. Multiple water well drilling
22 programs to establish future camp well water supplies at
23 the adjacent Keewatinoow Converter Station, establishing
24 and pump testing wells there for future fire suppression.
25 I wrote -- rewrote the geological interpretation of the

1 project -- for that future project for Manitoba Hydro.
2 It's two volumes. It included a free-flow model where we
3 evaluated sensitivities to grouting and fracture flow
4 issues that might occur. It's a complex foundation in
5 limestone. Other geological work -- groundwater work. I
6 established the -- the well water supply for the entirety
7 of the Keeyask Generating project that supplied over 1,000
8 workers, over seven or eight years' worth of time of the
9 construction of that site -- a sustainable, clean and
10 excellent water supply. Did the work to site that well.
11 All the testing, well installation, and all the things
12 that go with that. More recently, and analogous, is work
13 related to the Lake Manitoba and Lake St. Martin flood
14 channels. That goes back to emergency channel works in
15 2011. Design works starting in 2013. Exploration, pump
16 tests, instrumentation, quarry siting, rock quality
17 testing from 2013 to now, where we're in the hearing
18 process -- federal process. So, I'm sitting on -- on that
19 part of the table as a technical person with a long
20 history in that project. I think I'll probably leave it
21 there, but just to give a bit of a background on -- on
22 where I've started and where I've been, which would be
23 related to some of the things we're talking about here
24 today. The only ---

1 MR. SMITH: Bert here. If I could just
2 add to my comments, I guess a key consideration, or you
3 know, awareness is that both myself and Jason have an
4 extensive experience within the Province of Manitoba, are
5 very familiar with the conditions here -- both the tills,
6 the stratigraphic rock, bedrock, limestones such as occur
7 at this particular site, and -- and we've been involved
8 with these things for our whole careers. So, we're very
9 comfortable in -- in being local, very knowledgeable about
10 the situation here.

11

12 THE CHAIRMAN: Chair. I think -- I
13 think we probably can move on here. I expect Mr.
14 Duncanson will attempt to ringfence your expertise
15 anyways.

16

17 MR. MANN: Mann speaking. Thank you.
18 So, the overview of the presentation today, you know, I
19 would characterize the things we're going to talk about
20 today as bit cuts, and what I mean by that is to say what
21 are the things inside of this project that we feel are
22 important? Some of the questions that I've asked of the
23 panel earlier this week are related. Of course, they were
24 very specific and there was a lot of very specific
25 dialogue about very specific things in the last week and a

1 half. That's not really the cut here today. It's going
2 to be sort of a -- a reestablishment of what's important
3 and why, without going into the minutiae. Depending on
4 what the questions are later, we might go into the
5 minutiae and -- and that's okay, but just to give some
6 context of -- of the, the tenor of this presentation.

7

8 Want to touch on geology and geotechnical
9 stability, groundwater in terms of well extraction
10 operations, groundwater side on water quality, water
11 levels, and then some of the monitoring plans. So, we've
12 seen drafts of groundwater monitoring and mitigation plan,
13 the well abandonment plan, waste characterization plan.
14 The plans are important and we'll -- we'll touch on that
15 as we move through the -- the presentation.

16

17 So, on the geology, geotech stability, none
18 of what's in this slide will be probably surprising to
19 anyone. It's more of an overview and a high level look at
20 -- at how the process works and including on this project.
21 Data collection is important. Observation is important.
22 I'm a very observational person. Personally, I think it's
23 important in terms of looking at geology and natural
24 systems. Multiple scales of observation is important.
25 Natural -- natural variability, and addressing natural

1 variability is important.

2

3 So, you know, if you're looking at a
4 project, how do you do it? Well, you look at exposures of
5 -- of the geology that you're working in, if that's
6 possible, any analogues, similar situations, similar
7 geologies, similar conditions that you've worked in or
8 have looked at that -- that apply. Other large scale
9 examples. Drill down a little further. You have to look
10 at the literature -- papers that are published, maps, all
11 that good stuff. That's a given. Design your data
12 collection program. Collect the details -- you go out and
13 do drilling, you do core logging, you run a televiewer
14 downhole, you do lab test data to get material properties,
15 drill test wells, do pumping tests -- in this case, do
16 your sand extraction tests -- do your sonar of void
17 spaces. So, that's sort of the drilldown on how things
18 play out. And in this case, right, sort of the
19 progression of the project, I don't think any of this is -
20 - is terribly new.

21

22 But one of the things we want to touch on
23 is -- is the geology and the model geotechnical failure
24 modes currently modelled, the shear mode, and as a bending
25 failure mode. The assumption made here is that this is a

1 massive, predominantly horizontally bedded cap rock
2 without a real application of vertical jointing. So,
3 what's important here is that the vertical joints are
4 important. Not allowing for including modelling another
5 scenario that includes vertical jointing, if you don't do
6 that, the models that are here aren't representative of
7 what's known in Manitoba and what the geological structure
8 of all these carbonate strata are. These failure modes,
9 as done now, without the -- the consideration of vertical
10 discontinuities wouldn't represent the carbonate strata
11 and how they might actually behave in the field. Touched
12 on this before, but the carbonate bedrock in Manitoba
13 everywhere is characterized by horizontal bedding planes
14 and vertical to subvertical jointing. The vertical to sub
15 vertical piece, you know the -- the bedding plane part is
16 largely due to sedimentation and the history there on how
17 those sediments were laid down and later became rock. The
18 subvertical to vertical jointing is -- is also part of
19 geological history, but it's -- it's a result of a
20 different -- different processes, basin-wide uplift and
21 tectonism. Like, we're talking this is geological time,
22 this is hundreds of millions of years ago, so we got to
23 put that in context, too. In geological time, the
24 exposure, the erosion and karst processes that these
25 carbonate rocks were subject to where, when subject to

1 erosion and exposure, preferential weathering occurred
2 down these vertical and horizontal discontinuities. And
3 then more close to our history in the last, you know,
4 multiple tens of thousands of years, other glaciation,
5 which also impacts erosion and would lay down the tills
6 that we're all familiar with here. And in some cases, not
7 all, but in some cases, glaciotectonism, and what I mean
8 by that is big movements by ice are able to rip up parts
9 of rock, and move them around, and do various things,
10 which sometimes when you're out drilling, creates some
11 curious results. And then since the glaciation has gone
12 away, isostatic rebound is something that's been going on
13 here in the province as well. So, there's a -- a detailed
14 and important history here, and what's important is -- is
15 understanding what the geology is and what those
16 discontinuities are.

17

18 So, the next series of slides I have, and
19 you probably won't see them very well on the screen, but
20 hopefully you can see them inside of the printouts, and
21 this is where if you -- if you think about the -- the
22 start of my -- my dialogue about approaching a project,
23 you know, where can I look at analogues, where can I look
24 at exposures of the geology we're talking about? Because
25 we know the carbonate rocks that we're dealing with here,

1 where we are, and where this project are, are buried, we
2 can't see them, but we can see them in the province. This
3 is an exposure of the Ordovician Age Dog Head Member.
4 That is the carbonate strata sitting immediately above the
5 sand. And this is an outcrop in -- in the Hecla Island
6 area, Grindstone Provincial Park. It's one of the closest
7 places where you can see it. The geologist in the picture
8 is Jim Bamburak, he's a provincial geologist for decades.
9 He's -- he's since retired. These are a series of videos
10 which I -- the link is given. I think this is one of the
11 last things he did towards the -- the back end of his
12 career in -- in retiring I think five or six years ago,
13 maybe a little more. They were connected to our
14 provincial geological and -- and engineering governance
15 body, Engineers, Geoscientists Manitoba, sort of as
16 outreach. But importantly, these -- these are sources of
17 images just to help all of us visualize what this stuff
18 looks like. And this is the formation sitting exposed in
19 a different -- different location, but the formation that
20 sits above the sand here. And I just want to talk a
21 little bit about these discontinuity sets. So, the block
22 that he's got his hand on there might be -- it's
23 weathering out of an exposure, it's a bit of a displaced
24 block, but the interesting part is that you can kind of
25 see it's got a bit of a V-shape and its shape -- that

1 shape is a resultant of the fact that there's vertical
2 discontinuities that define these rock blocks in this
3 formation. We move to another screenshot out of this
4 work. This is just another visual of what the bedding
5 plane partings look like. I apologize there's not a scale
6 here, but I believe by context of this video these --
7 these bedding plane partings are probably tens of
8 centimetres separated. And again, this is just shown for
9 interest, what does this look like, you know, in places
10 where we can go and look at what the geology is.

11

12 This is an interesting one. Again, same
13 formation. You can kind of see the sand below the outcrop
14 of rock here. Why I've shown this picture is that where
15 this rock is exposed and to -- to show how it weathers and
16 how it behaves, let's say. So, you can see those blocks
17 or to the right. You can -- you can make out those sort
18 of centimetre scale or tens of centimetre scale bedding
19 planes. But what's important is that these blocks of
20 rocks are a little bit bigger. So, you know, and I know
21 in the geotechnical work the -- the key bedding plane
22 partings chosen in terms of horizontal discontinuities, I
23 believe, were between point six, point eight of a metre.
24 You know, that's probably reasonable. It looks like that
25 is the scale of these blocks. But the other part that's

1 important is that the vertical discontinuities define how
2 these things break out effectively and fall out of the
3 formation. So, you can see these sort of square-shaped to
4 V-shaped, you know, metre thick plus or minus two, -- you
5 know, metre and a half to two metre-sized blocks of rock.

6
7 Horizontal discontinuities matter.
8 Vertical discontinuities matter. It is the formation
9 that's sitting on the sand here. We can go and look at
10 it, and this is what it looks at -- like, in the places we
11 can go and see it. There isn't a reason to believe that
12 this kind of structure doesn't exist here.

13
14 This is one last look. This is a quarry
15 floor in -- of the same Ordovician aged bedrock. It's a
16 very flat floor, as you'll notice, the reason being is
17 it's a glacially striated surface. What that means is
18 this is the -- the pavement left behind after the ice
19 plowed it and flattened it out. What's important here is
20 -- and Jim's there for scale, you can hopefully see two
21 parallel vertical fractures. He's standing on one of them
22 with his foot and the other is, you know, probably three
23 to four metres to his right, running parallel in and out
24 of the page, let's say. You can kind of see they're
25 defined by the -- the vegetation growing in them. It's

1 often because they fill with soils and the plants will
2 grow there, however, continuous spaced vertical joints.
3 You can also see in and around his feet to his left, to
4 the right of the photo, other obliquely angled vertical
5 joints that run into the ones that he's standing on. So,
6 again, this is the kind of structure that's pervasive in
7 the rock. They exist. I know in earlier dialogue, talked
8 about vertical holes versus inclined boreholes. If you
9 can imagine drilling vertical boreholes, even -- even on
10 top of this surface -- if you drill in the middle of one
11 of these intact blocks, you wouldn't resolve a vertical
12 feature. If you drilled on top of a vertical feature, you
13 would see it. You know, roll the dice, what's your luck
14 of hitting one of these vertical features? Again, you
15 could just look proportionally at what intact rock blocks
16 are versus discontinuities. It's a bit of a needle in the
17 haystack, but the point is, they're there. And often, to
18 resolve these, inclined holes are drilled to -- to get a
19 better characterization of what it looks like. So, I'll -
20 - I'll leave it there. I just wanted to, for information
21 purposes, for context, to present this information because
22 it's important. It's important to the geology. It's
23 important to how the geology is looked at and modelled on
24 this project. And I think we've talked about that before,
25 but here are some visuals to -- to help with that.

1
2 So, again, design on the geotech side was
3 based on the sequence of competent and predominantly
4 unfractured cap rock found to be present -- found to be
5 present in vertical boreholes. So, the geotechnical
6 failure modes as we've touched -- touched on, or the shear
7 mode and bending failure mode of a relatively planar and
8 continuous strata. Again, vertical joints exist. They
9 exist in the carbonate rock everywhere in this province
10 and in the project area, and they're not really directly -
11 - they're not directly addressed or accounted for in -- in
12 the geotechnical modelling to date.

13
14 One of the things in the terms of the
15 failure modes, at least in some of the earlier
16 geotechnical analyses, was in the beam -- beam mode, and
17 there were cantilevers of I think up to about seven metres
18 in length modelled or allowed form within that work. And
19 again if -- it may be valid, it may not be valid, if these
20 vertical joint spacings in these rock blocks are of a
21 smaller scale. If they're exposed in the -- in the roof
22 of one of these void spaces, you know it -- it could be a
23 challenge. So, know, again, we've touched on this in the
24 panel, all the investigation boreholes, the reviewed water
25 well boreholes, et cetera, their vertical -- vertical

1 fractures within the bedrock are not easily resolved by
2 vertical boreholes unless you drill right into one of
3 these vertical features. The lack of this data or a gap
4 regarding the vertical jointing in the bedrock was noted
5 in our discussions with the geotech panel and that's --
6 that's great.

