THE ALBERTA ENERGY REGULATOR

IN THE MATTER OF

Regulatory Appeal 1927181

to the Alberta Energy Regulator

AER PROCEEDING

VOLUME 1

VIA REMOTE VIDEO

October 13, 2020

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(PROCEEDINGS COMMENCED AT 1:01 PM)

Opening Remarks

THE CHAIR: Good afternoon, everyone, and thank you for participating in the AER's first full and fully electronic hearing.

My name is Cecilia Low, and I am chairing this proceeding. The other Panel Members assigned to this proceeding are Claire McKinnon -- and I'll get Claire to say hello -- and Brian Zaitlin. Brian, do you want to say --

And the three of us will have the blue AER background, assuming the technology continues to work for us, through the duration of the hearing, and our names should also be visible on the bottom of our frames.

So I would like to acknowledge that, as I think we are participating from a variety of spots potentially around Alberta, we are located in the traditional territories of the First Nations of Treaties 6, 7 and 8 and the Métis peoples of Alberta.

As you know, AER staff are assisting the Panel in this proceeding, and I will ask them to identify themselves, I guess, just with a hello since we don't have them on screen as I say their name.

So first we have Alana Hall and Scott Poitras -- there you are -- from the law branch. So I see Alana.

Scott, where did he go? There we are.
MS. HALL: Hello.
MR. POITRAS: Hello.
THE CHAIR: Thank you.
Then we have Tammy Turner, Dean Campbell, and Elizabeth McKellar from hearing services.
MS. MCKELLAR: Hello.
MS. TURNER: Hello.
THE CHAIR: And the technical staff assisting the Panel with this proceeding are Scott Botterill, there he is; Luyi Shen, there he is; Teresa Rempfer; Susan Harbidge; and Elwyn Galloway.
Elwyn, are you there?
MR. GALLOWAY: I am here. My video is --
THE CHAIR: Okay.
MR. GALLOWAY: -- not showing, though.
THE CHAIR: All right.
MR. GALLOWAY: I'm here.
THE CHAIR: And you can hear us. That's good. Okay.
As this is an electronic hearing, I want to outline a few details before we start, and I'll try not to repeat what was covered in your practice session last week, although I may repeat a couple of important points. I'll also try to avoid repeating too much of the information that would've been included in the

detailed procedures document.

With the added challenge posed by the electronic format, first identifying and then following who is speaking with a number of frames on the screen at one time, and for Sarah, our court reporter's benefit, I'll ask everyone to first identify themselves, and then say what you have to say slowly.

Please also ensure that if there are multiple people in a room -- it wasn't clear to me if that was going to happen for some of the witnesses or not but the person who is speaking is in the video frame and that participants not speak over each other.

If you do need to speak, whether to raise an objection or a concern for some other reason, please interject orally and wait for me to recognize you. So if we were in a hearing room, Counsel, you'd stand up, and it would -- that would get my attention. In this case, let's try for now a "Madam Chair" and maybe a wave. A real wave, not a Zoom wave. And that will hopefully get my attention.

One change to the detailed procedure --

MS. TURNER: Madam Chair, sorry. We're just --

THE CHAIR: Oh, okay. Oh, sorry. You weren't just showing a practice wave. You were actually waving. That's why the "Madam Chair" part

will be helpful.

MS. TURNER: Thank you.

THE CHAIR: Are they in? Okay.

So one change to the detailed procedures that I think you had received is that all participants except counsel for the parties should remain muted when they're not speaking.

The idea comes from feedback that we had after a virtual prehearing that was conducted by a different Panel where counsel for the parties felt the delay in trying to find the unmute button sometimes prevented them from interjecting in a timely manner.

So, Ms. Berg and Ms. Jamieson, you can leave yourselves unmuted once we get going, and we'll see how that works.

And I think that we will hopefully encounter fewer challenges if we all slow everything down a bit.

And, Sarah, if we're going too fast for you for any reason, just let us know. Okay?

THE COURT REPORTER: Okay.

THE CHAIR: So during the hearing, the Panel will be making notes. So we will be looking down from time to time. It will also likely appear that we aren't looking directly at a witness or witness panel when they're speaking because, of course, we will be looking at them but on our screens, so we won't be

looking directly at the camera. So please know that we are all engaged and paying attention.

We, like you, also have phones at hand in case we need to communicate between Panel members or between Panel and our counsel. You know, in a hearing room, I could put a sticky note in front of one of my co-panelists or they could put a sticky note in front of me. Here we're going to have to use WhatsApp or some other form of communication that will be phone-based, but we'll try to minimize any interruptions on that basis, and I assume you will be doing likewise.

We all need to do our best to juggle our various electronic methods of communication in a way that is the least disruptive to the proceedings. So as I say, please note that we're very much engaged, and we'll assume that you are too. And this probably is a good point for us actually to all check our alternate electronic devices and just make sure that they are, in fact, on silent.

I think we would be overly optimistic to expect that we'll go through this whole proceeding without at least one technical glitch. So we will all have to be patient if and when issues occur.

You have received instructions about what to do if you do become disconnected. If you're an active

participant and are disconnected, we will pause the proceeding as soon as that fact comes to our attention.

I did want to just -- because it wasn't clear to me whether this was something that had been discussed at all in the practice session, what an active participant is. So I'm just going to throw out there a view of that, and then I will hear from -- from counsel for the parties when we do preliminary matters on this point.

But I think for the purposes of this proceeding, an active participant would be a person who's in the process of speaking, counsel for the parties, and counsel for the AER regardless of whether they're speaking, hearing panel members, and our hearing coordinators. If you've got any concerns about that definition, then I'll ask you to raise it as a preliminary matter.

If you are disconnected, you should first try to reconnect using the link that hearing services has provided. If that does not work, then please text Ms. Turner at the number she's provided to you. And if your video freezes or we encounter audio difficulties, you may find that you're asked to repeat portions of what was said before the video froze or your audio difficulties started. Please do let me know if you

notice that somebody's video is frozen and that's causing problems. During breaks, please be sure to mute your audio if it isn't already muted.

If you want to have an exhibit shown on the screen as you are speaking, please ask the hearing coordinator to bring up the document by reference to the exhibit number and then to the specific PDF page number that you want to have shown. The hearing coordinator will also be sharing that document on the -- on the live stream -- I guess the delayed stream or the video stream.

If anybody has questions during the course of the proceeding, please feel free to send a direct message to either Ms. Turner or Mr. Campbell or Ms. Hall or Mr. Poitras and ask them for their assistance.

And as at an in-person hearing, please do not attempt to communicate privately with the Panel members. I don't think any of you know how to get ahold of us at this point in time anyway, so that's sort of a moot point.

As set out in the Panel's notice of scheduling of hearing of September 24th, 2020, this proceeding is being webcast on a YouTube channel and is publicly available from a link on the AER's website. Anyone participating in this hearing will appear on that webcast. Members of the public accessing that link

will be able to observe the hearing but cannot participate. The public may also listen to the hearing through an audio only webcast. This link is also on the AER website.

Please note that the webcast is not the official transcript of the proceeding. The official transcripts are being provided by our -- prepared by the court reporters and will be posted to the AER website the next day.

So now, Ms. Turner, could you please read out the safety procedures and particulars of this proceeding as well as the publication of notice of hearing.

MS. TURNER: Yes, Madam Chair.

Although this is an electronic hearing, safety is still very important. We encourage everyone to carefully review any potential safety hazards in your homes or the location from which you are participating in this hearing.

If an alarm sounds at your location or any other safety issue arises, please let me know, and we will pause the proceedings. Then calmly collect your things and proceed to the nearest safe exit. In the event of medical emergency, call 911. Then alert me as to the situation, and we will pause the proceedings. For any other emergency, please notify me immediately.

The Panel has for consideration at

today's proceeding Regulatory Appeal 1927181 by ISH Energy Limited. On February 21st, 2019, the AER received a request for a regulatory appeal under Part 2, Division 3 of the Responsible Energy Development Act and Part 3 of the Alberta -- Alberta Energy Regulator Rules of Practice of the AER's decision to approve Canadian Natural's Application 1909395 under the Oil Sands Conservation Act to amend scheme approval 11475.

The amended approval 11475EE dated January 24th, 2019, permits Canadian Natural to add a seventh steam-assisted gravity drainage box at Section 1, Township 75, Range 9, West of the 4th Meridian, in Canadian Natural's Kirby North in situ oil sands development located approximately 135 kilometres south of Fort McMurray. The AER -- the AER granted a request on February 11th, 2020.

The purpose of this hearing is to determine whether the AER should confirm, vary, suspend, or revoke its decision to issue approval amendment 11475EE.

The notice of hearing and notice of scheduling of hearing are Exhibits 10.01 and 62.01 respectively and were distributed directly to all interested and potentially affected parties within the prescribed notification radius as set out in the AER Directive 56: Energy Development Applications and Schedules.

The amended notice of scheduling of hearing was posted to the AER website and emailed to the parties on October 8th, 2020. The original notice of hearing was advertised in the Daily Oil Bulletin. That summarizes the details of the giving of notice of this hearing.

Madam Chair, I would like to remind participants that the materials filed for the proceeding, the notice of hearing, and other Panel records and correspondence were marked as exhibits prior to the hearing. All parties to the hearing were sent a copy of the list on October 9th, 2020. Thank you.

THE CHAIR: Thank you. Ms. Turner.

And will we all be provided with updated exhibit lists as we go through the hearing?

MS. TURNER: Yes.

THE CHAIR: Okay. Thank you.

So I would now like to register the participants in the hearing. Our court reporter, who's preparing the transcripts, would appreciate it if we all -- I also need to be reminded to speak clearly and slowly so an accurate transcript is obtained.

Please unmute your microphones as you are called to be registered and mute it for now when you're finished. And just for general notice, the hearing coordinator may mute microphones if they appear to be have left -- to have been left on inadvertently.

And I note for the purposes of the transcript that the hearing Panel and parties were advised that the AER regulatory applications group would not be participating in the evidentiary or final argument phase of this hearing. So they won't be entering an appearance.

The AER did receive submissions from ISH Energy Ltd., whom I'll refer to from here on usually as "ISH Energy", and from Canadian Natural Resources Limited, who I will refer to as "Canadian Natural".

So who is represented ISH Energy?