7
8 We talked about the potential for maybe an
9 additional failure mode, you know, something related to
10 discrete blocks of rock defined by these bedding planes
11 and vertical joints that might be subject to displacement
12 out of the roof of these void spaces by gravity. We
13 discussed that.

14
15 I don't know if there was a commitment to
16 revise or revisit the geotechnical modelling, but it -- it
17 would be important. And just to look at this potential
18 failure mode and -- and assess this failure mode, which
19 would -- would more closely honor the -- the observed
20 discontinuity structures in the carbonate bedrock. And
21 that could -- you know, one could discuss about well, we
22 don't know orientation, we don't know spacing all of these
23 -- these good things and -- and you know you're not going
24 to go and drill eight million boreholes to do that. But
25 some of that could be handled with a sensitivity analysis.

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What does this mean for me if I've got joints at two metres, or five metres, or seven metres, or some other number? So, just -- just some context and -- and some -- some comments on -- on what might be -- what is important here, we feel, to -- to assess or address what -- what the geology is and what the performance of these void spaces might look like.

One more on -- on geology and geotech. We talked a lot about it in the panel, the 65-degree sand slope geometry. So, in the -- in the sonar imaging, you know, there is vertical -- the overhanging sand imaged in the sonar data in the upper portions of the void spaces, that's -- that's clear. There -- one thing that's interesting, and variability comes in here is, you know, with the voids that were created in the test well drilling, they're a variable geometry. They're not all the same shape, not relatively all the same size, and that's of interest because, to me, that would imply quite simply there's variability in cementation or cohesion, probably both vertically and horizontally. It's unclear, to me, at least, if the cementation state or cohesion of the sand is consistent from top to bottom of the formation. Clearly, we see it standing in the upper part

1 of the formation, but it's not clear to me if that would
2 be pervasive vertically to the base of that formation.
3 And so, having said that, is it relevant or is it
4 appropriate that a 65-degree slope is assumed throughout
5 the vertical section of the sand?

6
7 We talked a bit about the sonar data. It
8 is blind due to turbidity and perhaps sloughing sand to
9 the lower void space. And so, imaging is a challenge and
10 -- and I can appreciate that it is challenging. We talked
11 a bit about trying to determine what the delta is, or the
12 difference is, between sloughing sand and the base of the
13 production casing by running a tagline, so, you could
14 understand, you know, how much turbid water is there and
15 where really is the bottom. So, we -- we talked about all
16 of those things. But again fundamentally, it isn't clear
17 whether the cohesion state or the -- the cementation state
18 of the sands would be consistent vertically throughout
19 that unit. So, just some considerations -- some thinking
20 about that probably -- or not probably, would -- would be
21 in order in -- in our view.

22

23 And quite simply, too, in terms of context
24 of transition from that shale aquitard to the sands, and I
25 don't know because it -- it wasn't necessarily abundantly

1 clear in -- in a couple of the borehole logs I've seen
2 since, but sometimes these -- these contacts are
3 transitional, there can be interbedded shales, other
4 things. And so, again, it would be reasonable to think
5 about the upper part of that sand having a -- a bit of a
6 different behaviour in terms of its cohesion and
7 cementation versus, perhaps, the sand that's below it
8 deeper in the formation. Maybe it is the same. I guess,
9 to me, I would just raise the concern or the
10 interpretation of the perspective that it's not clear to
11 me that a 65-degree geometry would be relevant and
12 consistent throughout the vertical section of those sands,
13 and especially in the long term.

14
15 A bit more on -- on geotech and well
16 extraction. I won't necessarily read -- read the quote or
17 the narrative here, I believe it comes out of -- of some
18 of the IR approaches or responses that we talked about.
19 Just to paraphrase, you know, Sio has decided or -- or
20 discussed starting its operations at a location that
21 allows for reduced number of wells in a cluster. And --
22 and doing a multi-well test in Sio's view, after the
23 licence and a ramp up period, and some -- some guidance or
24 planning around how Sio would execute that first cluster,
25 or that first -- first call it, test cluster. So, again,

1 the plan of this cluster execution, like how are you going
2 to do it? Where are you going to do it? What are you
3 going to measure, all of those good things, and the
4 associated trigger action response plan, the TARP, they're
5 -- they're not defined. And so, I think what's very, very
6 important here is that it is true that sand excavation on
7 a cluster scale must be executed, but when that's done,
8 there needs to be a rigorous geotechnical and groundwater
9 monitoring program defined in the TARP or other governance
10 documentation on how this will be executed to demonstrate
11 a full cluster extraction scale. Demonstrate that the
12 various geological, geotechnical, groundwater
13 interpretations made to this stage of the project are
14 valid, or not. That well cluster execution and TARP plan
15 has to include, I believe, means and methods to
16 restabilize underground void spaces should something,
17 perhaps, a bit unexpected occur. Or if there are
18 settlements that occur that are beyond the allowable
19 thresholds that the geotech group have set, and certainly
20 I would believe, would be captured very -- very precisely
21 in the TARP.

22

23 So, with -- with this, it would be our view
24 that stakeholder input and review is necessary. The
25 completion of this plan must be a requirement for the

1 issuance of the project licence. And I'm not the decision
2 maker, but my view would be that these plans -- and
3 there's other plans we're going to talk about, would be
4 optimal that they would be done before the granting of a
5 licence.

6
7 Well extraction operations. This one's a
8 bit about groundwater flows. Again, I won't paraphrase
9 the -- the text here as part of the IR response. The end
10 of the day, it sounds like, and there was dialogue this
11 week, there's approximately a ten US gallon per minute net
12 loss to the aquifer because Sio's process and plans would
13 include reinjecting processed water, or produced water,
14 from the formation back to the sandstone -- back to -- to
15 where it came. And the groundwater flows have been
16 modelled. They've been demonstrated in the field in terms
17 of pumping tests that were done, but they haven't been
18 done on a full-scale cluster basis. So, that's important.

19
20 There is seasonable -- seasonal variability
21 in aquifer recharge rates and overall water levels are
22 important. There's a lag time for seasonal recharge to be
23 realized in the aquifer here in this part of the province
24 -- as much as eight months in some cases, sometimes more.
25 And again, depending on what Sio does in terms of their

1 operations, these interacting, you know, naturally
2 occurring systems with the work that they're doing could -
3 - could actually have an enhanced overall effect on what
4 the aquifer response is, and what that means for the
5 aquifer resource and its water levels. One of the things
6 about this, we know there'll be drawdown. We know there's
7 an affected area of drawdown. Really critical to all of
8 this is a third-party well inventory -- baseline water
9 quality collection and having a response plan. And that
10 response plan would speak to what are we going to do to
11 mitigate someone's water loss or change in their water
12 supply, water quality? With that 24/7, 365 coverage is a
13 must, and it really does need to be an integrated
14 component to the groundwater monitoring and mitigation
15 plan. And I appreciate that well inventory and some of
16 these themes are touched on in the documentation to date,
17 but they're not fleshed out in detail. And I -- and I can
18 tell you, and I will tell you, because I -- I had personal
19 experience directly on the floodway expansion project,
20 such a third-party well response plan existed. We did
21 extensive baseline data collection and sampling. And
22 there was a very well-defined process that was understood
23 in the public about what to do if something happens to
24 your water supply. There was a 24-hour call-in line which
25 was hosted by a third party. That third party contacted a

1 responsible party at the Province of Manitoba. There was
2 a bit of a triage to -- to determine what is it -- a loss
3 of water, other water quality issues, is it an immediate
4 concern, you know, what do we need to do here? I was the
5 next person that got the call. I was the person going in
6 the public to see these people and help them with their
7 water supply issues. In some cases, based on baseline
8 water quality, we would resample. Things were good. Some
9 cases, they lost their well, it was replaced. Some cases,
10 they lost their water supply, we had tankage pumps,
11 potable water delivered and made a plan to -- to get them
12 back in order. Critical item, there's precedent and --
13 and there needs to be a -- a detailed development of -- of
14 such a plan. Stakeholder input and review I believe is
15 necessary, and I would again say that I'm not the decision
16 maker. I'm not the process writer, however, I would.
17 Interpret or I would personally feel it would be important
18 to have this in place prior to issuance of a licence.

19

20 Groundwater, water quality, water levels.
21 Again, I won't -- I won't paraphrase the IR response or --
22 or read it directly. I'll touch on it. Sio has, you
23 know, obviously presented a draft of their groundwater
24 monitoring and impact mitigation plan. They have stated
25 water quality in the sandstone and carbonate aquifers will

1 be monitored before, during, and following operations to
2 confirm that quantity and quality is preserved in both
3 aquifers. It goes on to discuss, you know who will review
4 that and who will evaluate it, and those things are all
5 important. But again, in discussions in the last week and
6 a half-ish -- last days with panel, there will be a loss
7 of the shale aquitard that separates the carbonate
8 sandstone aquifers. The creation of these
9 interconnections is irreversible. There's been a lot of
10 dialogue of what that means for water quality and what the
11 consequences are. I'm not going to go into those details,
12 but these connections will be created, and they are not
13 reversible. There's been a lot of discussion with the
14 panel regarding the consequences with the loss of the
15 aquitard and mixing of aquifer groundwaters. In most
16 cases, the gradients will change vertically. Some cases
17 they'll equilibrate -- we've talked about all those
18 things, but there certainly will be an exchange of
19 groundwaters between those aquifers. It's irreversible
20 where the mixing of those aquifers will occur. And
21 importantly, critically, the groundwater monitoring and
22 mitigation plan is intended to manage the residual
23 uncertainties attached to this and the risk attached to
24 this. Critical, but I'd say a governance document of how
25 this project will proceed and what it -- its bounds will

1 be in terms of responsibilities to the aquifers, and water
2 quality, and water levels -- critical. And on that,
3 again, stakeholder input and review, I believe, is
4 necessary. And again, in my view, I would say completion
5 of this plan would be something to be completed and agreed
6 to prior to issuance of a licence. That's my opinion.
7 I'm not a decision maker.

8
9 And I'll touch on it here and I may later.
10 You know I say stakeholder input and review and there's --
11 there's two ways you could think about that. There's
12 consultation and engagement in my own view of these
13 things. Consultation is -- is informing someone --
14 informing a stakeholder about what you're doing and why,
15 and that's okay, but they don't really have a hand in it.
16 I think engagement is important. You draw the right
17 people in -- the affected stakeholders, you bring them in,
18 you engage them in what you're doing. They have a say in
19 it, they have a hand in it. There's a dialogue, there's a
20 mutually agreeable outcome. That's important. And I do
21 feel like, in terms of these plans, managing
22 uncertainties, managing risk, that's important.

23

24 This is about groundwater quantity. The
25 other was more about quality. Again, paraphrasing, but

1 you know, pump tests show rapid recoveries, all of those
2 things that are good. But mentioned prior, aquifer
3 recharge in this region on an annual basis, there's a lag
4 time. And so, what the operations are doing and what that
5 means for drawdown and recovery could look differently if
6 there's a -- a sequence of years that are drier than
7 normal in terms of recharge or a sequence of years that
8 are wetter than normal with recharge. And when I say
9 drier than normal or wetter than normal, I'm just
10 referring simply to mean annual precipitation. Bob
11 Betcher has done a really nice paper regarding most of the
12 aquifer systems in this province, and he looked at those
13 responses. It's a nice piece. So, again, Sio operations
14 are seasonal. I believe they run into around November.
15 But again, the lag time for recharge -- again, should
16 there be a series of years that are different could have
17 this advance -- sorry, enhanced overall effect on the
18 resource. And I think it would be important to discuss
19 what the -- this may look like for long-term water levels.
20 Maybe there's a need to adjust trigger levels or adapt the
21 groundwater monitoring mitigation plan, right, as things -
22 - time goes on, as things change, as things progress.
23 These are living documents. That's important.

24

25

And again, the groundwater monitoring

1 mitigation plan is intended, and designed, to manage these
2 uncertainties and risks. It needs to be robust. It needs
3 to be detailed. It needs to be executed, monitored,
4 interpreted, evaluated, adapted based on what you learn
5 going forward. And again on this one, I say stakeholder
6 input and review, I'd like to call that engagement, hands
7 in, come to a mutually agreeable outcome of what that
8 looks like and really, this is a critical thing and again,
9 my opinion should be something that would be completed
10 prior to issuance of licence.