MS. BERG: Good afternoon, Madam Chair. My name is Laura-Marie Berg, and I'm representing ISH Energy Limited in this appeal.

I'm not certain with regard to the -- to an electronic hearing. In the normal course, I would introduce my witnesses right now, but if we're going to more of a roll call, I'm fine with that as well. I'm in your hands.

THE CHAIR: So if you want to -- why don't we do it this way, if you just advise us orally at this point to confirm for the record who your witnesses are.

And then it looked to me like in your written direct evidence there was a more fulsome introduction -- I guess, sorry, to my co-panelist who hates that word -- introduction of them. We can do

that at that point.

MS. BERG: All right. Well, ISH Energy will be presenting a witness panel comprised of Veronique Giry, who is the chief operating officer of ISH; Edward Mathison, who is a geologist and will be speaking on behalf of ISH; Peter Vermeulen, who is a senior geophysicist; and David Leech, who is a well test specialist.

Now, in addition to the witness panel, we have back-row support at this hearing. Jennifer Clee is a reservoir manager of ISH, and Earl Ward is an engineer in training at ISH. And they just -- I'll let people know just how the seating arrangements are working. Mr. Ward, Ms. Clee, Mr. Leech, and Ms. Giry are sitting in a room together and will be wearing masks throughout the proceeding except when they are speaking.

In addition, we have Mr. Brett Thompson, who is providing back-row support. He is located at his home today 'cause he has a family member -- like many of us have experienced, a family member who is awaiting a COVID test, and so he will be providing back-row support from home.

Mr. Owen Lewis is a geologist with ISH. He is seated in the same room as Mr. Mathison and Mr. Vermeulen. And, sorry, Mr. Lewis is a geologist in training with ISH, and -- and he will be providing

support as well to Mr. Mathison, we anticipate, primarily with navigating the very large record on -- in geology in this proceeding.

And then, finally, I am in a separate room with -- from all of the witnesses, and Ms. Hryciw of our office is providing regulatory support. Thank you.

THE CHAIR: And so my apologies. I may have missed it. Mr. Leech is located where?

MS. BERG: Mr. Leech is in the same room as Ms. Giry, Mr. -- Ms. Clee, and Mr. Ward.

THE CHAIR: Okay. Thank you.

And then I also have another question. So we had some back-and-forth last week about the witness support with the idea that people providing witness support, who would also be potentially conferring with the main witness panel, would also be sworn so that in the event -- if it was appearing that answers were actually coming from the support and not the witnesses themselves, then questions could be directed to them. So is it your intention to have your witness support people sworn as well?

MS. BERG: We have no issue with having our witness support people sworn. We anticipate that -- that the primary witness panel will not need to rely too heavily on them but, yes, happy to do that.

THE CHAIR: Okay. Thank you.

So now representing Canadian Natural?

MS. JAMIESON: Yes. Good afternoon, Madam Chair and panel members.

So my name is JoAnn Jamieson, and I confirm I'm here representing Canadian Natural in this proceeding.

I can also go through our witnesses, but I'm thinking that might make more sense tomorrow when we're actually seated. But it's completely up to you, Madam Chair. Would you like a rundown on who everybody is and where they're physically located today?

THE CHAIR: If you've got that in front of you, why don't we just do that now, and then you can give the more detailed introduction tomorrow when you're seating your Panel.

MS. JAMIESON: Sure.

So with the Canadian Natural witness panel is Mr. Gerard Iannattone. He's vice president of thermal operations with Canadian Natural, and he is here in the building. For the most part, our witnesses are here in the Canadian Natural building in their own offices --

THE CHAIR: Okay.

MS. JAMIESON: -- with a couple of exceptions. I'll talk about that.

Second is Jason Lavigne, and he is a senior geologist. He will be providing key evidence in the proceeding.

Scott Sverdahl, he is a geophysicist and also with Canadian Natural.

Mr. Peter Thomsen is a geomechanical specialist, and he's with Canadian Natural.

There's Dr. Xiang Wang. So Dr. Wang, also an employee with Canadian Natural. He has a PhD in rock physics and structural engineering, I believe. We'll come back to that tomorrow. I'm going by recollection.

Next we have Mr. Dale Walters, and he is a geomechanical engineer, and he is responsible for the geomechanical modelling that was performed by Canadian Natural.

Mr. Ryan Craig, he is an operations -- a senior operations fellow, and he's an employee of Canadian Natural.

We also have Dr. Tom Boone, and he's an independent third-party witness. He -- expert, rather. He conducted a thorough review of the geomechanical analysis that Canadian Natural performed as well as did his own independent risk assessment of the -- the risks involved.

I believe that's our -- sort of our full witness panel. In terms of -- so I believe all of those people are in the building. I think the exception would be Tom Boone.

Is that right? Sorry? Dr. Wang is here too or

no? Okay. So two of those are at home. Dr. Wang is from home, calling in from home. And Dr. Boone is calling in from home. I believe Dr. Boone is located in Canmore. So we are -- oh, there's a third. Corrected. He's Dr. -- or, sorry, Mr. Thomsen, Peter Thomsen, is calling in from home.

And then we have our back-row support. We've identified two. So Devin Ollenberger, and he is also an engineer with Canadian Natural.

Is he -- Devin is in the building?

So he is here in the building today as well as Mark Scrimshaw, and Mark's from -- the regulatory specialist, and he is also located in the building with us.

Where I'm located is in a conference room with two other regulatory people. One is Maude Ramsay. She's a regulatory manager for Kirby in situ development, as well as Heather Sampson, a regulatory coordinator. And we are sharing a large conference room, but we're spread out at two different ends. So that's how we're making that work.

If either Ms. Ramsay or Ms. Sampson need to speak or introduce themselves, then I will be muting my microphone so that we don't pick up the -- the feedback in the room.

So I believe I caught everybody. Okay. So that's

us.

Tammy, did you have a question? Sorry, Ms. Turner.

MS. TURNER: Excuse me, Madam Chair. We had somebody call in, and I believe it's with Canadian Natural. And I just want to make sure. The first three numbers are 587. The last three numbers are 492. Can we just get -- I believe it is Mr. Craig or Mr. Thomsen called in in addition to having the video on. Perhaps his audio wasn't working. Okay.

MR. THOMSEN: I signed in twice, and I'm only using this log-in for audio.

MS. TURNER: Okay. Great. Thank you. That's all I wanted to know.

MS. JAMIESON: Thank you, Madam Chair. If there's nothing else, then I'll hand it back to you.

THE CHAIR: Okay. Thank you.

So I'll briefly explain the procedures we are currently planning to -- to use in this hearing. So in accordance with Section 21 of the Alberta Energy Regulators Rules of Practice, all witnesses must give evidence under oath or affirmation.

The court reporter will provide for this at the time the witnesses give evidence. Witnesses who are choosing to be sworn will have to have their own Bible or sacred object at hand for that purpose.

Please also note that we will not be qualifying expert witnesses in this hearing as is the AER's usual practice.

We will follow the order of presentations set out in the AER's Rules of Practice without, of course, the decision-maker.

So, first, we will be inviting ISH Energy to provide its direct evidence. Witnesses for ISH Energy will then be available for questioning first by Canadian Natural, then by AER staff, and, finally, by the witness panel -- or, finally, by the hearing Panel.

It is the AER's practice to allow witnesses to confer briefly, if necessary, to answer a question. If we find that witnesses are routinely conferring for long periods of time to avoid delaying the hearing, the witness panel may decide to establish a time limit for witness conferral. No one other than sworn witnesses being examined are allowed to confer.

Following questioning, counsel for ISH Energy will have an opportunity to conduct redirect examination of the witnesses on matters arising from the questioning of the ISH witnesses.

Next, Canadian Natural will present its direct evidence and be subject to questions from ISH Energy, AER staff, and, finally, from the hearing Panel.

Following that, counsel for Canadian Natural will

have an opportunity to conduct redirect examination of their witnesses on matters arising from the questioning, and the advice about conferring is, of course, the same for Canadian Natural's witnesses as it is for ISH Energy.

Finally, we will give ISH Energy the opportunity to present any rebuttal evidence it wishes to provide. If rebuttal evidence is presented, it will be subject to questioning from Canadian Natural as well as from AER staff and the hearing Panel.

We'll decide the mode and timing for final argument at the conclusion of the evidentiary portion of the hearing, but we plan to give counsel for the parties an opportunity to share their views on mode and timing for final argument at the opening of the first afternoon session tomorrow. That will give us all a chance to sort of see what the space is like and how we're proceeding.

Please do remind me that I intended to raise that if I forget to ask. I can tell you that I think our -- our preference all things being equal would actually be to have online oral argument at the end of the week.

We plan to take mid-morning and mid-afternoon breaks and may take other short breaks as needed. All of this, of course, is dependent on various developments that can alter our schedule. We will try

to be flexible when necessary.

It's also my intention to check in regularly to see how the electronic process is working for you so that we can learn and make any necessary adjustments as we go. If there is a matter related to the electronic nature of the hearing that's causing issues or concerns or that you want to raise, please let Ms. Turner or Mr. Campbell know or AER counsel. We do want to ensure a fair and efficient process.

So are there any questions about the procedures we intend to follow today? No. I don't see anybody raising their hands or -- or identifying themselves to speak.

So before we go into the more formal preliminary matters, I had given you our view about -- about who is an active participant in the hearing so that if they drop off, we'll try and stop as soon as we notice that and not restart until they're back on.

Ms. Berg and Ms. Jamieson, do either of you have any concerns about the way we were identifying active participants? No? Ms. Berg is shaking her head.

MS. BERG: No. I -- I have no concerns with --

THE CHAIR: Okay. Thank you.

MS. BERG: -- with that. Thank you.

THE CHAIR: Thank you.

And Ms. Jamieson?

MS. JAMIESON: No concerns. Thank you.

THE CHAIR: Okay. Thank you.

So preliminary matters, I think we have a couple of things that have been filed recently that we may need to get marked as exhibits. In addition to that, so we've got -- ISH had filed some corrections, and I believe, if I understood correctly, that Canadian Natural didn't have any objection or any concerns about those corrections.

First of all, am I -- did I get that right? So, Ms. Jamieson, do you have any concerns about the map, the most up-to-date version of the map showing the well locations? I believe you had requested that the locations that had core that were available be marked. So it looks like those have been marked now.