11

12 So, again, we talked about the groundwater
13 monitoring mitigation plan. This might be repetitive, but
14 there's a few other details in here. Again, key document
15 that governs how uncertainties and risk associated with
16 the resources here in this area of the province will be
17 managed and protected. It needs that involvement -- that
18 engagement. It needs a mutually agreeable outcome and
19 what it is. It must be robust. It must be a living
20 document, must be adapted -- updated as necessary as you
21 learn things from prior experience. The well inventories,
22 baseline water quality, water level, critical -- we've
23 touched on that. One of the things we talked about in
24 terms of what we saw in the draft monitoring plan was to
25 add some monitoring wells outside of the zone of influence

1 of the operations. Zone of influence -- what I'm
2 referring to is the drawdown cones predicted by the
3 operations of this project. We felt adding monitoring
4 wells a bit outside of that would be helpful to verify the
5 assumptions or the interpretations made so far. We do
6 feel that the shale aquitard should be monitored and our -
7 - our groundwater presentation yesterday -- and I'll
8 apologize, I am forgetting his name, but he was with
9 Matrix, had a really good dialogue or discussion about how
10 that aquitard responds and the pressure responses that --
11 that happen. Exactly right. But I do think it's
12 important to measure it -- can be done easily with
13 commonly available geotechnical instrumentation. And the
14 expectation would be you'd see those pressure changes with
15 production in the shale aquitard, but I think what might
16 be important is in the longer term, you know, there's
17 these short-term stresses in terms of production and then
18 recovery. You know, you could -- you could look at what
19 that looks like for both aquifer systems and the aquitard.
20 But what would be curious is in the longer term, as the
21 project might grow, should it -- should it be implemented
22 and grow? You would be able to measure those aquifer
23 levels, you'd be able to measure the aquitard pressures
24 and have some understanding. If it's changing, I think
25 that's very important, because again, we know we're going

1 to lose the aquitard with what's proposed in terms of this
2 project, and it's important to understand what's going on.

3
4 Again, there's trigger levels for quantity
5 and quality. Those are established, they're in the --
6 this plan. It's important, but I think they would need to
7 be looked at as -- as time goes on, to reflect ongoing
8 variability. There is that need for 24/7-365 third party
9 well support. It's a critical item. And again, I'm not
10 the decision maker, this is my opinion, it would be good
11 to have this -- it would be preferable, it would be
12 optimal to have this plan done prior to issuance of a
13 licence.

14
15 Well abandonment plan, another key
16 governance document, if I can call it that. Helps deal
17 with the uncertainties of risk with, again, the long-term
18 groundwater resources and how they'll be protected. It
19 needs to be thorough and robust, updated as necessary.
20 There is no plan in this plan to backfill any of the void
21 spaces. Only the well casings will be sealed. And I
22 think what's unclear with that is, you know, how the
23 annular seal or the seal between the geology, the
24 formation, and that first well casing will behave and
25 remain and -- and remain intact between the drilled

1 formations and the installed well casing, under conditions
2 where, based on sonar, we've seen three metres or more
3 vertically of geology collapse to the void space. Could
4 be some kind of displacements, could be some disturbance
5 to those -- those well casing seals attached to that -- I
6 don't know, just raising it. But again, if something like
7 that occurs, if those well casing seals aren't robust,
8 maybe -- maybe are compromised by things that happen down
9 hole and in the void space, sealing the inside of that
10 well casing, as per the standards in the province,
11 wouldn't deal with that external seal. So, we'd want to
12 be sure that there's good planning and good execution of
13 what that well seal is, because again, should this project
14 go forward, there'll be many, many wells requiring
15 abandonment and many potential interconnections from
16 surface to the aquifer systems potentially.

17

18 Minimizing the time between production and
19 abandonment may be important unless they're being used for
20 monitoring or performance measurement, which -- which
21 might be part of what goes on should this project go
22 forward. Again, important to have a comprehensive and
23 approved plan, in my opinion, prior to licence. Waste
24 characterization and management plan, we talked a lot
25 about the shale and ARD metals leaching. Those are all

1 really good things and of interest. Again, it deals with
2 the uncertainties and risks around how these materials
3 that are extracted from the ground will behave at surface,
4 and whether there is any sort of environmental impact
5 attached to that as they're stored, and or moved around on
6 surface, and that site. One of the things that would
7 probably be important here is that engineered containment
8 or drainage for any material stockpile must be detailed as
9 part of this plan. That's -- that's fairly normal and
10 it's -- it's actually good because it allows for another
11 level of environmental protection should anything want to
12 leach from any of these stockpiles. But on the other
13 hand, it adds ease and sampling effectiveness and methods
14 for monitoring surface water runoff from -- from an
15 operational site. So, you know you're getting good data,
16 you know you're measuring what's actually happening based
17 on those materials that are at surface, and how they may
18 or may not be creating any kind of an impact. It's
19 important and I think I touched on that in the next
20 bullet. I won't -- I won't go through that.

21

22 The planned program here is based on MEND's
23 documentation, you know, practice in the mining industry
24 and that's -- that's good. It's based on tonnage of
25 excavation -- we've done the same thing. One of the items

1 we flagged was that there was a sample per 500 tonnes of -
2 - of shale produced and that's probably higher than what
3 the MEND documentation might say. But because the -- the
4 volume of shale to be produced here largely is going to be
5 coming from boreholes, the -- the production rate of shale
6 will be low. It is -- it is a geologically and
7 geochemically unique piece on this. And so, the comment
8 would be maybe rather than simply working from tonnage or
9 a tonnage basis, maybe there could be a commitment there
10 to do a quarterly sample of -- of those separated and
11 stockpiled shale pieces -- maybe it's biannual, I don't
12 know, but testing and understanding what that shale is.
13 There's been a lot of discussion about the shale here as
14 part of the process -- I think is important -- another --
15 another element here, should this project go forward,
16 which would be important.

17

18 It was touched on in this plan so far that
19 the shale will be handled separately. It's important.
20 It's unique. It has the potential for metals leaching --
21 other ARD when exposed at surface and stored at surface.
22 So, again, I'm touching on these points that managing
23 these materials, having contained areas that are easy to
24 sample and understand what may or may not be happening is
25 very important to document what may or may not be

1 happening in terms of surface impacts should this project
2 go forward, should there be material stored on surface --
3 critical. And again, another plan, in my view, that
4 should be engaged with stakeholders -- mutually agreeable
5 plan completed prior to issuance of a licence.

6
7 Summary. I don't think there's anything
8 new here. I've touched on them all, but I'll -- I'll hit
9 them again. In our view, there's a need to revise or
10 revisit geotechnical modelling approaches. Assess the
11 failure mode that honours the observed vertical
12 discontinuity structures within the carbonate bedrock --
13 they exist, they're everywhere. It's unclear if the
14 cementation state or cohesion, if I can call it that, of
15 the sand is consistent from top to bottom of the
16 formation, and whether the interpretation of an effective
17 65-degree slope geometry is valid in the long term. This
18 is a high-level statement. There's been a lot of heavy
19 detail about geotech and all the things that went into it.
20 That's great. But again, this comment is simply coming
21 from looking at the geometry of the void spaces created,
22 their variability, what the sonar was able to resolve or
23 not resolve. So, a closer examination of what the sonar
24 scanning may be blind to, I believe would be necessary.
25 There is going to be loss of the shale aquitard that

1 separates the carbonate sandstone aquifers. The creation
2 of these interconnections is irreversible. There will be
3 an exchange of water -- groundwaters between the aquifers.
4 There will be an irreversible change where mixing of the
5 aquifers will occur. With any kind of operations here,
6 whether it's water levels, water quality, a very robust
7 and detailed third-party well inventory response plan,
8 24/7, 365 coverage is necessary, has to be part of the
9 groundwater monitoring mitigation plan which is designed
10 to manage uncertainties and risk. But it's also got to be
11 designed to allow for residents in this region to maintain
12 a water supply always. And should their water supply be
13 affected, changed, or otherwise impacted, it would be on
14 the proponent to make it right.

15

16 Management plans, we've talked about a lot
17 of them -- the TARP, groundwater monitoring, mitigation,
18 well abandonment, waste characterization and management.
19 There may be others. These are key documents that govern
20 how the uncertainties and risks associated with the --
21 with the long-term groundwater aquifer resources, the
22 environment in general, this project, and -- and how these
23 things will be protected? Again, meaningful engagement,
24 hands-in development, mutually agreeable outcomes, in my
25 view, are important to develop those plans, and develop

1 those plans in advance of a licence. And I'll make one
2 last comment where I've been an advocate for engagement
3 and an advocate for stakeholder group or some -- some
4 organized contingent of stakeholders to be involved in
5 these processes, should this project go forward, because
6 these are -- there are uncertainties, there are risks --
7 they're important. One of the immediate responses might
8 be, well, what you're talking about is going to involve a
9 lot of people and it'll be difficult to -- to reach a
10 consensus or make decisions. Too many cooks in the
11 kitchen if -- if you could say that. There's ways to
12 manage that, too. There's responsibility matrices, right?
13 You have a smaller group of people that are key and -- and
14 in deep in the process, and it -- and it builds out from
15 there. Those individuals have responsibilities to inform
16 people, keep them in the loop, other things. So, there's
17 ways to manage it. But I think, in my own view, it is
18 critical, and it is important, and its involvement in what
19 is going to be -- or what are going to be the critical
20 governance documents should this project go forward that
21 will work to deal with the uncertainties, deal with the
22 risks, protect the environment, protect the aquifers as
23 best as practicable in the long term. And I think I will
24 end there.

25

1 MR. SMITH: Thanks, Jason. I think that's
2 very comprehensive. Bert here. If I can add a few
3 comments to emphasize some of the points Jason made and in
4 particular this question of a sensitivity analysis on the
5 stability of the cap rock. Very important to understand.
6 When you run a model, a model is just a tool, and it's
7 only as good as the data that you put into it. And if
8 that data is not representative of the conditions, then
9 the results that the model generates aren't reliable. And
10 so, there's a lot hinged here on this model, and the
11 bending seven metre lengths, and the fact that the
12 limestone is -- is competent and uniform throughout.
13 That's key to the -- the work that's been done today. In
14 my experience, and -- and my opinion, it's fundamental at
15 the front end of a project to do some sensitivity
16 analysis. You want to know what the range is. You've got
17 to bracket, your -- your assumptions on the -- on the
18 parameters, the strength parameters of the various units,
19 and get a feel for what if. If there is jointing at two
20 metres, or five metres, or ten metres, we're talking about
21 a 30 to 50 metre open span of cavity. So, in reality will
22 that be supported by a -- what's assumed to be a 15 to 25
23 metre cap rock. Clearly, if there is jointing there, that
24 will likely collapse. And -- and so, the modeling can
25 demonstrate that and give you some brackets and give you

1 some -- some early warnings of what could happen, and
2 therefore what -- what's the contingency -- what are you
3 going to do in that regard? And -- and that should be
4 done at this stage, in my opinion, not after you get full
5 speed ahead on the project and then start to do your
6 homework. And in that regard, I'll just mention the till
7 above that's assumed to be initially on the Stantec
8 January 14th, 2023 geotech analysis, they -- they've
9 assigned a strength to the till based on typical strength
10 from their previous experience. I don't know how much of
11 that experience was in Manitoba and how typical it is with
12 the specific tills that we're dealing with, but they've
13 put in a -- a (inaudible) of 30 and a cohesion value of 20
14 kilopascals. Jason advised me that, I guess in some of
15 the subsequent presentations, the cohesion is apparently
16 now not in the model. I don't know -- I don't know that
17 we've seen the model results without it, but I will say
18 that the recent geotech assessment summary on February
19 27th doesn't give any parameter specifics. It's an
20 overview. The geotech additional clarifications, February
21 28th, this focuses on that Carmen Sand, not -- no
22 reference to the tills. So, I -- I just caution that
23 that's -- that's another variable, if the -- if the till
24 strength is less than what was assumed, that'll influence
25 the stability of that cap rock and -- and the ability to

1 bridge. So, those are -- those are things that I, in my
2 opinion, would have addressed at this stage, prior to
3 getting the licence and charging ahead with the project.
4 And I guess I'll -- in that regard I'll just mention,
5 recently I see that there was a -- a drill log provided
6 BRU 95-8. When you look at that log, the upper overburden
7 is described as sand and gravel, silty sand, eight to 15
8 metres clay, 15 to 32 metres silty sand over weathered
9 bedrock. No -- no identification of till. So, I'm not
10 just sure what it -- what the basis is of selecting a
11 till, but it's not on that log. Nor is there an
12 indication of the coring procedure -- is it a double tube,
13 a triple tube core diameter? Sort of -- you -- those
14 things normally, one puts on a log that I -- I wasn't able
15 to identify. They may be there somewhere in the legend,
16 however, I just thought I'd mention that. And then the
17 five holes, of course, from the Stantec March 6th '23
18 report, they list five holes, three of them are 12 to 14
19 metres of, what they define as, competent rock. One was
20 19 metres, one was 21. So again, we're assuming 15 to 25
21 metres of competent rock for the model. So, it just comes
22 back to doing, I think there was sensitivities on the
23 model for thickness of the competent cap, but these other
24 variables also should be addressed in my opinion. And I
25 think that was the main point I wanted to make. The -- I

1 guess you -- you could follow up with Jason's comment on
2 the sand. If it's -- and you see very descriptions in the
3 reports, whether it's poorly cemented, or unconsolidated
4 and sometimes not cemented, if there is a -- a weak
5 cement, normally you would identify what it is. Is it
6 calcareous cement and therefore, is it susceptible to
7 being dissolved out with time once you've changed the
8 groundwater flow regime with these cavities? And then
9 therefore there's -- there's also reference to the drill
10 holes that -- that collapsed, they weren't able to get a
11 sample in the sand which would suggest it's not
12 consolidated, not cemented and -- and there's, you know
13 lots of experience in the area of other drilling,
14 referring to flowing wells where the sand flows into the
15 well. So, as Jason indicated, yeah, there -- there's a
16 question mark on the variability of that sand unit. Now
17 those are just a few of the points I wanted to add to the
18 presentation.