MS. JAMIESON: Correct. We had requested that the publicly available core wells be marked on the map, and we have no concerns. That was completed and filed.

THE CHAIR: Okay. So do we have an exhibit -- a new exhibit number for this, Ms. Turner, or how are we doing this?

MS. TURNER: Yes. So the cover letter ISH submitted, 2020 October 13 ISH to AER, Version 2 of map of cored wells, will be Exhibit Number 84.01.

EXHIBIT 84.01 - Cover letter, 2020 October 13, ISH to AER, Version 2 of map of cored wells

MS. TURNER: Then the ISH to AER map of cored wells V2 is the actual map. It will be Exhibit 84.02.

EXHIBIT 84.02 - ISH to AER map of cored wells V2

THE CHAIR: Okay. Thank --

MS. TURNER: And, Madam --

THE CHAIR: -- you.

MS. TURNER: -- Chair, I think you started speaking about the corrections to Exhibit 66.01? That was --

THE CHAIR: Yes. We have a corrected Kirby Upper Mannville to gas pool map?

MS. TURNER: There's a letter submitted by ISH on Friday, October 10th.

THE CHAIR: Yes. That attached the map.

MS. TURNER: Right. So that would be exhibit -- did you want to speak to that now, or did the -- map of cored wells --

THE CHAIR: I think we're done with the map of cored wells because I don't think anybody had any concerns about that. So I will just double-check.

So, Ms. Jamieson, did you have any corrections or

concerns about the corrected -- about ISH's corrected map showing its mapping of the Kirby Upper Mannville to -- superimposed on the AER designated pool area?

MS. JAMIESON: No concerns.

THE CHAIR: Okay.

MS. TURNER: So that would be marked as Exhibit 85.01. That's 2020 October 09 ISH to AER enclosing corrections to Exhibit 66.01.

EXHIBIT 85.01 - 2020 October 09 ISH to AER enclosing corrections to Exhibit 66.01

THE CHAIR: And then the other one that I wanted to ask about is: We have the written -- as we had requested, we have the written opening statement of ISH Energy that was filed this morning. I've had a chance to go through it, and it seemed to me that there's information in it that people may want to refer to directly through the proceeding.

So my question to Ms. Berg and Ms. Jamieson is whether we should have this marked as an exhibit and if so, whether we should do that now or, Ms. Berg, if you were intending to have it done as you were seating and -- and going through the preliminaries with your Panel.

MS. BERG: If we could mark it as an exhibit now, that would be preferable.

THE CHAIR: Ms. Jamieson, do you have any concerns about that?

MS. JAMIESON: No. We would prefer that as well. Thank you.

THE CHAIR: Okay. So, Ms. Turner, can we have an exhibit number.

MS. TURNER: Yes. So the cover letter enclosing the opening statement is Exhibit 86.01. The actual opening statement is Exhibit 86.02.

EXHIBIT 86.01 - Cover letter enclosing ISH's opening statement

EXHIBIT 86.02 - ISH's opening statement

THE CHAIR: Okay. Thank you.

So is there anything that I have missed in terms of preliminary matters that we should be dealing with before ISH -- I was going to say seats its Panel -- before ISH presents its Panel for direct evidence? So hearing nothing and not seeing any waving, I'll now ask counsel for ISH to present its Panel and proceed with its direct evidence after your witnesses have been sworn or affirmed, and I'm going to leave that in the capable hands of our -- of our court reporter.

MS. BERG: Thank you, Madam Chair. I have already gone previously through the introductions of our Panel. And just also wanted to note that for our witness panel, Ms. Giry, our expert witnesses,

Mr. Mathison, Mr. Vermeulen, and Mr. Leech CVs are found at Exhibit 64.01.

Now, I've already noted that for safety reasons we have asked all persons to wear masks when they are speaking. We have tried to anticipate which witnesses will need to convene to discuss responses to questions, and we've seated those witnesses together in the same room.

When it is necessary for witnesses to convene as a larger group, or if it is necessary, what we propose is that witnesses move from one room to another where the witnesses in the second room would remain seated so that you're able to see witnesses convening on camera.

And in the event if -- in the event that it is necessary for Mr. Mathison to convene with Mr. Brett Thompson, the plan is for the witnesses to mute their computers and to contact Mr. -- Mr. Thompson by telephone.

I also wanted to advise that all witnesses are in rooms with two very large screens that are in addition to the laptops that they're using on Zoom. One of those screens will have the Zoom call, and we understand that exhibits will also be broadcast on that screen. And we are going to endeavour to have the exhibits up on the other screen as well. So if witnesses are not facing the camera, as they discuss an

exhibit, it is because they are looking at the exhibit on the larger screen.

MS. TURNER: Ms. Berg, sorry to interrupt.

MS. BERG: Yes.

MS. TURNER: We'd like your witnesses -- if your witnesses turn their video on, they will come into the screen as you are speaking.

MS. BERG: Okay. So, yes, I would ask actually that all of the ISH witnesses at this time put themselves on the screen.

MS. TURNER: Including back row, please.

MS. BERG: Including back-row support. Thank you, Ms. Turner. These are things I wouldn't have thought about.

THE CHAIR: You're not alone.

MS. BERG: It's all rather novel. All right.

Ms. Giry, Mr. Mathison, and Mr. Leech will -- Mr. Vermeulen and Mr. Leech will speak to the opening statement of ISH that was filed on October 13th and was just entered as Exhibit 86.02.

Now, Ms. Giry will speak to the following evidence and materials filed as exhibits in this proceeding. So 29.01, the evidence submission from ISH; Exhibits 46.02, 46.04, and 46.05, which are the response from ISH to CNRL's information requests, including Appendix B and

Appendix C to that response; Exhibit 54.02, the joint submission from ISH and CNRL; Exhibit 63.01, the confidential reply submission from ISH; and Exhibit 66.01, the response from ISH to the Alberta Energy Regulator information request.

And Ms. Giry will also be speaking to all of those -- all of the -- the exhibits that were just entered, including her portion of the written opening statement. And we will refer to all of that as the ISH evidence.

Mr. Mathison will be speaking to the following evidence and materials that were filled as exhibits in this proceeding, Exhibits 29.01, 29.02 and 29.03, and, specifically, he will be speaking in 29.01 to paragraphs 36 -- or 32 to 62; 29.02, he will be speaking to the stratigraphic cross sections; and then 29.03, the structural cross sections.

He will also be speaking to IR Responses 1 through 4 of Exhibit 46.02. He'll be speaking to Exhibit 46.03 and Exhibit 63.01, the confidential reply submission from ISH at paragraphs 6 through 49 and PDF 91 through 99.

And just an added note that Ms. Giry -- while Ms. Giry is speaking to material in the same exhibits, I did want to note that she is speaking to those materials with the exception of those portions that

were prepared by Mr. Mathison, by Mr. Vermeulen, and by Mr. Leech.

Finally, there's one other piece of evidence that Mr. Mathison prepared, Exhibit 66.01, the confidential response to the Alberta Energy Regulator information request. Mr. Mathison will be speaking to IR's 1 through 5 and 11 through 12 as well as the Core Study 2 and stratigraphic cross sections that are at Tab 2 and Tab 3 of that response. And we'll refer to that as the evidence of Mr. Mathison.

Now, Mr. Vermeulen, will speak to the following evidence and materials filed as exhibits in this proceeding. Exhibit 63.01, confidential reply submission from ISH at paragraphs 50 through 52 and paragraph 90, and we will refer to that as the evidence of Mr. Vermeulen.

And, finally, Mr. Leech will speak to the following evidence and materials filed as exhibits in this proceeding. Exhibit 63.01, Mr. Leech's report attached to the confidential reply submission from ISH at PDF pages 52 through 88. And we will refer to that as the evidence of Mr. Leech.

So I now wish to request that the witnesses be sworn or affirmed. And, actually, all the -- we have checked with our witnesses and all have decided to be affirmed in order to avoid touching any objects. So if

I could ask the court reporter to affirm all the witness, please.

VERONIQUE GIRY, PETER VERMEULEN, DAVID LEECH, EDWARD MATHISON, BRETT THOMPSON, EARL WARD, JENNIFER CLEE, OWEN LEWIS, Affirmed

Direct Evidence of ISH Energy Ltd.

MS. BERG: All right. Ms. Giry, do you have before you copies of the opening statement you're curriculum vitae and exhibits comprising the ISH evidence referred to above?

MS. GIRY: Yes.

MS. BERG: Can you confirm that the purpose of your appearance in this proceeding is to provide corporate and technical evidence on behalf of ISH?

MS. GIRY: Yes.

MS. BERG: Can you confirm that your curriculum vitae, as filed on the exhibit on the record as 64.01, accurately sets out your professional qualification and was prepared under your direction and control?

MS. GIRY: Yes.

MS. BERG: Can you confirm that the evidence that comprises the ISH evidence with the exception of the material that was prepared by Mr. Mathison, Mr. Vermeulen, and Mr. Leech was prepared

under your direction and control?
MS. GIRY: Yes.
MS. BERG: And you adopt that ISH evidence as your evidence in this proceeding?
MS. GIRY: Yes.
ms. Berg: Can you confirm that the ISH evidence is accurate to the best of your knowledge and belief?
MS. GIRY: Yes.
MS. BERG: Do you have any corrections or revisions to make to the ISH evidence?
MS. GIRY: Yes. At Exhibit 46.02, PDF page 7, I make reference to a voluntary safe disclosure report regarding a well located at 10-34. The voluntary safe disclosure report is attached as Exhibit 46.05.

In that report, I advised that efforts were made to test and restart the 10-34 well on January 3rd and 4th. Before the field operator was advised, this was a GOB well. We have conducted subsequent inquiries, and I am advised by the field operator that efforts to prepare for testing the well began in late December 2019. Restart of the well did not happen, and, in any case, it would have required internal approval which would not have been given as it is a GOB well.

MS. BERG: Ms. Giry, do you adopt each of the exhibits referred to as the ISH evidence listed above in the opening statement filed on October 13, 2020, as part of the evidence of ISH Energy in this proceeding?

MS. GIRY: Yes.

MS. BERG: And do you adopt the evidence of Mr. Mathison, the evidence of Mr. Leech, and the evidence of Mr. Vermeulen as evidence of ISH in this proceeding?

MS. GIRY: Yes.

MS. BERG: All right. Thank you.

Mr. Mathison.

MR. MATHISON: Yes.

MS. BERG: Do you have before you copies of your curriculum vitae and the exhibits comprising your evidence listed as the evidence of Mr. Mathison?

MR. MATHISON: Yes.

MS. BERG: Mr. Mathison, can you confirm that the purpose of your appearance in this proceeding is to speak to the opinion evidence you submitted as ISH's independent expert witness?

MR. MATHISON: Yes.

MS. BERG: Can you confirm that your curriculum vitae is filed on the record at Exhibit 64.01, sets out your professional qualifications, and was

prepared under your direction and control?
MR. MATHISON: Yes.
MS. BERG: Can you confirm that what I have referred to as the evidence of Mr. Mathison was prepared under your direction and control?
MR. MATHISON: Yes.
MS. BERG: Can you confirm that this evidence is accurate to the best of your knowledge and belief?
MR. MATHISON: Yes.
MS. BERG: Do you acknowledge and confirm that you have a duty to provide opinion evidence to this Regulator that is fair, objective, and non-partisan?
MR. MATHISON: Yes, I do.
MS. BERG: Does your evidence disclose the information upon which it is based, including a description of any factual assumptions made, research conducted, and any other documents or data relied on in --
MR. MATHISON: Yes.
MS. BERG: -- preparing your evidence?
MR. MATHISON: Yes.
MS. BERG: Do you have any corrections or revisions to make to your evidence?
MR. MATHISON: Yes, I do. I would like to

simply -- I would simply like to note that my initial report, which is Appendix K of Exhibit 29.01, it was prepared without the benefit of significant amount of core data. It was provided by CNRL in Exhibit 49.02 and 53.02.

My latter -- the -- my latter evidence, including evidence of Exhibit 63.01 and 66.01, does reflect the receipt of this additional core data.

I also want to clarify some issues on the record with regard to stratigraphic nomenclature framework. Although I use a different nomenclature, there's a general agreement between me and CNRL on this regional stratigraphy. With regards to where we disagree, I'm at the view that what CNRL calls the "post B2 non-reservoir" is predominantly inclined heterolithic stratification.

I'm also of the view that although CNRL recognizes a truncation surface at the Wabiskaw D, their image at Time 8 of Tab 1 in their Exhibit 65.01, PDF 29, minimizes the depth of incision in the immediate vicinity of the KNO6 box.

MS. BERG: Mr. Mathison, do you adopt what I have referred to as the evidence of Mr. Mathison as your evidence in this proceeding?

MR. MATHISON: Yes, I do.

MS. BERG: And Mr. Mathison -- and I'm

sure there will be many reminders throughout the proceeding. But if you could speak a little more slowly in particular with the terminology and the geology.

MR. MATHISON: Right.

MS. BERG: I think -- I think that --

MR. MATHISON: My Apologies.

MS. BERG: -- that would be helpful to the court reporter.

MR. MATHISON: Sure. My apologies.

MS. BERG: Mr. Vermeulen.

MR. VERMEULEN: Yes.

MS. BERG: Do you have before you copies of your curriculum vitae and the exhibits comprising your evidence which I have referred to as the evidence of Mr. Vermeulen?

MR. VERMEULEN: Yes.

MS. BERG: Can you confirm the purpose of your appearance in this proceedings is to speak to the opinion evidence that you submitted as ISH's independent expert witness?

MR. VERMEULEN: Yes.

MS. BERG: Can you confirm that your curriculum vitae is filed on the record at Exhibit 64.01 accurately sets out your professional qualifications and was prepared under your direction and control?

MR. VERMEULEN: Yes.
MS. BERG: Can you confirm what I have referred to as the direction of -- what I have referred to as the evidence of Mr. Vermeulen was prepared under your direction and control?
MR. VERMEULEN: Yes.
MS. BERG: Can you confirm this evidence is accurate to the best of your knowledge and belief?
MR. VERMEULEN: Yes.
MS. BERG: Do you acknowledge and confirm that you have a duty to provide opinion evidence to this Regulator that is fair, objective, and non-partisan?
MR. VERMEULEN: Yes.
MS. BERG: Does your evidence disclose the information upon which it was based, including a description of any factual assumptions made, research conducted, and any other documents or data relied upon in preparing the evidence?
MR. VERMEULEN: Yes.
MS. BERG: Do you have any corrections or revisions to make to your evidence?
MR. VERMEULEN: No.
MS. BERG: Mr. Vermeulen, do you adopt what I have referred to as the evidence of Mr. Vermeulen as your evidence in this proceeding?

MR. VERMEULEN: Yes.
MS. BERG: Thank you.
Mr. Leech, do you have before you copies of your curriculum vitae and the exhibit comprising your evidence which I have referred to as the evidence of Mr. Leech.
MR. LEECH: Yes, I do.
MS. BERG: Can you confirm that the purpose of your appearance in this proceeding is to speak to the opinion evidence that you submitted as ISH's independent expert witness?
MR. LEECH: Yes.
MS. BERG: Can you confirm that your curriculum vitae as filed on the record at Exhibit 64.01 accurately sets out your professional qualifications and was prepared under your direction and control?
MR. LEECH: Yes.
MS. BERG: Can you confirm that what I have referred to as the evidence of Mr. Leech was prepared under your direction and control?
MR. LEECH: Yes.
MS. BERG: Can you confirm that this evidence is accurate, to the best of your knowledge and belief?
MR. LEECH: Yes.
MS. BERG: Mr. Leech, do you acknowledge

and confirm that you have a duty to provide opinion evidence to this Regulator that is fair, objective, and non-partisan?

MR. LEECH: Yes.

MS. BERG: Does your evidence disclose the information upon which it is based, including a description of any factual assumptions made, research conducted, and any other documents or data relied on in preparing the evidence?

MR. LEECH: Yes.

MS. BERG: Do you have any corrections or revisions to make to your evidence?

MR. LEECH: No.

MS. BERG: Mr. Leech, do you adopt what I have referred to as the evidence of Mr. Leech as your evidence in this proceeding?

MR. LEECH: Yes.

MS. BERG: Thank you.

Madam Chairman, Ms. Giry, Mr. Mathison, and Mr. Leech will now deliver ISH's opening statement, and I now turn it over to Ms. Giry.

THE CHAIR: Thank you.

MS. GIRY: Good afternoon, Panel Members. My name is Veronique Giry, and I'm the chief operating officer at ISH Energy limited.

ISH has been an oil and gas producer in Alberta,

Saskatchewan, and British Columbia for 30 years. We are proud to work in Alberta's oil and gas sector and to employ highly skilled workers in a sector that is so vital to Alberta's economy.

ISH's core values are integrity, long-term performance, humility, agility, and sharing knowledge.

Regarding my own background, I am an engineer and have been working for 30 years in the oil and gas upstream industry. I worked for the Total Group, a major international energy company for many years on projects around the world, including Total's SAGD operations in Alberta.

I spent almost two years at the Alberta Energy Regulator as vice president of the industry operation branch and then have been with ISH since 2018.

We found this regulatory appeal to be difficult. We are a relatively small company doing our best to work in an economic environment that is extraordinarily challenging with the double impact of COVID-19 and a very low world oil price.

As we noted in our application, we believe that ISH is the last non-SAGD operator that still owns gas rights in the gas over bitumen or GOB zone. We have, therefore, been in a position where we lack the information and experience that CNRL has in order to assess the impact of CNRL's operation on our gas

rights.

Finding expertise among consultants that would be willing to be affirmed at this hearing in a case against CNRL has also been challenging. We expected CNRL would take steps to develop its bitumen in a manner that respects ISH's ability to ultimately produce its currently shut-in gas.

ISH has significant concerns about the potential impacts of CNRL'S KN06 operations on our gas rights which led us to commence this regulatory appeal. The additional information that we have been allowed to access as part of this appeal has made it clear to us that CNRL did not provide critical information in its application, information that we believe would have prevented the approval and appeal from being issued.

One of the main concerns were the fact that the AER was led to conclude that the GOB zone was not affected because the Clearwater caprock shale in situ stress was higher than the max operating purchase of 7 MPa. All parties now agree that Clearwater shale is excluded from the review of this appeal as the GOB zone is located below this shale barrier.

The CNRL application was approved in January 2019. ISH's gas asset in the Wabiskaw B sits under the Clearwater caprock and above CNRL's McMurray B2 bitumen reservoir. It is ISH's understanding that the AER's

mandate is to prevent the waste of gas resources and offer each owner an opportunity to opt in its share of production from any oil and gas pool.

ISH points out that CNRL's application for the KN06 drilling and operations would not be in compliance with Directive 23. Directive 23, paragraph 7.10 says that the AER requires in situ operations to be conducted in a manner that ensures reservoir fluid containment.

Item 3 requires an in situ operator to discuss the presence of water and gas bearing intervals between the caprock and the bitumen pay zone within the target reservoir. This is also -- this also requires including an isopach map of these intervals.

The CNRL application did not make mention of the Wabiskaw B gas and did not consider the impact of CNRL's operations on this ISH gas resource. ISH believes that if the AER regulatory applications branch had access to the information that is now on the record of this proceeding, it would have either refused to grant the application or would've granted the application with significantly different conditions on CNRL's approval. Such conditions include lower start-up and operating pressures, a requirement for monitoring well in KN06, or 4D seismic.

Further, in its application, CNRL did not

differentiate Kirby North geology from Kirby South geology. CNRL, as stated, did not mention the presence of the GOB zone. CNRL did not provide a review for any potential sealing intervals between the McMurray B2 and Wabiskaw B GOB zone. CNRL proposed operating conditions that could exacerbate the potential of communication between the bitumen zone and the GOB zone. CNRL did not identify the risks of SAGD operation in the KN06 on the GOB Zone. And CNRL did not provide monitoring and mitigation appropriate to the facts observed at and around KN06.

During the course of this appeal, ISH has finally been able to see the information that CNRL has that it neglected to provide until forced to do so or developed during the AER process. That information makes it clear that ISH was correct to have significant concerns about the impact of the KN06 approval under the appeal and its effect on ISH's overlying gas.

Initially, ISH was concerned by CNRL's maximum operating pressure, or MOP, during circulation causing fractures to potential existing sealing layers. ISH is now concerned not only with the start-up pressure and the possibility of hydraulic fracturing. ISH notes that there are also other existing leakage pathways such as noncontinuous sealing layers, existing fractures and faults where potential sealing layers may

exist and, finally, a proven wellbore integrity issue.