19

20 MR. MANN: Mann here. Thanks Bert, for
21 that. And yeah, you know, some of the information you're
22 looking at the drill log we -- we just received --
23 actually thank you to the panel for providing that
24 additional geotech stuff that was done in the last days.
25 It's appreciated. So, it's new information, and -- and

1 just to your comment, Bert, back to the till and cohesion,
2 I did ask that question in panel which I think you and I
3 touched on. It'll be captured in the -- the transcripts,
4 you know, and we could revisit or dig into that a little
5 bit more, but do appreciate as well, some of the touch
6 points you just raised, and if you don't have anything
7 else there, Bert, I -- I don't either, and -- and we could
8 turn it over to the chair.

9

10 MR. SMITH: Just Jason, on that point,
11 were there additional stability analyses done from
12 January, and I think -- and if so, I haven't seen them,
13 not aware of them, they may be in some of the
14 documentation.

15

16 MR. MANN: Yeah, Bert, sorry about that.
17 Just to close the loop on that and hopefully I'm going to
18 paraphrase this correctly, there were some tweaks in the
19 work and it was largely related to reconfiguration of the
20 well arrangement in the clusters and the numbers of wells.
21 So, I -- I think there were some tweaks there, and I --
22 and I think that's all I'll say. That's my recollection.
23 But I'd have to dig -- we'd have to dig back into that,
24 and that may be a piece that you haven't necessarily seen
25 Bert, because it's quite recent.

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MR. SMITH: Right. Okay, thank you.

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MR. MANN: I'll turn it over to the
chair. Thanks.

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THE CHAIRMAN: Chair. Thank you very
much, Mr. Mann and Mr. Smith. I am aware of the hour.
Ms. Boryskavich, is there anything you'd like to clean up
before we break?

MS. BORYSKAVICH: Thank you, Mr. Chair.
Boryskavich. I can wait until after we break.

THE CHAIRMAN: Will you be seeking
some clarification?

MS. BORYSKAVICH: I believe that my
learned friend got to seek some clarification following a
questioning of the witnesses. So, if you would indulge in
that, I would wait until that point in time.

THE CHAIRMAN: Chair. Happy to do
that. Let's break for ten.

1 (OFF RECORD)

2 (ON RECORD)

3

4 THE CHAIRMAN: So, let's resume in
5 two minutes, please.

6

7 (LONG PAUSE)

8

9 THE CHAIRMAN: Chair. Let's go back
10 to where we were. Our Line in the Sand is -- or MBEN any
11 wish to -- oh sorry, I'm -- I'm actually offside. Mr.
12 LeNeveu, do you seek any clarification?

13

14 MR. LENEVEU: (inaudible).

15

16 THE CHAIRMAN: Thank you very much.
17 Rural Municipality of Springfield, any clarification? I'm
18 not sure they're paying attention. Rural Municipal, City
19 of Springfield, any clarification? Thank you very much.
20 Our Line in the Sand?

21

22 MR. WILLIAMS: Williams speaking.
23 Just on behalf of Our Line in the Sand and the Manitoba
24 Eco-Network, we did -- did want to thank the -- the
25 witnesses and the -- and the municipalities for their

1 thoughtful information requests -- questions during the
2 hearing and oral submissions. We have no questions of
3 clarification that is without prejudice to our ability to
4 address the chicken analogy and conditional licences and
5 closing argument though. Thank you.

6

7 THE CHAIRMAN: Chair. Duly noted,
8 with a smile on my face. Mr. Duncanson, are you ready to
9 go?

10

11 MR. DUNCANSON: I am, Mr. Chairman.
12 I'll just move up to the front.

13

14 MR. MANN: Mann speaking. Just Chair, if
15 -- if I may, I had communicated with Bert -- but Bert,
16 just letting you know, when your webcam is on, you're now
17 visible in the room on quite a large screen. You look --
18 you're looking good.

19

20 THE CHAIRMAN: Chair. Mr. Smith,
21 good to see you.

22

23 MR. SMITH: Yes.

24

25 MR. DUNCANSON: Thank you, Mr. Chair.

1 Good morning, everyone. Mr. Smith, I don't know if you
2 can see me on your screen.

3

4 MR. SMITH: Yes -- yes, I can.

5

6 MR. DUNCANSON: Very good. So, this
7 is Sander Duncanson speaking. Mayor Poirier, Sander
8 Duncanson, legal counsel for Sio Silica. I've met Mr.
9 Mann already over the course of this last couple of weeks.
10 And Mr. Smith, nice to meet you.

11

12 MR. SMITH: Yes -- same.

13

14 MR. DUNCANSON: Mayor, where I'm --
15 I'm going to have just a few questions for you and then
16 I'll -- I'll focus on the folks from KGS. First of all,
17 thank you for spending time with us this morning and --
18 and speaking with us. The RM of Tache has had meetings
19 with Sio about the project prior to today. Is that right?

20

21 MR. POIRIER: Poirier. Yes, that's correct.

22

23 MR. DUNCANSON: Duncanson. Can you
24 confirm, sir, and -- and if you don't know the answer to
25 any of these questions, definitely just say so, but can

1 you confirm that the last meeting that you had with Sio
2 was in 2020?

3

4 MR. POIRIER: Poirier. I cannot confirm
5 that.

6

7 MR. DUNCANSON: Duncanson. Thank you,
8 Mr. Poirier. To your knowledge, has Sio offered to have
9 additional meetings with the RM if it wished?

10

11 MR. POIRIER: Poirier. A couple of things,
12 Mr. Duncanson, the last meeting that I recall having with
13 Sio, and I'm using Sio, but at the time it was CanWhite,
14 there was a representative that showed up and asked to
15 speak with us in camera, meaning that I can't divulge the
16 details of that meeting. I can tell you that I was not
17 supportive of an in-camera request at the time, but that
18 was the reality of the situation. After that, the former
19 mayor would have been the one who was, I guess, in contact
20 with Sio if he was, and he left me no -- no records that I
21 can go on.

22

23 MR. DUNCANSON: Duncanson speaking.
24 So, sir, I -- I took a look through Sio's engagement
25 materials prior to -- to this morning and my understanding

1 was the last meeting between the RM and Sio was in 2020,
2 and Sio had, on numerous occasions, provided updates to
3 the RM and -- and offered to meet if the RM was interested
4 in meeting, and to date the RM has not expressed any
5 interest in having further meetings with Sio. Do you
6 agree with that summary?

7
8 MR. POIRIER: Poirier. I would say I agree
9 loosely with it. Because I was not the mayor, I was not
10 made privy to some of those contacts, I guess, I would
11 have to say. I do recall that when CanWhite came, they
12 always indicated a willingness to communicate.

13
14 MR. DUNCANSON: Duncanson speaking.
15 Thank you, sir. And my -- my last question on -- on this
16 line, again, based on my understanding of -- of the
17 history, but you probably know better than I do, was that
18 at one point in time there was specific feedback from the
19 RM to Sio, and I believe it was CanWhite at the time, to
20 relocate a -- an exploration well, which CanWhite agreed
21 to do, but apart from that, RM has never expressed any
22 concerns about the project in its discussions directly
23 with Sio. Would you agree with that?

24
25 MR. POIRIER: Poirier. Yes, I guess I would

1 have to agree with that yeah, that -- to my knowledge,
2 because I don't know -- I don't have 100 percent of the
3 whole background information on this now.

4

5 MR. DUNCANSON: Duncanson speaking.
6 Fair enough. Thank you, Mr. Poirier. Just a few more
7 questions for you. First, in your presentation this
8 morning, you talked about the need to ensure that the
9 aquifers are -- are safe and abundant, and absolutely
10 agree with that. If -- if Sio was able to demonstrate to
11 the Government of Manitoba that the project will not have
12 any negative impact on water quality in the aquifers, or
13 abundance of water in the aquifers, would you be
14 supportive of this project going ahead?

15

16 MR. POIRIER: Poirier. Not specifically
17 because, Mr. Duncanson, as I alluded to this morning when
18 I spoke, part of the consideration for this project --
19 part of the -- the serious considerations for this project
20 again, is environmental, not specifically with soil,
21 water, and air quality, but also with quality of life.
22 And I'm going to be maybe hypothetical here, and that's
23 why the importance of a review every four or five years.
24 But if Sio comes and establishes in the RM of Tache, and
25 there is a significant diminishment, we'll say, in the

1 quality of life, and people are complaining that we can't
2 live with this anymore, we can't live with the traffic, we
3 can't live with some of the effects that are happening.
4 And again what I had mentioned this morning, even on the
5 taxation level, what if this is approved and the
6 ratepayers are on their own to double down on the costs
7 for protective services, for maintenance, for hiring more
8 staff, so on and so forth? They're not going to feel good
9 about this and it will affect people's responses to
10 whether or not they want to come and live in Tache. The
11 quality of life, the environment that people are there now
12 -- now enjoy, is a very primary concern that's expressed
13 to me constantly, and there's not one public hearing that
14 we get where that doesn't come up. We're living here
15 because of quality of life, because we hear the birds, we
16 can enjoy the Seine River, we can go cycling on our roads,
17 so on and so forth. So, that, to the people that I
18 represent, is extremely important. And I'm not expressing
19 my personal views here, I'm expressing the views of the
20 people that I'm representing.

21

22 MR. DUNCANSON: Duncanson speaking.
23 Thank you, sir. I -- think that's a very -- a fair
24 statement. So, I think you made a good point, which is
25 this is not just about environmental effects, this is

1 about quality of life as well. And as part of Sio's
2 application for this project, it did have its experts look
3 at things like traffic, and impacts on municipal
4 infrastructure, and services, and Sio's experts found that
5 traffic will be quite minimal. There won't be any
6 negative impacts on municipal services and infrastructure.
7 Now, I take your point about we'll need to go back and
8 review things every few years, and that's actually what
9 Sio is proposing to do, is have reviews after every four
10 years or so, but did -- did you or -- and when I say you
11 did -- did the RM of Tache or any of the other MSSAC
12 municipalities, did they conduct any separate study or
13 assessment of how this project might affect traffic, or
14 municipal services, or infrastructure?

15

16 MR. POIRIER: Poirier. My view on that, Mr.
17 -- Mr. Duncanson, is why should we have? It wasn't
18 incumbent on us. But further to that, yes, Sio said there
19 would be no effects. But if there are effects, is Sio
20 prepared to help us cover the costs of these effects. And
21 again, I will repeat myself, the cost of buying another
22 grader, hiring five extra personnel, increasing the
23 services at the fire department, who knows? Those are the
24 things I have to take into consideration as mayor or a
25 member of Council.

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MR. DUNCANSON: Thank you, sir.

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Duncanson speaking. And my last question for you, Mayor Poirier, I took it from your statements about, you know, the need to, you know, once a project like this gets approved, if it gets approved, it's important to have regular reviews to make sure that if there are things like traffic that we're not expected to be problems, but there are, for some reason, problems, there's an opportunity to -- to deal with those things. So, I took from that you would be supportive of an approach where this project, if it does get approved, would require further approvals after the first few years of extraction to deal with whatever information is available at that time.

MR. POIRIER: Poirier. Well, again, Mr. Duncanson, I think that's very important, and we owe that to the people who will govern after us. For me to make permanent commitments today, perpetual commitments, and we see that -- we see that under many agreements and contracts where someone who's been in the grave 50 years made an agreement that we now have to live with. And my -- my viewpoint on that is that, as I explained earlier, I'm in a passage as a mayor. The mayor that will come after me, him or her, will be faced with the decisions of

1 the day. And I think that it's incumbent or important for
2 us to be able to allow them the privilege and the right to
3 govern according to the conditions of the day. I can't
4 foresee how things are going to go if this project is
5 approved and I can't foresee the future. Global warming
6 is going to play a major part in all these things,
7 eventually. Therefore, I think, it's absolutely essential
8 that there be a review of sorts after certain amount of
9 time.

10

11 MR. DUNCANSON: Thank you very much,
12 Mayor Poirier. Those are all the questions I have for
13 you. But thank you again for answering my questions and -
14 - and coming here this morning.

15

16 MR. POIRIER: Thank you. You're welcome,
17 Mr. Duncanson.

18

19 MR. DUNCANSON: So, Mr. Mann and Mr.
20 Smith, I'm going to turn to some questions for you.
21 Again. This is Sander Duncanson speaking. Mr. Mann,
22 you're a geologist by training, is that right?

23

24 MR. MANN: Mann speaking. Yes, I'm a
25 P.Geo.

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MR. DUNCANSON: Duncanson. Mr. Mann,
can you confirm you're not an engineer, is that right?

MR. MANN: Mann speaking. It's self-
evident as a P.Geo, I am not an engineer or a P.Eng.