I am going to briefly outline what the data provided by CNRL in this proceeding reveals, and we'll then ask each of the experts that ISH has retained to give a brief overview of that evidence.

Issue Number 1, the presence, absence of an effective barrier or top seal overlying the bitumen bearing McMurray formation and, if present, its relative characteristics in the area of the CNRL KN06 box.

The evidence provided by CNRL reveals that the confining strata are not continuous and not a competent seal. The post B2 non-reservoir just above the McMurray B2 bitumen reservoir which consists of inclined heterolithic stratifications, or IHS, that are inclined limited layers of mudstones and sandy intervals filled with bitumen is not a sufficient barrier.

The B1 mudstone just above the B2 is thin or absent in the KN06 drainage box. And the A2 mudstone above the B1 mudstone varies from zero to 0.8 metres and is absent from the northwest corner of the KNO6 box.

Issue Number 2, the risk of fractures or other breach of the barrier/top seal, if it is present, resulting from CNRL operations in the KNO6 box.

The evidence produced by CNRL in this proceeding demonstrates that natural fracturing in the formations overlying the KNO6 area is prevalent. The geological story told by the core samples, well log correlations, seismic, and the oil water contact demonstrate that there are fractures and faults that create leakage pathways for steam and sour gas to migrate to ISH's resources.

The seismic interpretation produced by CNRL in this appeal was not a thorough review, and it doesn't go far enough to demonstrate that no fractures or faults exist. The review materials that are included leave more questions than are answered and, in some cases, support the evidence of fractures and faulting from the core samples in and around the KNO6 box.

CNRL asks -- CNRL asks to be able to inject steam at a MOP above the minimum in situ stress. CNRL asserts that the leak-off effect and potential mudstone barriers will limit vertical growth of any hydraulic fractures that could be formed during circulation, but this fails to account -- this fails to account for the longer-term effect.

ISH believes that the steam chamber will encroach on ISH's GOB zone because of pre-existing fractures and faults, the absence of A2 mudstone in the northwest corner of KNO6. And a well integrity issue.

There is an issue with the 10-01-75-09 well, the 10-01 well. The 10-01 well was initially not thermally compliant. In 2005 [sic], CNRL worked over the well to set a thermal cement plug inside the tubing below the GOB perforations.

In March 2019, CNRL installed a downhole pressure/temperature engage with the dual purpose to monitor this wellbore for thermal well integrity and to acquire data in the GOB zone.

ISH's expert, Mr. David Leech, has reviewed the data and has concluded that the data demonstrates the possibility that the well could be channelling gas behind casing from the GOB zone into the Upper Manville HH gas pool.

CNRL has argued that another GOB well would have been produced to explain depletion of the GOB zone. Analysis of the data available since March 2019 is clearly highlighting that there is a significant issue at the 10-01 well.

The bottom of the 10-01 well is located within 18 metres of a proposed steam injector inside KNO6. The 10-01 well is located within 150 metres of KNO5, which is already injecting steam at pressures four times higher than the current GOB pressure. CNRL cannot be allowed to commence drilling at KNO6 if the 10-01 well is compromised and is, therefore, a

potential conduit for steam and sour gas.

Issue 3, the need for an observation well in the KN06 box. Even in the absence of issues such as we see for the KNO6 box, other in situ operators use combinations of observation wells, pressure temperature measurements, 4D seismic and gas analysis to monitor SAGD operations.

For the KN06 box, the evidence shows the absence of an effective barrier. Fractures and faults in potential sealing layers are present in and around the KN06 box, and the 10-01 well could be compromised. This clearly indicates that more rigorous monitoring methods need to be deployed and maintained to monitor steam chamber growth at KN06.

CNRL has justified the removal of observation wells in Kirby North by asserting similarities between the Kirby North and Kirby South SAGD reservoir. However, the decision for the KN06 must be made on the data specific to the KN06 box and cannot be made on the basis of CNRL's other SAGD operations.

The KN06 data indicates significant risks to the -- ISH's GOB zone if the CNRL's bitumen resource development is allowed to proceed under the current approval with no additional monitoring and mitigation in place.

As demonstrated by the evidence, CNRL risk

identification for steam and sour gas migration into the GOB zone was limited to the early hours of the circulation phase and does not consider any other leakage pathways, even when compelling data from the 10-01 well were available.

Requiring additional monitoring, including the drilling of an observation well, will provide necessary data to identify risks and potential mitigation to avoid communication between the bitumen zone and the GOB zone that can happen during the lifetime of SAGD operations.

A risk not identified is a risk not managed. ISH requests a mechanism that can identify and mitigate the risk of communication between the bitumen zone and the GOB zone.

I will now ask the experts who have been retained by ISH to speak briefly to their evidence. We will begin with Ed Mathison, who will speak about geology; followed by Peter Vermeulen, who will speak about geophysics; and David Leech, who will address the 10-01 well integrity issue.

MS. BERG: Just one moment. I did want to confirm that before we move to Mr. Mathison that all of the Panel members have a copy of the opening statement available because Mr. Mathison will be referring -- Mr. Mathison and Mr. Vermeulen will be

referring to exhibits in the proceeding that have been copied into the -- into the opening statement.

THE CHAIR: So I can confirm that I do, but I'll just ask Ms. McKinnon and Mr. Zaitlin to confirm that they do as well. I know they were circulated electronically earlier this morning.

MS. MCKINNON: I do.

DR. ZAITLIN: Yes, I do. I have a copy right here.

THE CHAIR: Okay. Thank you.

The one thing I would ask then, as they go through, it would be useful when they are referring to specific sections of an image, if they've got -- I have seen in other Zoom meetings a pointer that can be used to identify specific -- if that is technology that we have access to and you're able to use, let's do that. If not, then we'll just have to do the best we can with describing it in words where you want us to look at and what specifically you're asking us to notice. Thank you.

MS. BERG: What we might try to do -- there are a few computers in that room, and so, yeah, if the exhibit comes up, maybe what we can do is ask that one person turn their computer so that Mr. Mathison can be seen pointing at the exhibit. We'll maybe try that and see how it goes.

MR. CAMPBELL: Madam Chair, it's the Zoom host speaking as well. If you would like a particular exhibit to be brought up on screen that I can share to everyone, I can do that as well.

THE CHAIR: Yeah. Well, let's maybe -- well, we can maybe try it both ways and see what works best for people in terms of being able to convey the information that you want us to get from the exhibit.

Mr. Mathison, you're on.

MR. MATHISON: Good afternoon, Panel. My name is Ed Mathison, and I've been retained by ISH to examine the geological evidence in this proceeding.

My scope was to look at the presence/absence of an effective barrier or top seal overlying the bitumen bearing McMurray formation and, if present, to determine its relevance, characteristics in the area of the CNRL KN06 box from where there were existing fractures or other breaches of the barrier/top seal.

To perform my review, I compiled information from well logs and cores observations to create isopach maps for each of the layers that CNRL indicated would work together to form an effective barrier overlying the bitumen zone and structural cross-sections. Excuse me.

The evidence clearly indicates that fractures are prevalent throughout the vicinity of the KN06 box. There is also evidence of faults that can be seen in

core photographs and are inferred from the differences in the oil water contact and in the seismic data that -- that has been provided to these proceedings.

The B2 is not a sufficient barrier. The McMurray B2 regional varies from 3 to 1 metres throughout the KN06 area. Given that the McMurray B2 is a tidal flat assemblage that -- that grades from dominantly sandstone to dominantly mudstone and is bitumen saturated, it cannot be interpreted as a barrier to steam. What I've called the B2 valley fill reservoir is comprised of -- there is -- comprised of muddy silty inclined heterolithic stratification, IHS. Sandy intervals within the strata are bitumen saturated.

The muddy silty IHS passed laterally to sandy IHS both along the strike of the reservoir and down dip or -- where this occurs, the reservoir is almost entirely made up of sandy strata up to the base of the regional B2 layer indicating that the entire valley fill succession is one continuous reservoir with local baffles.

The B1 mudstone is thin or absent in the KN06 drainage box. Finally, the A2 mudstone is not a sufficient barrier. It is a thin to nonexistent layer in -- in and around the KN06 box.

The parties agree that this is completely -- that it is completely absent from the northwest corner of

the KN06 box. The presence of fractures and faulting raise additional questions regarding whether a thin A2 mudstone in the KN06 box would act as a kind of barrier between the steam chamber and the overlying GOB zone.

Much of the geological story is found in the well cores and well-log correlations from the area. In this opening statement, I would like to walk you through the evidence from some of those wells.

And would you -- so this is Exhibit 53.02, PDF 41, and it's the 1AA/02-01 well, and it's a core going from the Paleozoic into the overlying McMurray formation.

The photo we will look at -- be looking at first are in the 'A' -- 1AA/02-01 well. The core photo I am commencing with is from the basement in the Paleozoic.

If you look at the bottom column on the left-hand side -- can we show this? So that's the bottom column.

THE CHAIR: So, Mr. Mathison, I --

MR. MATHISON: Yes.

THE CHAIR: -- think we can probably get hearing services to bring up Exhibit 53.02, PDF page 41 on the screen or a screen for us. So I'll ask them to do that, and let's see what happens.

MR. MATHISON: That would be very helpful. Thank you --

THE CHAIR: Okay.

MR. MATHISON: -- Madam Chairman.
THE CHAIR: Since we're not in the hearing room, I can't -- oh, there we go.
MS. TURNER: So Exhibit 53.02, PDF page 41 is -- was one of the confidential exhibits filed. So the public version does not have any of the photos.
THE CHAIR: So let me ask Ms. Jamieson whether Canadian Natural has a concern about putting the same photo that appears in the printed version of the opening statement that we all received on the screen and, therefore, out on YouTube.
MS. JAMIESON: Yes. Understood. And we have no concern.
THE CHAIR: Okay. Thank you.
MS. TURNER: So to clarify, we will put up the opening statements.
MR. CAMPBELL; I want to clarify I'm not putting up the opening statement. I'm putting up page 41 of Exhibit 53.02
MS. TURNER: No. Because that is a confidential --
THE CHAIR: Let's --
MS. TURNER: Okay.
THE CHAIR: So instead of -- Mr. Campbell, if you can put up the opening statement and then go to PDF page 8, and let's see if the resolution we get is

sufficient on that.
MR. CAMPBELL: Okay. Well, give me a moment to locate the opening statement. Do we have an exhibit number for that?
THE CHAIR: 86.02.
MR. CAMPBELL: And page 8?
THE CHAIR: Yes, please.
MR. CAMPBELL: Okay.
THE CHAIR: So can you see that, Mr. Mathison?
MR. MATHISON: Yes, I can. Thank you --
THE CHAIR: Okay.
MR. MATHISON: -- very much.
So to go back to this, you'll look at the bottom column on the left-hand side, and you'll notice that there is a significant fracture going -- a significant vertical fracture. In addition, since you cannot match the stratigraphic sedimentary layering across this fracture, it indicates there has been vertical displacement indicating that this is, indeed, a fault.
Let's go on to moving up from the basement. Now, this is Exhibit 53.02, PDF 39.
THE CHAIR: So, Dean, it'll be the next page. It's PDF page 9 of the opening statement.
MR. CAMPBELL: Sorry. I am stuck on annotate. I need to take that off.

MR. MATHISON: Okay. Moving up from the basement, if we look at the second column from the top, in this photo, it is heavily fractured, forming an orthogonal pattern.

As we move to the top of core of the second column, the fracturing is so intense that we see brecciation or, in other words, complete shattering of the sedimentary layer.

It is evident from this photo that the fracturing was post-depositional, and after lithification or, in other words, after it has been turned into mudstone.

I'd also like you to look at the second column from the bottom of this core photo. You'll notice there is a sand-filled fissure penetrating the underlying mudstone. This is evidence of an open fracture filled from -- with sand from an overlying unit.

This -- the next is Exhibit 53.02, PDF 33. So it'll be page 10 of the -- that's it. Very good. Moving up further in the core -- can we all see the core? There. That's better. Thank you.

Moving up further in the core of the 02-01 well, I would like to begin with the second column from the bottom. You will see at the right-hand side that this column has a vertical fracture. Oh, sorry. I made a mistake. I -- I've -- I've jumped a line.

If we begin with the second column from the bottom, if you look at the left of the core near the top of the column, you will see highly distorted strata. Sedimentary layering -- layers are broken and lack continuity. So that's just right above the 485 mark.

We'll go to the third column from the bottom, and you'll see on the right-hand side that this column has a vertical fracture and that the overlying silty mudstone have highly variable inclinations suggesting that it's been completely fractured after lithification.

If we move up to the third column from the top, you'll note that to the right close to the 484 marker, the sandstone bed has been truncated by a small fault.

Are you following me where this is? The truncation is between the sand and the mudstone.

THE CHAIR: So if you were to give a description, you say just to the right of the 484 marker.

MR. MATHISON: Yes. And just above it. Do you see that that -- there's a bitumen-stained layer in there? Typically, these bitumen-stained layers are continuous. This one has been truncated, and it juxtaposes the -- the bitumen-stained sandstone against a mudstone, a grey mudstone.

MR. CAMPBELL: Madam Chair, I believe Mr. Mathison can annotate on the documents, if you would like him to be able to do that.

MR. MATHISON: Can I? Just a second. Can I confer? One second.

THE CHAIR: So, Dean, the annotation, would that give him a pointer or an arrow that he can use to sort of ring a circle around what he's talking about or something like that?

MR. CAMPBELL: It will -- yes. He can choose, like, an ink colour and then just draw or make a mark on something. It won't save it as a permanent part of the record. If they want it saved, we would then have to take a screenshot and save that.

So he would need to go up to the top where it says "annotate" and pull down, and then he can select a mouse just to point or to draw to be able to make a mark.

MS. BERG: I believe Ms. Hryciw's trying to assist him with that.

MR. MATHISON: Would you like me to -- just to point out some of the previous ones, or do you want me to just keep going?

THE CHAIR: Well, if you could point out the one you were just talking about.

MR. MATHISON: Right. It's right here. Can

you see this here?
MS. BERG: No.
MR. MATHISON: You see this sandstone bed? What? Oh, okay. Right there.
MS. BERG: There we go. Yes.
MR. MATHISON: Yeah. Okay. I think we've got the technology figured out now.

So that's the -- that's the 44 -- if we move up to through the column, you'll note that the -- right close to the 484 marker, the sandstone bed has been truncated by a small fault.

Yeah. And then moving up to the second column.
THE CHAIR: You may have to actually go click on the arrow and then click again where you want to put it, if you're wanting to move the arrow.
MR. MATHISON: How do we -- yeah. No. I want to just move it up or put a new one. Okay. Sorry.

Moving up to the second column, top, to the right of the column, you can see that the thin sandstone bed has been truncated by -- oh, sorry. Yeah. This is the final one. The second column from the top. I think this may be an error. Yeah. I think we'll just ignore that, and we'll go to the final 46.

Finally, moving to the centre of the second column from the top just to the right of the red line, so just

in this area, there's a sand-filled fracture that indicates that the timing of fracturing occurred after oil migration and degradation into bitumen. So you can see this. That's a fracture coming through there.

Moving on to Exhibit 53.01, PDF 29.

THE CHAIR: So page 11.

MR. MATHISON: Yes. Sorry. My apologies.

THE CHAIR: No. No worries.

MR. MATHISON: Okay. How do we get to -- we'll do this one.

Finally moving to the top of the McMurray Formation and the base of the Wabiskaw, if you look at -- to the -- look to the bottom column on the right-hand side, you will see a highly deformed strata that has been cut by small fractures. You can see the small fractures.

If you move to the top column just to the left of the 467, so let's -- 467 marker, you will see a vertical fracture that extends upward. This is a post-bitumen fracture.

To summarize, in the 1AA/02-01 well, the core photos demonstrate fracturing and faulting from the Paleozoic up to the Wabiskaw D level. This is a consistent story in the wells of the KN06 box and the KN06 area.

So Exhibit 29.01, PDF page 98, so it's page 12,

please. Thank you. Please and thank you.

The interpreted presence of faults is also apparent from the oil water contact. We have reproduced part of the structural cross sections from Exhibit 29.01, W-W prime for the 1AA/06-01 well and the 1A seventh -- 1AC/07-01, which are 241 metres apart.

I would like to direct you to the left side of the page where there is a dark blue/purple line unconformity near the bottom. Notice the offset between the two wells, which is 11.6 metres. You will note that there's an offset all the way up to the top of the -- of the -- of the Wabiskaw. If you look at the right-hand log for the 06-01 well, about four metres above the Paleozoic, above the blue/purple line, you will see a dramatic increase in the resistivity that signifies bitumen above and water below. This is the oil water contact.

For the 07-01 well, we will see the oil water contact on -- on the right-hand log chart. There is a significant offset of the oil water contact which roughly parallels the Paleozoic. The difference between the oil water contact between the two wells is 7.5 metres. This offset has occurred -- has had to occur post oil migration and post biodegradation. The oil water contact offset is also evident in other wells

in the KN06 area.

Could you go to page 13? We're looking at Exhibit 30.02, PDF 124. Very good. Thank you.

The presence of a significant structural dislocation between the 1AA/06-01 and the 1AC/07-01 well is also apparent from other evidence submitted by CNRL. We have reproduced the seismic cross section from W-W prime below. In the cross section, we can see that -- the flexure in the Paleozoic that is between AA/06-01 and AA/07-01.

Could we move on to page 14, Exhibit 53.02, PDF 207.

Two core photos below from the 1AB/05-01 well illustrates some key differences in the way that CNRL calls the "Post B2 Non-Reservoir", what I interpret as IHS. If you look at the bottom column, you will note that they have labelled "Top of Post B2 reservoir" [sic]. It is at the top of the -- it is at the top of what is predominantly sandy -- sand. I would refer to these as "Sandy IHS".

So page 15, Exhibit 53.02, PDF 208. Moving to the next core photo from the 1AB/05-01 well and down through the stratigraphic column deeper into the reservoir, you will see that CNRL places the top reservoir at the top of the third column.

In the third column from the top, you can see

the -- what they call a post -- pardon me. In the third column from the top, one, two, three, you can see that they've placed the bottom of what they call the "Post Non-reservoir". So that's actually what I'm pointing to right there, and then the top is just immediately below that. So they consider this reservoir and this non-reservoir.

You see that the strata consists of mudstone interbedded within sandstone which, again, I would refer to as "IHS". I would refer to the entire core in this photo as "IHS".

Moving on to page 16, Exhibit 53.02, PDF 135. Moving to the next core photo, which is from the 1AA/11-01 well. You will see in the third column from the bottom that CNRL has marked what they called the "Regional Lower B1 Sequence". Moving up the columns and the wellbore, you will see that it is interbedded thick sands and thin mudstones. In my opinion, it is highly unlikely that this -- these thin interbedded mudstones can act as a barrier.

Page 17, Exhibit 53.02, PDF 92. Moving to what CNRL calls the "Regional B1 Mudstone", what -- and which I will call the "B1 Mudstone", you will note that the -- that CNRL has marked the bottom and top of the unit in the lowest column in the photo below from the 1AA/07-01 well. You will note that it is 15 centimetres

thick. Could you raise it just a little bit, and we'll see the scale. The scale is along the bottom, and it's marked off in centimetres.

Looking again at the lowest column, below the B1 mudstone, this is the -- what ISH -- CNRL considers the base of the B1 mudstone. Below the B1 mudstone to the bottom of the core, you will note there is a vertical fracture network coming through the core. You will -- I'll show you what this looks like at the bottom of the core, and I will also show you -- you will also notice in some of the fractures are sand fill. They're small vertical lines that disrupt the stratigraphy of the core.

So there are a number of these. And on the third one, it's -- you can see one down here.

Page 18, Exhibit 53.02, PDF 300. I would like to move next to the 1AB/09-01 well, what CRNL -- CNRL calls the "Regional Upper B1 Sequence." This -- in the third column from the bottom, you will notice the sharp contact marked in red for what CNRL terms the "Upper B1 Mudstone and Sequence" and the "Middle B1 Mudstone," which I call the "B1 Mudstone." You'll notice that the B1 is very thin in this well, about 15 centimetres. And if we could move it up just a touch. So it's -- from there to there would be 15 centimetres -- oh, can't see it 'cause I don't have the arrow on -- and

has been fractured as is evident by the changed colours between light grey and medium grey silty mudstones. Notice the thickly interbedded sands and mudstones of the regional B1 that directly overlie the middle B1 mudstone.