MR. DUNCANSON: Thank you, sir.
Duncanson speaking. Things that may be evident to you may
not be to me, so excuse my questions if they are evident.
Mr. Smith, reviewing your CV, I understand you did a -- a
bachelor's degree in geological engineering and a master's
degree in hydrogeology. Is that right?

MR. SMITH: That is correct.

MR. DUNCANSON: Thank you. Duncanson
speaking. Mr. Smith, would you say that your primary
expertise is in hydrogeology or geotechnical matters? Or
would you say it's ---

MR. SMITH: I ---

MR. DUNCANSON: -- equal between the
two?

1

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MR. SMITH: I would say it's all of those.

3

I -- I have been responsible in the company both for geotechnical work, for groundwater, hydrogeology, environmental work, and geomatics survey.

6

7

THE CHAIRMAN: Chair. Mr. Smith, if

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you could write yourself a little sticky note to remind

9

yourself, please, that you need to state your name first

10

for the transcribers in Toronto, otherwise they have no

11

idea who's talking.

12

13

MR. SMITH: Okay, sorry about that. Bert

14

here.

15

16

MR. DUNCANSON: Thank you, Mr. Smith.

17

Duncanson speaking. So, just so that I -- I heard you

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correctly, I understand that your responsibility within

19

KGS encompasses a few different things. Your view is you

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are -- you have no more focus or expertise in hydrogeology

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versus geotechnical versus the other things you just

22

mentioned.

23

24

MR. SMITH: Depending on the project, I'll

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get involved to varying degrees in -- in all those

1 aspects. Oh, Bert here, speaking. And certainly
2 groundwater, geology, geotechnical, all of those areas,
3 I'm very experienced in.

4

5 MR. DUNCANSON: Okay. Thank you, sir.
6 Duncanson speaking. Mr. Mann for yourself, same question.
7 as a P.Geo., would you consider your primary expertise to
8 be hydrogeology or geotechnical, or would you say you're
9 equally focused in both of those two disciplines?

10

11 MR. MANN: Mann speaking. I would say
12 that hydrogeology is a large part of what I have done in
13 my career at KGS Group, and continues to be, but related
14 is geology or geoscience -- we could call it either or
15 both. I -- I tend to use geology, because it's important.
16 And so, you know, what's unique or what's of -- of
17 importance, I think, is that while I'm not an engineer, I
18 work very closely with many engineers, geotech engineers,
19 and other types of engineers on all kinds of projects --
20 large mega project to small. And what's important is
21 that, I think, they come to me to understand natural
22 systems and inputs to the things that they're doing and
23 what they mean because it's important for them to
24 understand the -- the geoscience or geological
25 perspective. And vice versa, I -- I do glean or gain and

1 -- and have over, going on 24 years, the engineering
2 perspective. So, yes, groundwater is largely what I've
3 done, but I would say that my background and experience in
4 geology, and knowledge base fits into, and is an important
5 component to a lot of the engineering we do, on a lot of
6 different projects. And that is groundwater related and
7 geotechnical related. So, there's -- there's an important
8 interface there, which I guess is what I'm trying to say.
9 But I, of course, would never claim I'm an engineer,
10 because I am not.

11

12 MR. DUNCANSON: Thank you, sir.
13 Duncanson speaking. Have either of you, over the course
14 of your careers, conducted geotechnical assessments for an
15 underground mine project? Maybe, Mr. Mann, I'll start
16 with you and then I'll turn to Mr. Smith.

17

18 MR. MANN: Mann speaking. An underground
19 mining project, no. Underground space project, yes. And
20 that project specifically was the Mayo B Hydroelectric
21 Project in the Yukon. So, my personal involvement there
22 was investigations, instrumentation, geology, core
23 logging, interface with geotechs in the design phase of
24 that project, and I think if I'm thinking correctly in my
25 timing that was -- I want to say 2012 and 2013 when that

1 work was going on -- or maybe 2013 was the start of
2 construction. Sidebar, interesting site -- very
3 challenging. Phyllite bedrock - it's kind of a --
4 intermediary between shale and slate, and it's accessory
5 mentality mineralization is talc. It's very slippery and
6 very challenging to -- to tunnel in. Drill and blast job
7 -- so, not a mining project, but heavy involvement from
8 investigations -- actually in the licensing phase of that
9 project, as well, through construction -- two years of
10 construction drill and blast tunnel which was through
11 challenging geology and actually tied into an existing
12 decline -- an existing tunnel that was at that site. So,
13 I would say that's my strongest experience in underground
14 space -- underground works. And I'll leave it to Bert, he
15 was obviously involved in that, but he has probably other
16 things to -- to discuss as well.

17

18 MR. DUNCANSON: Duncanson speaking.
19 Mr. Smith, just quickly before we -- we pass it over to
20 you, just to confirm, Mr. Mann, so that -- that one
21 project in the Yukon that you referenced that was related
22 to drilling and blasting a tunnel for a hydroelectric
23 project?

24

25 MR. MANN: That's correct. Mann

1 speaking.

2

3 MR. DUNCANSON: Duncanson. Thank you.
4 Mr. Mann, can you confirm whether you have previously
5 conducted a geotechnical assessment for an underground
6 mine project? Sorry, I met Mr. Smith, I said Mr. Mann.

7

8 MR. SMITH: Oh, Smith speaking. So, in
9 addition to Jason's reference to the Mayo project, which I
10 was also involved in. Various tunnelling projects for the
11 Nipawan Hydro project we put in a -- I think it was a --
12 I'll say it was either a kilometre or longer tunnel in the
13 till at the base of the shale -- or just top shale, base
14 of the till, sorry. And that -- that involved underground
15 works over the period of a year, and a lot of related
16 water well depressurization, and the instrumentation works
17 there.

18

19 You know, in geology I've been in -- worked
20 for mining companies, more of a summer job ---

21

22 MR. DUNCANSON: Duncanson speaking.
23 One other area, just in terms of -- of each of your
24 experience, have either of you done work specifically in
25 geochemistry? And I'll start Mr. Mann, with you.

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MR. MANN: Mann speaking. So, thinking about a similar question asked by you prior, I'll -- I'll try and go through and answer it as -- as best as I can. My experience with geochemistry as a -- as a scholar, I'll say, or as a student, would be what was necessary through becoming a geologist. That includes actual chemistry in chemistry, it includes geochemistry classes that are required as part of achieving that degree, I would not call myself a geochemist -- that might be your next question -- but I most definitely work in geochemistry because along the lines of much of the data that's been looked at this week and has been dealt with, and analyzed, and dialogued, and discussed, we do the same work in groundwater. We work in isotopes, we work in groundwater quality, we look at groundwater mixing, we do all of those things. That is geochemistry. We run similar softwares. I do that work for the province, for private clients, for -- in the nuclear industry as well, which is very rigorous. So, I wouldn't say I'm a geochemist. Do I work in geochemistry? Absolutely.

MR. DUNCANSON: Thank you, sir. Duncanson speaking. As part of the -- the geochemistry modelling work that you just referenced, would that

1 include developing models using PHREEQC software?

2

3 MR. MANN: So, in my own experience,
4 while we have that software, I'm -- I'm not -- I don't run
5 that software. A lot -- or much of the work that we do
6 would be in AquaChem -- t's a different software.

7

8 MR. DUNCANSON: Thank you, sir.
9 Duncanson speaking. Before we turn it over to Mr. Smith,
10 I'll just finish this line of questions with you first,
11 Mr. Mann, Have you completed waste characterization
12 programs for any mining projects in Canada?

13

14 MR. MANN: Mann speaking. So, this is --
15 you're speaking to, you know, acid rock drainage
16 protocols, mine -- mine waste materials, metals leaching,
17 correct?

18

19 MR. DUNCANSON: Duncanson speaking.
20 Yes, those would be the focuses typically of waste
21 characterization programs for mines.

22

23 MR. MANN: Mann speaking. I have. You
24 may want to ask the same question of Bert, as well. Have
25 they been related to mining projects -- active mining

1 projects? No, they have not. They have been related to
2 large hydroelectric developments in various locations.
3 And Bert may want to speak more to the mine closure side
4 of work that we do, which, of course, is dealing with
5 huge, massive legacy issues with acid rock drainage and
6 metals leaching. We have a lot of experience in that
7 realm. If -- or I'll let you ask the question -- maybe
8 you want to ask that question -- you could ask it of Bert.

9

10 MR. DUNCANSON: Appreciate that Mr.
11 Mann. Duncanson speaking. So, just so that I'm clear,
12 because my -- my question was whether you've completed
13 waste -- any waste characterization programs for mining
14 project -- sorry, just to finish. I think I heard you say
15 that you have and then you said you have not done any for
16 mining projects. So, my question to -- have you completed
17 waste characterization programs for mine projects, is that
18 a yes or a no?

19

20 MR. MANN: Yes, on large hydro projects.
21 No, on mining projects.

22

23 MR. DUNCANSON: Thank you, sir.
24 Duncanson speaking. I think to my question that's a no,
25 but we'll let the transcript speak for itself. Finally,

1 this is related to that same -- same type of question, Mr.
2 Mann, but you talked a little bit this morning about
3 mitigation and monitoring plans for Sio's proposed
4 project, and we'll talk more about the details of that a
5 little bit later on. Recognizing that you have experience
6 with hydroelectric projects, among others, do you have
7 experience developing mitigation or monitoring plans for
8 mine projects?

9

10 MR. MANN: Mann speaking. I'll keep it
11 simple and say no.

12

13 MR. DUNCANSON: I appreciate that.
14 Duncanson speaking. Mr. Smith, turning to you, my -- my
15 first question for -- for Mr. Mann, and to be fair to you,
16 I'll ask the same questions to you as well, would you
17 consider yourself a geochemist?

18

19 MR. SMITH: I have a master's in
20 hydrogeology, which is a -- was a broad range of
21 groundwater including geochemistry, modelling, physical
22 hydrogeology -- so a broad base. I didn't go in and take
23 a Ph.D. in -- in geochemistry as such. Again, having the
24 broad understanding is key. Then you can bring in the
25 individuals, as you choose, if you need that very detailed

1 assessment. In this case, no, I'm not -- I would not
2 class myself as a -- as a geochemist, per se.

3

4 MR. DUNCANSON: Thank you, sir.
5 Duncanson speaking. Have you completed a waste
6 characterization program for a mine project over your
7 career?

8

9 MR. SMITH: So, Smith speaking. Yes.

10

11 MR. DUNCANSON: Can you specific ---

12

13 MR. SMITH: Would you like me to
14 elaborate?

15

16 MR. DUNCANSON: Duncanson speaking. I
17 would, sir. Both you and your colleague have been very
18 good at elaborating so far, so I'd appreciate elaborating
19 on that one.

20

21 MR. SMITH: I just did that for fun.
22 Okay, Smith speaking. So, currently KGS Group are
23 involved in numerous projects for the province of
24 Manitoba. They have what they call an abandoned mine
25 program to clean up existing abandoned sites. So, we've

1 just finished closing the Ruttan site, which is a massive
2 facility, massive tailings areas, waste rock, acidic
3 generating. So we did, initially assessments of the --
4 the problems there and then developed the solutions to
5 close the site and address the acid generation and impacts
6 on the environment. So, that's one project, but there's
7 probably ten around the Province of Manitoba that we're
8 currently in -- carrying on with an involved with.

9

10 MR. DUNCANSON: Thank you, sir.
11 Duncanson speaking. So, typically when -- when I've heard
12 the term "waste characterization program", my
13 understanding of that and let me know if you if -- if you
14 understand differently is those are programs to manage
15 waste that are generated in -- over the course of an
16 active mining project. So, when those programs are
17 developed, they're either developed as part of the
18 development stage of a new mine project or over the
19 operating life of an active mine project. Do you have
20 experience developing those types of programs?

21

22 MR. SMITH: I want to say yes, we have had
23 some involvement in -- in mine projects at various stages,
24 and -- and I also want to speak to expand on this. We've
25 been involved in waste characterization and management of

1 -- many different types of facilities -- a lot of
2 landfills, a lot of wood waste sites. Jason Mann alluded
3 to the nuclear facilities. We're currently out of Pinawa
4 dealing with nuclear waste issues out there. He's also
5 doing an assessment for the nuclear disposal of waste in
6 Ontario, doing the -- doing site characterization -- early
7 stages. So, we're very much involved in waste
8 characterization. I wouldn't want to pigeonhole it into
9 mining or nothing.

10

11 MR. DUNCANSON: Okay. Thank you, sir.
12 Duncanson speaking. Perhaps my last question on this for
13 you, although I don't want to jinx it. When you're
14 speaking, Mr. Smith, to "we", I'm interested in -- in your
15 own experience personally, either with KGS Group or
16 otherwise. Sir, do you -- do you have personal experience
17 in developing waste characterization programs for active
18 mind projects?

19

20 MR. SMITH: Trying to go back 50 years. I
21 -- I'm sure I have, but I can't come up with a specific
22 site at this time.

23

24 MR. DUNCANSON: And that's fair, Mr.
25 Smith. Duncanson speaking. I'm going to move on. Mr.

1 Mann, you have considerable experience in hydrogeology
2 matters. I heard through the grapevine that at one point
3 you studied under Doctor Harvey, who we -- we heard from
4 last week, and won't ask you about -- about that
5 specifically, but you -- you didn't make any comments this
6 morning in your presentation about AECOM's groundwater
7 modeling? Can I take that to mean that you have no major
8 concerns with how AECOM developed its modeling for this
9 project?

10

11 MR. MANN: Mann speaking. I would not
12 say that would be the interpretation. My answer to that
13 question would be that I felt that the reviews, the
14 dialogue, the content created by Doctors Woodbury and
15 Hollander were -- was well done, and -- and fulsome, and
16 important. I would say that -- and I apologize again.
17 I'm forgetting his name, our panelist yesterday with
18 Matrix, I thought that the work he did and the things he
19 brought forward were excellent. So, my answer to your
20 question would be based on what I heard from those
21 panelists, I felt like the things that needed to be
22 discussed, addressed, otherwise commented on, we're done
23 very well. And as such, then I didn't dig into the
24 minutiae of that work today.

25

1 MR. DUNCANSON: Thank you, sir.
2 Duncanson speaking. Recognizing, though, Mr. Mann, that -
3 - that you do have considerable experience in
4 hydrogeology, there -- there has been some debate over the
5 course of the last week as to whether AECOM's numerical
6 modeling generally met, industry standards, or was it
7 state-of-the-art? There was some debate around that.
8 Based on your experience, did AECOM'S numerical model
9 generally conform to industry standards?

10

11 MR. MANN: Mann speaking. I'll just have
12 to start by saying I -- I really am not a fan of using the
13 terminology industry standard because, in my view, it's a
14 very broad statement and I don't know if it's well
15 defined. However, in thinking about the -- your lines of
16 questioning the other day with the other panelists in
17 terms of very detailed questions about calibration,
18 calibration state, what it means, the various metrics on
19 measuring the calibration of -- of a model like this, in
20 my view, due -- by the -- the various measures and metrics
21 that one would look at a calibration of a model, was it
22 reasonably calibrated? I would say that, yes, it was.
23 However, having said that -- and I raised this, as did
24 others, and I raised this in an IR -- I had some, and I
25 still have some, concerns about uniqueness. The

1 permeability field assigned to some of the strata in that
2 model is consistent and the same everywhere, and I think
3 it was Dr. Hollander had demonstrated you could adjust
4 permeability and adjust boundary conditions and achieve a
5 similar calibration. So, I would have a concern with
6 that. The metrics, the measures, looking at a
7 calibration, yeah, it looks pretty good, but behind it,
8 behind the scenes, what I just described, is something
9 that I would have a concern with, or -- and I've commented
10 on it. The other item I would say along those lines was
11 verification. I said that in panel, and I asked that
12 question. Verification is important. If you calibrate a
13 model, and then you give it another set of conditions, of
14 some other event, a dry year versus a wet year -- and
15 there's lots of data here -- I heard from the panel there
16 wasn't enough data, there's a lot of data -- that
17 verification step could have been done. You calibrate a
18 model, you run it against some other set of known
19 conditions, and you see how it performs. I've talked
20 about that, so that's important to me.

21

22 And I'll give you an example. I did the
23 model -- regional model for the Winnipeg Floodway
24 expansion. It was about a year's worth of work. And for
25 various reasons I won't go into in terms of the

1 engineering design and -- and decisions made on the
2 project, groundwater decisions that affected the
3 engineering of that project. So, the -- the importance of
4 the groundwater model, per se, changed because of that.
5 But what I will say is that we created a model, it was
6 regional. We calibrated that model. It was verified
7 against the original construction of the floodway. The
8 original construction of the floodway created a drawdown
9 cone that was, like, 25 feet at the heart of the drawdown
10 cone and expanded 20 kilometres in east-west, north-south
11 directions, verification. We created a calibrated model.
12 We verified it over an event that we knew about and it --
13 and it performed well. From that, we worked on
14 simulations of deepening the floodway. And this is where
15 I'm going about engineering design. The decision was made
16 very early for groundwater reasons not to deepen that
17 channel. The expansion of the floodway included no
18 deepening of the channel, so an engineering decision was
19 made to widen it for the reason of a groundwater resource
20 and the sensitivity to it. So, I'm going down a long
21 line, but verification is important. So, that's another
22 item I would -- I would talk about.

23

24

25

And there was one more after I went down
that -- that line -- I'm forgetting, with respect to the

1 model. We talked about calibration, uniqueness,
2 verification. I'll leave it there for now. I thought
3 there was one other thing I would talk about, but I'll --
4 I'll say that.

5
6 MR. DUNCANSON: Thank you, sir.
7 Duncanson speaking. This morning in your presentation,
8 Mr. Mann, you -- you mentioned recharge of up to eight
9 months from drawdown associated with this project. Can
10 you just provide what was the basis for that statement?

11
12 MR. MANN: Mann speaking. No, I'd be
13 happy to clarify that. So, what I was referring to there
14 is the natural progression of recharge to the aquifer in
15 this region of the province. So, what -- what I mean by
16 that -- so, it - -it's not to do with the modeling, it's
17 not to do with the project, it's just to -- to do with
18 what do we know, based on the long term groundwater
19 records today, of how the aquifer behaves? And there's a
20 paper published, it was done by Bob Betcher, and I think
21 Mr. Wang was on there as well. It's a nice paper. He
22 looked at all of the aquifer systems in the province, but
23 essentially what he did was to take the long-term
24 hydrograph records, take the long term climactic records,
25 look at years that were wetter than average precipitation,

1 look at years that were drier than average precipitation,
2 look at the long-term hydrograph and determine well, I
3 know I've had two years worth of dry -- drier than normal
4 conditions, for example, when do I see that in terms of
5 the aquifer water level bottoming out, right? What's the
6 response to that? In this area, that lag time is around
7 eight months. That's what I was referring to.

8

9 MR. DUNCANSON: Thank you, Mr. Mann.
10 Duncanson speaking. We thought so, but just wanted to
11 confirm. So maybe I'll move on to -- to a different line
12 of questions. And really, I'll ask these questions to
13 both of you and -- and you can sort out amongst yourselves
14 who should answer, or perhaps you both want to answer.
15 Based on your knowledge of geology across Manitoba, would
16 you agree that there is variability of limestone types, in
17 the sense that some are stronger, and some are weaker than
18 others?

19

20 MR. MANN: Mann speaking. I want to give
21 a lot of context here because I've done a lot of work
22 about this. The answer is yes. And I've -- I've seen it
23 over and over again. It's a broad question you're asking
24 because there's quite a number of different limestone or
25 carbonate bedrock units in this province, and -- and

1 correctly, yes, they do vary.

2

3 MR. DUNCANSON: Thank you, sir.
4 Duncanson speaking. And would you agree that the effects
5 of glaciation and isostatic rebound vary, depending on
6 things like the specific characteristics of the geologic
7 materials, the age of those materials, material
8 properties, depth of cover, those types of things?

9

10 MR. MANN: Again, a question I'd really
11 like to get into a dialogue about, but I guess I would say
12 that in short answer, yes. How various geological units
13 respond to what I'll call the stressors you describe --
14 glaciation, rebound, and -- and be told, isostatic rebound
15 here is differential -- it's not the same everywhere --
16 I've studied that. Anyhow, I guess yes is the answer.
17 The various geological carbonate bedrock units will behave
18 differently to these sorts of stresses -- glaciation,
19 other things. They have different lithologies, they have
20 different histories, exposures, weathering, I mean, you
21 name it, this is a deep subject, but to answer your
22 question, yeah, they vary.

23

24 MR. DUNCANSON: Thank you. Duncanson
25 speaking. And just to follow up on that, as part of that

1 variation, you would agree that spacing and continuity of
2 vertical jointing and limestone is likely to vary across
3 the province?

4
5 MR. MANN: Mann speaking. That's a yes
6 and no question. Yes, it varies. Is there none in the
7 carbonate rock in this province? That -- that's a no.
8 There -- there are these discontinuities everywhere. Is
9 there spacing continuity, site specific habits different
10 in different places? Sure, but they exist everywhere. I
11 think that's important.

12
13 MR. DUNCANSON: Duncanson speaking.
14 And just for example, Mr. Mann, and perhaps we could just
15 turn to this, on Slide 7 of your presentation, this is one
16 of the images that -- that you walked through and -- and
17 you're the geologist, not me, but this is showing
18 horizontal bedding in limestone, which is one of the
19 things that -- that Stantec specifically looked at in its
20 assessment, but that would not show vertical jointing,
21 correct?

22
23 MR. MANN: This particular face, correct,
24 is showing horizontal bedding partings. It does not show
25 vertical -- actually, I could have picked another image

1 out of this deck that would have shown both, but I didn't.
2 But what I will say to you is that the face that we're
3 looking at, as exposed, and it's general habit that it's
4 planer, like we're -- we're looking into a vertical joint
5 face, but we're looking at horizontal discontinuities.

6

7 MR. DUNCANSON: Thank you, sir.
8 Duncanson speaking. And I just wanted to ask a few
9 questions about the series of images that -- that you had
10 in your presentation. Most of the slides, if not all of
11 them, reference the -- I think it's the Hecla Grindstone
12 Provincial Park. Can you confirm that that is where all
13 of these images are from?

14

15 MR. MANN: Mann speaking, it says that on
16 each slide, that this is at the -- the nearest location
17 where this strata, which directly overlies the sand
18 everywhere in this province, it is the closest location
19 where it's visible at surface.

20

21 MR. DUNCANSON: Duncanson speaking.
22 Thank you. And just to orient those of us in the room who
23 aren't familiar with exactly where that park is, roughly
24 how close or far is that from the project area?

25

1 MR. MANN: Mann speaking. I didn't
2 measure it, but it's tens of kilometres.

3

4 MR. DUNCANSON: Thank you, sir.
5 Duncanson speaking. Do you know, Mr. Mann, whether
6 there's any anthropogenic disturbance in proximity to any
7 of the images that you've shown -- things like historic
8 blasting activities, for example?

9

10 MR. MANN: Mann speaking. So, I don't,
11 but what I will say is that again, the one image I showed
12 further down in this slide deck was in a quarry site. But
13 what's important that I'll acknowledge about that quarry
14 site is the floor -- maybe I'll scroll to it -- of that
15 quarry site is a glacially striated surface. It's -- it's
16 an in situ surface -- unaffected. It's a -- it's a
17 geological feature that's there, and was there, and is
18 there. I would not say that -- that flat looking pavement
19 like structure, that Jim is standing on, is disturbed --
20 for those reasons, it's -- it's showing striation, it's
21 showing all of the things that are relevant. I'll just
22 add one more comment. While you're -- you're being very
23 specific, and I appreciate the questions you're asking me
24 about where this is and why I'm showing it, really, the
25 reasoning here is that -- is to say that, you know, the

1 simplest answer is usually the simplest answer or the most
2 elegant answer, and you know, the -- the inverse question
3 to where I think you might be going is, you know, in other
4 words, I see it here in this formation. This structure
5 exists in this formation. Yes, it's in a different
6 location, but this formation was subject to basin wide
7 geological events. So, for example, if this is the kind
8 of discontinuity pattern I'm seeing in this formation at
9 this location, and it's subject everywhere to the same
10 geological history, I can't see it here. It's buried.
11 But why would I decide or infer that perhaps this doesn't
12 exist here? Because it does exist I don't -- you know --
13 you don't know, you can't see it, you'd have to do some
14 drilling to try and characterize it. But it exists. Is
15 it different than this pattern? Could be -- probably. I
16 would argue that some of the regional features, general
17 orientations of some of these large discontinuities are
18 basin wide, because they formed because of base and wide
19 tectonism uplift pressures, right? They form orthogonal
20 to some of those main stresses, like they exist
21 regionally, everywhere, relatively with the same
22 orientation. Would exactly this pattern show up down --
23 down the road over here? Well, no, but it would be
24 similar.

25

1 MR. DUNCANSON: Duncanson speaking.
2 Mr. Mann, turning back to these specific images that you
3 walked through this morning, would you agree that rock
4 outcrops would have been subject to weathering over time
5 through things like frost heave?

6

7 MR. MANN: That is -- yes, outcrops are
8 subject to weathering and frost heave.

9

10 MR. DUNCANSON: Duncanson. And in
11 your view, would physical and chemical weathering likely
12 enhance the presence of karst and fracturing?