And finally, page 19, Exhibit 53.02, PDF 133. Finally, I would like to direct your attention back to the AA/11-01-75-9 well, which is located in the KN06 box. You will notice the sharp erosional contact between the Wabiskaw D and the top of the underlying A1 -- actually, A2 mudstone marked in -- in the second column of the top. So CNRL calls it the "top of A2 mudstone." In the -- in the third column from the top is marked in red what it is believed what -- CNRL has marked in red what it believes is the bottom of the A2 mudstone. I take issue where they have marked it "A2 mudstone." I would place the bottom of the A2 about 10 centimetres above where CNRL has placed it, in the third column, based on the presence of sandy interbeds. This would place the A2 mudstone at a total thickness of 25 centimetres at the 11-01 well. Also notice the same -- in the same third column from the top, right underneath the mudstone, is what looks like a series of small fractures. This section of core is highly anomalous and -- just note this contact and also there. That's my direct. Thank you.

MR. VERMEULEN: All right. I will continue on with the geophysics. If we could get that same document -- get that same document up to page 21, and I just want to figure out how to do the annotation before I start here. All right. I think I've got it.

All right. Good afternoon, Panel. My name is Peter Vermeulen, and I'm a geophysicist. I have been retained by ISH to review the seismic data submitted by CNRL in this proceeding. I concluded that CNRL's seismic review only investigated the presence of very large-scale faulting and/or major collapse due to salt dissolution. The core and log evidence within Kirby show that faulting and fracturing within the confining strata are expressed at a much smaller scale. Detailed seismic analysis capable of measuring small-scale changes in seismic waveforms were not provided within CNRL's evidence. ISH noted this in their response to CNRL's evidence and requested CNRL provide ISH with the seismic volumes to conduct their own independent analysis. CNRL declined to provide ISH with any further seismic analysis nor the seismic data and instead responded with the same seismic evidence that was derived from an alternately processed seismic volume.

Some of the advanced seismic analysis CNRL could have provided to strengthen their position on fractures

and faulting would include horizon amplitudes, horizon and zone attributes, a collection of semblance slices, frequency decomposition, pre-stack gather analysis, inversions, and seismically derived geomechanical properties.

Also, I noted a single semblance slice at the Mid-B1 mudstone level in the evidence that CNRL provided ISH. This semblance slice is reproduced here on page 21, which is on your screen. It is Exhibit 30.02, PDF 120. So this semblance slice is reproduced here and by itself demonstrates a piece of seismic evidence that leaves the interpreter with more questions than answers.

There are several linear trending dissimilarity anomalies within and beside the KN06 drainage box as highlighted by these black lines that I'm drawing overtop of them, a few. Some of these anomalies appear to be supportable with geological cross sections and core evidence of faulting fractures.

A further review of semblance slices above and below the mid one -- Mid-B1 mudstone level would be the first step to determine if or how faulting propagates through the semblance volume. CNRL did not provide additional semblance slices in their evidence.

That's all I have, and I'm going to pass it over to David now.

MR. LEECH: Good afternoon. Am I on?
THE CHAIR: Yes, you are.
MR. LEECH: Oh, get it in my ear.

Good afternoon, Panel. My name is David Leech, and I was retained by ISH to assist in an investigation regarding anomalous bottomhole pressure data observed in the gas over bitumen pool. My review focused on the 10-01 well.

I've concluded that GOB gas has been flowing around or through the 10-01 perforations. I believe that the most likely scenario involves gas channelling behind 10-01 casing up hole to the Upper Manville HH formation which has two ISH wells producing. I believe that this is the most probable case given the apparent correlation of 16-35 production data to 10-01 pressure data.

I'm confident that the 10-01 well has been flowing because of a sudden drawdown pressure event on November 5th, 2019, which triggered a liquid unloading event followed by a Joule–Thomson cooling event.

I understand from my review of Exhibit 48.02 in this proceeding that CNRL is suggesting that the sudden change in 10-01 pressure on January 7th, 2020, came from an ISH shutdown of a well located at 10-34 about 2,200 metres away. I am of the view that the hard shutdown on January 7th, 2020, had to come from 10-01

or in very close proximity to 10-01.

This was an instantaneous hard shutdown. A shutdown from 2,200 metres away would not have had such an instantaneous effect at the 10-01 bottomhole pressure gauge.

Moreover, 10-34 was presumably shut in sometime before January 5th, 2020, whereas 10-01 final shut-in event was on January 7th, 2020.

MS. GIRY: Thank you, David.

I would like to conclude by outlining how difficult this proceeding has been for ISH. We began this appeal because we were concerned about the potential impacts on our GOB resources by CNRL's operations in the KN06 box.

As we have gathered more information through this appeal process, we have become increasingly concerned, given the data which shows the lack of a barrier, widespread fractures, faulting in the area around the KN06 box, and the well integrity issue.

We are aware that we are a tiny company with few resources compared to CNRL. We understand that CNRL has a right to develop its bitumen resources. However, it needs to do so by taking reasonable steps to ensure that our gas resources are preserved for ISH to produce. It should not be permitted to behave as if the geological facts around the KN06 box do not exist

and SAGD operations at KN06 would have no impact.

There have been arguments put forth by CNRL that the value of the resources in the GOB zone do not justify the cost to ensure the steam chamber is contained. But while the value of the resources may be small to CNRL, they are significant to ISH. CNRL should not be permitted to avoid the steps taken by other SAGD operators to protect GOB resources on the grounds that the resources that belong to parties like ISH are of little value to CNRL.

It is the AER's mandate to avoid wasteful operations of oil and gas resources and to protect ISH's opportunity to obtain production of its gas. Allowing CNRL's operation to sour ISH's gas is contrary to the AER fulfilling its mandate. ISH also notes that this argument about valuation in the end amounts to a commercial issue between ISH and CNRL.

We thank you for hearing this appeal and look forward to answering your questions.

MS. BERG: Madam Chair, the ISH panel is ready for questions.

THE CHAIR: Thank you, Ms. Berg.

And I will have to say that for our first shot at electronic hearing we're just about bang on, our time estimate. Well done, everyone.

So I think now would be a good time to take a

break. Everybody get away from the screen, especially our court reporter. I think we're scheduled to break until 3:30. So I'll just remind the ISH Energy witnesses that you can confer among yourselves, but you may not confer with counsel or anyone who's not on your witness panel.

Mr. Zaitlin and Ms. McKinnon, I think if we exit to our breakout room, and then we will rejoin you all back here at 3:30.

(ADJOURNMENT)

THE CHAIR: Ms. Jamieson, whenever you're ready, you can proceed.

MS. JAMIESON: Thank you, Madam Chair and Panel members.

I would just like to make note of the time and ask a question. I see we're allocated two hours to cross-examine. I think we're going to need that time. Do we still get the full two hours since we're five or six minutes starting late?

THE CHAIR: I want to say we were all back in the hearing room at 3:30.

MS. JAMIESON: We didn't receive the invitation to come back until just shortly, so I don't know -- there must be a lag.

THE CHAIR: Maybe so.

Well, let's see where we get to. There's a

variety of factors relating to the time, but let's see where we're at at 5:30. And if you're still -- have more questioning, maybe we'll just stop and see how much more and then make the decision then.

MS. JAMIESON: Okay. Thank you very much.

Ms. Jamieson Cross-examines ISH Energy Ltd.

Q MS. JAMIESON: Okay. Good afternoon, Mr. Mathison.

I'd like to start with a few questions for you, and I believe I followed Ms. Berg's outline at the beginning in terms of your -- the evidence that you will speak to, but if I, for any reason, get into an area that you're not prepared to speak to, then if you could just kindly let me know that.

So, Mr. Mathison, I noticed from your curriculum vitae that you participated in the gas over bitumen hearings back in 2004, 2005, as an expert witnesses. Is that correct?

A MR. MATHISON: That's correct.

Q And so you would be familiar with the 2003 regional geologic study?

A That is correct.

Q In fact, you wrote a paper about the same time. It's titled "Sequence Stratigraphic Architecture of the McMurray Formation" that Canadian Natural referenced in its materials. Do you recall?

A That's correct. Actually, it was done six months earlier prior to the RGS paper.
Q Okay. Thank you.
So just chronologically that takes us to about 2003. In the last ten years or so, do you have any direct experience working for industry in the McMurray-Wabiskaw reservoir?
A Let me see. Not -- not directly other than this -- this work that I've done for ISH.
Q Okay. Thank you.
And what about any experience just with SAGD operations in -- you know, in respect of looking at temperature data and characteristics of the vertical position of the steam chamber? Any experience along those lines?
A Yes. Yes, I have. I've -- I've actually worked on -- on three thermal projects beginning in 1984, and I worked closely with the engineers to -- to help to define the fluid motion, the -- the steam penetration into the reservoir. That was at Fort Kent, a thermal project with Suncor.
And then in '98, I worked on the Bolney project, which is in Saskatchewan. It's in upper -- Upper Mannville. It's actually at top of the Mannville.
And, again, I worked with the engineers on that on trying to understand and understand both the placement

of the wells, the development of the pool, and any -- any -- the influence of any barriers to steam flow and -- and steam propagation in the reservoir.

Q Thank you.

And can you recall what data --

A I'm not --

Q -- set you might've use --

A I'm -- I'm not quite -- I'm not quite finished.

Q Sorry.

A -- yet with the -- and then I've worked recently as late as 2014 with Northern Blizzard, and I've worked with the engineers to understand the -- the extent of barriers and baffles within the reservoirs of the north of their Kerrobert valley fill and to -- and -- and then to develop operations -- worked around to how to -- how to work around these issues.

So I have --

Q Thank you.

A We used -- yeah.

To anticipate, I've looked at temperature. In fact, in -- we had -- we'd -- we'd do temperature measurements at Fort Kent, and we could demonstrate there that there was a cemented horizon that was locally within the reservoir. It was not able to transmit steam. Of course, there we have deviated wells, so all you did was put -- put in some more

perfs [phonetic].

And then I worked -- and, sorry, what other information are you -- would you like me to --

Q Oh, that's all I need. Thank you.