13

14 MR. MANN: Mann speaking. Interesting
15 question. So, weathering, physical and chemical
16 weathering, can enhance discontinuities. That is true.
17 The time frames, in modern time, that those things have
18 occurred, I would say is not a substantive effect. You
19 know, the other part is, you know, we're also in a
20 location where, you know, we're not subject to acid rain
21 and other things that can -- can accelerate that. What I
22 would like to say is that when I talk about karst, and
23 some of these discontinuity features, dissolution
24 features, enhancement of discontinuities, I'm really
25 talking about paleokarst. They exist because of

1 geologically historic exposures, and weathering, and
2 karsticity back to the mid-Devonian, like, 400 million
3 years ago. So, the discontinuities formed from tectonic
4 stresses -- they're exposed, they're weathered in geologic
5 time, and this can vary from enhancement or widening of
6 joint sets to caverns. There's caves in this province.
7 That happened in geologic time. And I call it paleokarst
8 because it's the right way to refer to it, because in
9 geological time, those features have been infilled by
10 shales, tills, other materials in geologic history that
11 came after. And those karst processes really aren't
12 active, right. They happened in the past, they're there,
13 they're infilled, or might be a cavern, but in modern
14 times, if we can think about it that way, those karst-like
15 processes aren't really active because we're not in a --
16 in, A, in a time frame that we would discern it, B, not in
17 a place where, you know, we're subject to acid rain or
18 other things that would enhance it. So, it's a
19 complicated question and I apologize that I keep talking,
20 but I'll leave it there.

21

22 MR. DUNCANSON: Thank you, sir.
23 Duncanson speaking. Maybe I'll ask the question this way.
24 Would you agree that outcrops of limestone are typically
25 more weathered, and typically display more fractures, than

1 subsurface limestone?

2

3

MR. MANN: Mann speaking. Would you want
4 to refer me to a specific slide? Because if we were
5 looking at this one, I would say no, the joint pattern
6 we're looking at in this slide is due to the processes
7 that I've talked about. If you want to look at the very
8 first slide that I showed, which most definitely is a
9 displaced block of rock that is weathered and has
10 otherwise been displaced, that's a different discussion.
11 So, maybe -- maybe you want to be more specific.

12

13

MR. DUNCANSON: Duncanson speaking.
14 Well, sir, my question was whether you would generally
15 agree. I think I heard from you something I heard a lot
16 yesterday, which was, it depends. So, maybe we'll just
17 leave that there. But Mr. Mann, you acknowledge, and you
18 talked with the Sio panel last week about this, that Sio
19 and Stantec do acknowledge the potential for vertical
20 jointing in the project area and they have proposed an
21 angled borehole drilling program to quantify that
22 potential. Do you agree that that type of program, that
23 they have proposed, would allow for Sio to identify the
24 potential presence of vertical joints in the project area?

25

1 MR. MANN: Mann speaking. Obviously not
2 having the details of what would be planned, however, at a
3 high level, the drilling of inclined boreholes, such as
4 you described, with coring, would be the approach to
5 resolve, find, identify vertical discontinuities. So,
6 agree on that basis. And I think, obviously, I'll -- I'll
7 state my -- my opinion again, it's important. I think the
8 other part that's important is then not only -- and I -- I
9 do appreciate -- I'll step back, the panel having that
10 dialogue and acknowledging that piece, I do appreciate
11 that, it's important. The other part that's important,
12 however, is collecting the data and then looking at it
13 geotechnically, and determining whether it changes the
14 interpretation and what that might mean geotechnically.
15 So, I think there's two pieces there and I'll leave it
16 there.

17

18 MR. DUNCANSON: Thank you, sir.

19 Duncanson ---

20

21 MR. SMITH: Smith here. If I can add to
22 that? Smith speaking. So, the other thing with those
23 boreholes is the number of holes you're going to drill.
24 If you drill five or six holes, you may or may not have
25 them at the right orientation, in the right positions to

1 detect the -- the vertical jointing. The other thing is
2 not only drilling and coring but running geophysical
3 procedures. I'm sure they're aware of that -- I don't
4 know what the panel discussed, but to look at the
5 orientation of the fractures. So, when the core comes up,
6 it rotates around, you can't distinguish what the angle of
7 that -- that angle -- hole -- what the orientation of the
8 joint is, unless you run either borehole cameras and other
9 tools down the hole to establish that. That is -- yes, it
10 is a vertical (inaudible), for example. While I'm
11 speaking, just to clarify in an earlier question you had,
12 the Bissett Gold Mine was one site where I did get
13 involved in waste managing an active site. It was
14 relatively limited, but nevertheless did evaluate and --
15 and design some waste control facilities and monitoring.

16

17 MR. DUNCANSON: Thank you, sir.
18 Duncanson speaking. Mr. Smith, while we're chatting with
19 you, right near the end of the presentation this morning,
20 you talked about the strength of the till layer. And just
21 to confirm, are you aware that Stantec did not rely on the
22 till layer providing any strength as part of its
23 geotechnical assessment?

24

25 MR. SMITH: I'm not. I'm -- Smith

1 speaking here -- when I looked at their January 24th
2 geotech report, they gave us specific strength, 30 degrees
3 to the till, the cohesion 20 kilopascals, and that
4 presumably was going into the model. So, when you say
5 they didn't rely on any strength, I don't understand what
6 they ultimately did do, but I do know that even on that
7 report, they were not looking at any vertical holes or any
8 drilled angle holes. Those -- those have all been very
9 recent adjustments as a result of our earlier questioning.

10

11 MR. DUNCANSON: So, Mr. Smith, maybe
12 just to be more specific -- this is Duncanson speaking --
13 are you aware that the critical failure mode that Stantec
14 assessed was the bending failure mode?

15

16 MR. SMITH: Sorry -- Smith speaking -- you
17 were totally broken up and garbled. I'm going to maybe
18 take my video off for the moment. It might improve
19 connection here. I'm down in Florida.

20

21 MR. DUNCANSON: Sure, I'll --

22

23 MR. SMITH: Please.

24

25 MR. DUNCANSON: -- I'll ask the

1 question again. This is Duncanson speaking, and -- and if
2 -- if you can't hear me again, just let me know. My
3 question, Mr. Smith, was whether you were aware that in
4 Stantec's assessment, the critical failure mode that was
5 assessed was the bending failure mode?

6
7 MR. SMITH: Smith speaking. Very much so.
8 And if they allowed for vertical fracture, they'd find a
9 different critical mode -- collapse. So, the bending is -
10 - is predicated on the fact that you have a -- a competent
11 limestone, extensive area, more than the 50 metres with no
12 vertical or angled joints. Because if there are, then
13 that -- that model doesn't work. That's why I suggested
14 earlier some sensitivity analysis would help them to
15 define the range of potential failures and also prepare
16 them, so they don't get surprises down the road.

17
18 MR. DUNCANSON: Okay. Thank you, sir.
19 Duncanson speaking. So, I just want to -- based on the
20 comments that you were making earlier about the till
21 strength, I just wanted to be clear on -- on what your
22 understanding was. So, you did understand that the
23 critical failure mode that was assessed was the bending
24 failure mode. And did you understand as well, that as
25 part of looking at that bending failure mode, Stantec did

1 not rely on the till layer providing any strength?

2

3 MR. SMITH: Smith speaking. Again, that
4 January 24th report in 2023 that Stantec issued, gave till
5 strengths. There's no mention to say they ignored those
6 strengths as just pure loading. Because if you have -- in
7 order for that block of till to drop and shear through the
8 roof of your void, if you put cohesion on those -- on the
9 till and you put five frictional value, you can't say you
10 ignored the strength. They didn't -- I don't understand,
11 unless they just put a pure vertical load and they ignored
12 any side friction on the till. If they did, then that's -
13 - that's certainly the extreme condition, and you know,
14 that would be your worst case scenario. And that would
15 certainly apply if you had vertical jointing, because you
16 have no cohesion with -- with the vertical joints.

17

18 MR. DUNCANSON: Yes, thank you, sir.
19 This is Duncanson speaking. And we'll let the -- the
20 transcript from last week speak to -- for itself, but I
21 believe that's exactly the scenario that -- that Stantec
22 looked at for worst case scenario. But ---

23

24 MR. SMITH: Well again, I -- I guess --
25 Smith speaking -- we haven't seen those results other than

1 whatever they said this is what we get. What we do have
2 is a January 24th report that speculates between a -- a 30
3 and a 50 metre diameter void and that -- that the 15 to 25
4 metre competent limestone would accommodate -- with the
5 bending failure. I haven't seen the other analysis. In
6 fact, I just saw that one recently. Up until very
7 recently it was -- it was classified for some reason as
8 confidential. I don't -- I don't understand that at all.
9 There's nothing I saw there that was -- should make it
10 confidential.

11

12 MR. DUNCANSON: Okay, thank you for
13 that, Mr. Smith. Duncanson speaking. I just want to ask
14 one -- one question of -- of you both. And again, this is
15 one I'll just ask the question and you can sort out
16 amongst the two of you who the right person to answer it
17 is. There were some comments made in your presentation
18 this morning about the geotechnical assessment in terms of
19 looking at the -- the sandstone layer and whether that 65-
20 degree angle is the appropriate angle. And we -- I mean
21 we -- we obviously heard extensively from Stantec on this
22 last week, Mr. Mann, you questioned that panel extensively
23 -- and by the way I thought you did a very good job of --
24 of questioning -- we you here on Monday this week as well
25 when we heard from Mr. Wiatzka about the review that

1 Arcadis did, and their view that the geotechnical
2 assessment that was conducted for the project was an
3 appropriate adequate assessment for the stage of where
4 this project is at?

5

6 MR. MANN: Mann speaking. And I'll have
7 to answer that question because I was here. That was the
8 geotech engineer from Arcadis, correct?

9

10 MR. DUNCANSON: Duncanson. Correct.

11

12 MR. MANN: So ---

13

14 MR. SMITH: Sorry, Smith speaking. If I
15 can add to that, I was not at that particular
16 presentation, but I will say Arcadis looked at what was
17 given to them and said this is valid, what was given to
18 them. But if the assumptions aren't valid, then the
19 results aren't valid for that model. They -- they
20 accepted the model, per se, based on the assumptions made
21 for that model and how it was right. They didn't question
22 the fact that there could be vertical fracturing. They
23 didn't -- or cohesion in the till -- those were not items
24 that they brought up either way. So, that was my take on
25 reading Arcadis' report, just well, yeah, what -- what

1 Stantec had analyzed for makes -- you know the -- it's
2 valid. We can't -- we're not going to go into nitpicking
3 the model, per se. We'll accept as what they assumed.

4

5 MR. DUNCANSON: Duncanson speaking.

6 Mr. Smith, I just want to make sure that I'm clear on what
7 you're saying. Your view is Arcadis, as part of its
8 review, did not review the appropriateness of the
9 assumptions that Stantec used for its modelling?

10

11 MR. SMITH: Well, I'm saying that Arcadis
12 did not bring up the fact that there -- there could be
13 vertical jointing in that competent rock. Now, whether
14 they're aware of it, or not, or whether they're working
15 from another -- they're not local to the -- to Manitoba,
16 they may not be familiar with the local conditions, so it
17 may not have occurred to them to ask that question. I
18 don't know. I'm just -- my -- I'm assuming, based on what
19 I read in their writing, is that they took it at face
20 value, here's Stantec's assumptions, plugging them into
21 the model, yeah those results are reasonable for the
22 assumptions made.

23

24 MR. MANN: Mann speaking. If I could
25 jump back in just for a moment, because I was here, and I

1 believe -- I won't ask you to rephrase it, but the
2 question that you asked and how you phrased it, I did hear
3 the things that were said, and I think you characterized
4 them correctly. But I would also -- in terms of saying
5 specifically that review was based on the information that
6 was given, and it was in -- I would characterize it by
7 saying it was within hard bounds of what was given. My
8 own opinion, and my own sense would be that, and it's
9 similar to what Mr. Smith was saying related to his
10 original report of their original work, was that whether
11 or not they wanted to, and I -- and I'm saying this as
12 respectfully as I can, so please, let me say that, whether
13 they wanted to ask the question, wanted to stay within
14 hard bounds of their scope of only looking at what they
15 were given, were some of the things that I'm -- I'm kind
16 of speculating, but where I'm going is -- is that, I -- my
17 sense was is they didn't ask a lot of questions
18 necessarily, or at least I didn't hear that, in the
19 dialogue that I heard sitting here. And so, I guess
20 really that's an opinion or an interpretation. Maybe I'll
21 leave it there.

22

23 MR. DUNCANSON: I think that's a good
24 idea, Mr. Mann. Duncanson speaking. I think you
25 acknowledged that we're -- we're getting into the realm of

1 speculation, so, I -- I think I'll move on.

2

3

4 You talked about draft management plans and
5 proposed management plans quite a bit in your presentation
6 and in your written report. You stated a few times that
7 ideally these plans would be finalized prior to issuance
8 of a licence for the project. Now, Mr. Mann, you -- you
9 do have extensive experience in the Province of Manitoba.
10 You covered that. You would agree with me that these
11 types of plans, for a project like this, are typically
12 finalized after issuance of a licence so that the
13 conditions imposed in the licence can be reflected in the
14 final management plans, and so that the management plans
15 can reflect input from local stakeholders like MSSAC,
16 right?

16

17

18 MR. MANN: Mann speaking. So, what
19 you're saying is correct. You use the word typically or
20 always -- I'm not sure, maybe you used typically -- and
21 I'm not the decision maker so I -- I can't, in my own
22 experience, state that a different decision was made. In
23 other words, like I offered my opinion today that my sense
24 would be that the plans be completed prior to licence --
25 the way you described it, which is different, as a
condition of the licence -- licence comes first, plans

1 come later. I don't disagree with all the things you've
2 said. But one of the things, I guess, and maybe it
3 doesn't matter, it's opinion perhaps, is that there's some
4 sensitivities in this project. It's a long-term view,
5 it's a long-term condition, a long-term -- a long-term
6 commitment to stewardship, to do -- to do what's needed to
7 be done here to ensure that, as best as practicable, and
8 within the ream and realm of management plans, and
9 managing risk, and managing uncertainty, that things are
10 preserved -- protected as best as possible -- environment,
11 groundwater. So, it's -- it's important in this case.
12 It's a huge groundwater resource, there's a lot of users,
13 there's a lot of people here. So, while what you're
14 saying is correct, licence can be granted, all of these
15 other things can come after as a condition of the licence,
16 that's true, but I'm just offering my own perspective --
17 and I'm not the decision maker, that this one's important.
18 And I think what's important in whatever scenario occurs,
19 whether the licence is issued, and the plans come later,
20 whether the plans must be complete prior to the licence.
21 In any of those scenarios, what's critical is engagement.
22 What's critical is mutual agreement on what those things
23 are, and how rigorous they are, and what's going to be
24 done, and where is it going to be done, how often is it
25 going to be done? When am I going to see the results?

1 Can I see the results -- transparency? Who is the
2 shepherd overseeing all of it? Because without -- in this
3 case, for all of the complexities and reasons, I think we
4 all had our understanding -- and again, it's my opinion
5 the engagement is important. The hands into the process
6 is important. Simply relying on the process that's
7 written down in black and white, saying proponent shall
8 issue a plan after licence, it's not that simple. In
9 black and white it says that, but it isn't that simple.
10 And that's my opinion. And I know you're looking for yes
11 and no answers, but I can't give you a yes and no answer
12 on that.

13

14 And I'll give you another perspective --
15 and it's in the transcript when I -- when you asked me
16 about the geotechnical engineer from Arcadis. And I made
17 the statement about, as P.Eng. and P.Geo., the paramount -
18 - and the paramount function of the P.Eng. or a P.Geo. is
19 protection of the public. I know that because I am one, a
20 P.Geo. I also know that because I was president of our
21 association. And where I'm going is that I -- I'm
22 offering these opinions and this context because while
23 what you're saying is correct, I want to give more than
24 that because this is important. And for me, as a
25 practitioner and as a person, whatever happens is going to

1 happen -- I'm not the decision maker, but I need to make a
2 statement about how I feel about the importance of these
3 plans should this project go forward. The importance that
4 all of the stakeholders are engaged and understand them,
5 and have hands in them, and there's mutual agreement on
6 what they are and what they mean. So, it's just to give
7 you that context. That's why I'm saying it. I'm sorry
8 I'm taking so long, but it's important.

9

10 MR. DUNCANSON: I appreciate that Mr.
11 Mann. Duncanson speaking. And I suspect I know the
12 answer to -- to this, but last week we heard questions
13 from MSSAC's Council to -- to Sio, asking whether Sio
14 would work with MSSAC to incorporate their input into the
15 final plans. And I take it, based on your comments,
16 you're very supportive of that. These types of draft
17 plans should not be finalized until there is an
18 opportunity to incorporate input from stakeholders like
19 MSSAC.

20

21 MR. MANN: Mann speaking. I don't know
22 if that came from us, Mr. Duncanson -- I think it was
23 Springfield, but it doesn't matter, that exchange
24 happened, and -- and I -- I would agree with you that the
25 response from Sio was not in detail, but was supportive of

1 the engagement or partnership, if I could use that word.
2 Anyway, circling back to your original question, yes, it's
3 important, and yes, I'm supportive.

4
5 MR. DUNCANSON: I'd be surprised if
6 you gave a different answer, so thank you, Mr. Mann.
7 Duncanson speaking. Just a few final questions and Mr.
8 Chair, I know we're -- we're creeping up on lunchtime, but
9 I think I should be done pretty -- pretty quick here.
10 First question, panel, but I'll ask it to Mr. Mann,
11 because you presented this content this morning, in terms
12 of Sio's draft monitoring plans for groundwater, I took it
13 from reading your written report that your view is those
14 monitoring plans are appropriate for the stage that this
15 project is in. Is that still the case?

16
17 MR. MANN: Mann speaking. Agreed. I do
18 feel the level of detail that was developed in that draft
19 plan was reasonable. I'll say I was actually pleased to
20 see the level of detail was there because often in a
21 scenario like that, when it's presented as part of the
22 process, as a draft plan, sometimes you don't see much
23 more than a table of contents, and that -- that can
24 happen. So, reasonable plan -- we suggested some
25 improvements -- that's in the written report, a few

1 things. We talked about them today. So, maybe a little
2 bit of work to do, but you know, yeah, reasonable report.

3

4 MR. DUNCANSON: Thank you, sir.
5 Duncanson speaking. My next question, you -- you talked
6 this morning in your presentation about waste management
7 and I said earlier I would come back to this, and here I
8 am, but I just want to confirm one -- one part about your
9 understanding of what Sio is proposing, because you had
10 some recommendations that -- that flowed from that. You
11 talked about, you know, should waste be stored on surface,
12 and waste stockpiles, if that was to happen, it would be
13 important to do certain things. Is that your
14 understanding is that waste would be stockpiled on site?

15

16 MR. MANN: Mann speaking. So, I would
17 say I don't -- I don't have a full understanding on
18 exactly how each piece of those operations will play out.
19 But I'll give some context of what I -- what I do
20 understand, and I could be wrong. I think there'll be
21 sand stockpiles on site for some periods of time -- and
22 maybe I'm wrong, but with a relatively small effort of --
23 of creating a bit of an engineered containment, I'll call
24 it, it could -- could mitigate some of the concerns I
25 heard -- not necessarily for me, but from others that I

1 heard in this last week -- week and a half. And then on
2 the shale side of things, I think that's probably the one
3 that's a little more sensitive to leaving out to the
4 atmosphere, and lying around, and doing things. And I'm
5 not suggesting that's going to happen because your waste
6 management plan does state that the shale will be removed
7 and disposed of at an appropriate facility. And I think I
8 stated that that's good -- that's important. However, and
9 again, and I maybe don't have the context, on a day-to-day
10 basis, there'll be some kind of storing of some amount of
11 material for some period of time, and I guess that's what
12 I'm referring to. I'm not suggesting it's sitting there
13 forever. It's just, when it's there, being handled, being
14 temporarily stored, here's some things that could be done
15 to -- to, you know, improve the -- improve the -- that
16 storage, let's say.

17

18 MR. DUNCANSON: Thank you sir.
19 Duncanson speaking. And so, to the extent that Sio is
20 proposing to, you know, properly contain all waste
21 materials in an engineered solution so that they do not
22 access the surface environment, that would, at least in
23 part, alleviate some of the concerns you raised?

24

25 MR. MANN: Mann speaking. And I'll

1 apologize, if the waste management plan actually states
2 that there'll be engineered containment then I -- yeah, if
3 it says, that and -- and I might be forgetting, if it
4 does, that's where -- really where I'm getting at. And
5 so, if it says that, and if there's a commitment to do
6 that, then I -- I don't have anything much more to say
7 about that.

8

9 MR. DUNCANSON: Thank you, sir. And
10 I'll just turn to my last couple questions, and these are
11 just hopefully simple questions of clarification. But Mr.
12 Mann or Mr. Smith, whoever wants to answer this -- this is
13 Duncanson speaking, if I didn't say it -- can you confirm
14 that KGS was previously retained by Sio to do work related
15 to the project?

16

17 MR. MANN: Mann speaking. I can speak to
18 this, and it was an item raised, and dialogued, shared
19 early on, and I can tell you specifically what that role
20 and responsibility was. So, small job, geotechnical work,
21 test hole drilling on the processing site. And I -- I'm
22 forgetting the dates, but it's a handful of years ago -- I
23 mean, it was early in that whole process. So, factually
24 our -- our engagement with Sio on anything has been
25 geotechnical borehole drilling on the processing site. It

1 was probably -- you know, well, I won't speculate on how
2 long we were on site, or how many boreholes, I don't
3 remember, but a very simple, short-term assignment to do
4 some basic geotechnical boreholes. Period.

5

6 MR. DUNCANSON: Duncanson speaking.
7 And as part of that work that KGS did for Sio, KGS entered
8 into a non-disclosure agreement or NDA with Sio. Is that
9 right?

10

11 MR. MANN: My recollection on that would
12 be correct because -- and I -- yeah -- anyway, yes.

13

14 MR. DUNCANSON: Thank you, Mr. Mann.
15 Duncanson speaking. And sir, are you aware that when --
16 when Sio became aware that KGS may be providing evidence
17 for another party in this proceeding, Sio expressed
18 concerns to KGS that that NDA remained in place and that
19 there needed to be strict assurances within KGS that no
20 confidential information was shared outside the scope of
21 that agreement?

22

23 MR. MANN: Mann speaking. So, yeah, I'm
24 familiar with NDA's and what they mean.

25

1 MS. BORYSKAVICH: Mr. Chair, if I could
2 interject here. Boryskavich speaking. I don't know that
3 this line of questioning is appropriate for this
4 proceeding. I'm not sure where Mr. Duncanson is -- is
5 going with it, but I certainly don't want to put the
6 expert in the position where if any further action is
7 taken they're speaking in this proceeding.

8
9 THE CHAIRMAN: Chair. So, Mr.
10 Duncanson, where are you going?

11
12 MR. DUNCANSON: Not much further, Mr.
13 Chair. This is Sander Duncanson speaking. Really, I
14 mean, I'll just cut right to the chase, Mr. Mann, Sio had
15 asked for assurances that none of the individuals who were
16 going to be providing evidence in this proceeding had
17 access to the confidential information that was gathered
18 by KGS previously and would use it for the purposes of --
19 of this proceeding. And Sio you never heard back from
20 KGS. So, I just wanted to confirm that neither you nor
21 Mr. Smith did, in fact, use confidential information that
22 was -- that was gathered previously and covered by that
23 NDA, for the purposes of your evidence in this proceeding.

24
25 MR. MANN: Mann speaking. I can answer

1 this question and acknowledging that I'm under oath and
2 it's important. So, I had no involvement in that work.
3 I'm aware of it, right, because I work at KGS Group, and
4 the item came up and we wanted to be sure we understood
5 what our role and responsibility was with this proponent
6 moving into this arena. That work was entirely done by
7 geotechnical personnel. And in terms of the request or
8 response -- request from Sio to ensure that we didn't
9 share information from that work to other work, would have
10 gone to the head of our geotechnical department and I
11 can't comment on what the dialogue was, or exchange was
12 there. What I'll also say is that my recollection of that
13 work is they were surficial soil boreholes, probably for
14 foundation design purposes, although I'm -- I'm not
15 totally certain. But what I can say to you is that the
16 information gathered in that project, which again, I'm --
17 I'm struggling to even recall, has nothing to do with any
18 of the things that I've looked at, talked about,
19 discussed, otherwise, shared, rendered an opinion on --
20 they are completely unrelated.

21

22 MR. DUNCANSON: Thank you, sir.
23 Duncanson speaking. And really, Mr. Mann, that was all
24 that we were looking for is just getting that -- that
25 confirmation. And just to close the loop, Mr. Smith, can

1 I take it that the same confirmation is true for you as
2 well?

3
4 MR. SMITH: Yeah -- Smith speaking. I
5 agree with Jason's comments. Certainly I -- I don't
6 recall -- I might have seen that report several years ago
7 -- I don't recall it. It would have been a very
8 straightforward geotechnical foundation study that
9 typically the -- the geotech department issue. Sometimes
10 I'll see a draft of these, but I don't recall the
11 specifics of that. And certainly it would have had no
12 bearing on -- on my current involvement and -- and
13 evaluation of information provided.

14
15 MR. DUNCANSON: Thank you, sir. Thank
16 you, panel. Thank you, Mr. Chair. Those are all the
17 questions that -- that I have.

18
19 THE CHAIRMAN: Chair, great. Thank
20 you very much. So, Ms. Boryskavich, is there a redirect?

21
22 MS. BORYSKAVICH: Thanks to Mr. Mann's
23 great anticipatory skills, there is not.

24
25 THE CHAIRMAN: Chair. Mr. Secretary,

1 I believe we are adjourned then. Is that correct? We are
2 adjourned for the day. So, I would like to thank the
3 staff here at the Mennonite Heritage Centre for hosting us
4 for the last couple of week. We will regroup ten o'clock
5 Saturday morning in Anola for one of our public
6 participation sessions, which of course, has a different
7 format. So, until Saturday morning, I wish you all a
8 great day.

9
10
11
12
13

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