MS. JAMIESON: I'd actually like to pull up an exhibit now, if I could, Ms. Turner. I'm not sure who's running the exhibits, but Exhibit 65.01. This was Canadian Natural's response to the AER's information request.

A MR. MATHISON: Right.

Q MS. JAMIESON: I'd like to go to Tab 2, which is page 30 of 45. Do you recall this? Have you --

A Oh, I --

Q -- reviewed this?

A -- do, indeed.

Q Okay. So let's see if we can move through this. So this is ISH's regional strat chart on the right and compared to Canadian Natural's strat chart in the middle, Figure B.

A Could I correct you? That is not on the right. It is -- that is taken from my paper. That is not ISH's.

Q Okay. So let's start on the left. Sorry. I might've misspoke.

A Oh, okay. Okay.

Q Figure A.

A That's okay. That's fine.

Q All right.
A Yeah. Figure A.
Q Sorry.
A My -- my apologies.
Q Figure A.
THE CHAIR: Sorry. I'm just going to interrupt for a minute. I don't see our court reporter on screen, and I'm getting -- oh, there she is. And I'm getting an echo and a ringing.
So, Sarah, are you able to hear clearly enough?
THE COURT REPORTER: I can hear, yeah. I hear the same echo and ringing, but I can still hear.
THE CHAIR: And, Ms. Jamieson, have you got -- you've got one person in the room with you. Have you all got -- I'm wondering if the problem is if we've got multiple speakers or mics on listening at the same time.
MS. JAMIESON: No. I'm getting -- I'm the only one that is audio right now.
THE CHAIR: Okay.
MS. JAMIESON: I don't think it's coming from us.
THE CHAIR: Okay. Actually, right this minute with your speaking then, it's fine, and it's gone. So I guess let's carry on.
MS. TURNER: Excuse me, Madam Chair. It

perhaps happens when people are trying to -- are speaking over each other. So maybe just give a bit more of a pause.

MS. JAMIESON: Okay. We can try that. Thank you.

Q MS. JAMIESON: So -- okay. I'll slow this down, Mr. Mathison, just so you and I are on the same page. I think that's --

A MR. MATHISON: Sure. Sure.

Q -- important.

So I may have misspoke. Figure A on the left-hand side of the screen --

A Right.

Q -- that was taken from ISH's reply submission, Figure 1. Do you agree?

A Yes, I agree.

Q Okay. Thank you.

And in the middle is Canadian Natural's interpretation of the stratigraphic position of the KN06 reservoir.

A I agree.

Q And on the right -- okay. And on the right is Figure C, which is an excerpt from your Figure 6 of your 2003 paper; correct?

A That's correct.

Q And do you agree that these are fair depictions of the

information from the ISH strat chart as well as your paper?

A From the ISH strat chart -- now, I'm not really sure of the question, that -- do I agree that -- that it's -- my stratigraphy is in agreement with what ISH's nomenclature is? Is that the --

Q Well, we're going to --

A -- question?

Q -- get to that. Oh, sorry. Yeah. I'll ask the question. I just wanted to make sure that you thought it was a fair representation.

A I agree.

Q And you -- okay. So let's go to -- Figure A shows the red circle, and it reads "McMurray B2"; correct?

A That is correct.

Q And so just on -- so we are on the same page. Do you recognize that what ISH is calling the McMurray B2 on its chart, Canadian Natural is calling the lower B1 regional unit?

A I do, indeed.

Q All right. And then Canadian Natural has a couple of arrows on its Figure B. They're blue. And the first one shows -- well, first of all, do you agree that the lowest of the second, like, on the bottom is an accurate placement for the location of the B2 mudstone at the base of the regional B2 sequence?

A Based on the RGS's terminology, that is correct. Well, it's not what I would call it, but it is correct for the RG -- RGS terminology.
Q Okay. Thank you.
Do you agree that the log signature in your published paper is identical to what Canadian Natural correlates?
A It is the same unit. Yes, I agree. And these -- you'll notice also that this was an older terminology that was used prior to the RGS.
Q Sorry. Oh, because -- you're saying because you published it six months prior? Is that what you mean?
A That's correct.
Q Okay. But the blue -- can we just confirm, though, that the blue in that depiction, Figure 6, confirms the B2, correct, the McMurray B2?
A According to the RGS's terminology, yes. I agree.
Q Okay. All right. I think we're -- I think we're still on the same page. That's good.
So, now, do you -- you also agree that the upper arrow is an accurate placement for the location of the base of the regional B1 sequence which also agrees with your published correlation?
A I agree that what they term the "lower B1 unit" is the same as what I refer to as the "B2," and they are identical. It's just a difference in terminology, and

it is -- it is -- it is that -- the terminology used by CNRL is consistent with the RGS terminology.

Q Okay. Thank you.

Okay. So let's start with that. Your evidence is the terminology used by Canadian Natural is, in fact, the same as 2003 RGS. Okay.

So is that -- is it the case -- would you agree that it follows that the location of the McMurray B2 on ISH's strat chart is incorrect, then, and not plausible?

A No. I do not agree with that. It's just a difference in nomenclature, and if you would just take -- if you want to use my nomenclature, just replace the B2 -- or, yeah, the B2 regional units, what they have red, in blue -- thanks for colour-coding these in the -- in the -- in the same way they were named in -- in my earlier paper.

The blue is equivalent to what I would consider to be the McMurray C, and there -- and so what I consider to be the McMurray C mudstone would be equivalent to the B2 mudstone. So, essentially, if you take where they've got B2 regional and just change that to McMurray C, that would be identical. So it's just a nomenclature issue.

Q Okay. So, Mr. Mathison, I don't -- I don't think we're going to agree on that, but I do have one more question

for you, and this is just more general.

So would you agree with me that an incomplete understanding of regional stratigraphy sedimentation just generally would lead to improper correlations and interpretations by ISH?

A No, not at all. What -- in -- my 2003 paper, if anybody's read it, has -- I never identify a B2 mudstone in it. What -- what I was identifying were unconformity surfaces that -- that I could trace through the -- throughout the McMurray area. And we covered a very large area. Many, many townships. And -- and this was -- this was -- this was applicable throughout that area.

The other thing is -- so -- so I did not -- what they say, this is not the B2 mudstone in green. I never said was, if you look at the paper. That's where the unconformity is. And both ISH -- both CNRL and I, as well as ISH, agree that there is an unconformity at the top of what they call a B2 regional sequence.

For clarity, I am willing to use the terminology of -- of CNRL. To me, the terms, what you call it, is not important. The reason I separated it out is in classical sequence stratigraphy, you don't take a name up above an unconformity. There is a large time gap between the B1 and the -- and what ISH is -- CNRL is calling "B2." To call them -- use the same terminology

is very -- to me more confusing than naming it a different unit.

Q Okay. One last question, and I am getting out of my depth here, Mr. Mathison. But just so that I am clear on your evidence, when I look over at Figure C and what Canadian Natural's identified as "blue B2" --

A M-hm.

Q -- you're calling the "McMurray C"?

A That's correct.

Q Have I got that right? Okay.

And then where Canadian Natural -- like, now on Figure B, where -- so looking at Figure B, where Canadian Natural says this is not the B2 mudstone --

A Yes.

Q -- do you agree with that?

A Well, it is the B2 mudstone as defined by the RGS and -- and used by CNRL, but in my paper and as we have used it, it would be called the McMurray C mudstone. It's -- and it's just merely a different naming. It's -- it's just nomenclature.

Q That continues to confuse me, Mr. Mathison --

A Okay.

Q -- because on Figure A, that McMurray B2 -- like, McMurray B2 shows up and McMurray C shows up, but if I followed you correctly, you would have the McMurray B2 come down with your McMurray C.

A Yes. And that's -- that is consistent, actually, with what -- what CNRL is -- is -- is naming it. They call it the "post B2 reservoir unit," and that unit is cut into the regional stratigraphy which includes the -- the -- what I call the "McMurray C," what -- what CNRL calls the "B2 regional." It cuts -- cuts right through that. And -- and at the base of that is a regionally persistent mudstone flooding event that I call "McMurray C;" CNRL calls "B2." It's -- we're -- we're not in disagreement at all with the regional stratigraphy. It's just the naming. The --

Q Okay.

A Yeah.

Q Okay. But I just -- just from a basic logic perspective, so not geology, but what I thought I heard you say was that the McMurray B2 would be down on -- sorry. On Figure A, the McMurray B2 would be down there with the McMurray C where it's placed on there which would, in fact, make ISH's strat chart incorrect. Do you agree?

A No, I would not. No, I would not. I think that's a misinterpretation. What's -- there is -- the B2, what I call "B2 valley fill," truncates all of the regional strata and so is equivalent to -- and I don't think there's any disagreement between myself and CNRL -- is equivalent to that unconformity that I was the first

to -- actually, to recognize at the -- at the -- the -- the boundary between the B1 and B2 in CNRL's terminology.

Q Okay. Thank you, Mr. Mathison. Let's leave that line there 'cause I don't think it's -- would be any more fruitful.

I'd like to understand a little bit about your evidence on the A2 mudstone.

A Sure.

Q Do we agree that the A2 is recognized as a seal that -- the A2 regional mudstone is recognized as a seal? Do you agree?

A According to the RGS finding, yes, it is a very persistent mudstone. It's -- it's very easily mapped. It's readily mappable. It can be thin, though. That's -- that is an issue, so that -- that could be an issue. But its characteristics, it's a silty bio -- highly bioturbated silty mudstone. So from those characteristics, where it's present and -- and thick enough, it should act as a barrier.

Q Okay. Thank you.

So on page -- so this is 35 of your opening statement, and I don't think we need to bring it up. But you made a statement. You said: (as read)

> The parties agree that the [A2 mudstone] is completely absent from the northwest corner

of the KN06 box.

Do you recall making that statement?

A Well, I guess it's -- it's -- it is absent over a portion of the northwest box, KN06 box, and I don't think there's any agreement. Both of our maps show that. We agree that it's missing in -- in the same wells. In fact, even the numbers we're using are very, very, very similar. The difference that we have is that we think that -- I would argue that the way it has been contoured by CNRL would actually indicate that it was of -- of greater -- greater extent than it actually is, that the zero zero value that -- in the 186 of 11-1 well, right at the north corner of the pool, is a zero value, yet that's -- which means it -- it is actually not absent as opposed to the zero edge because we don't -- there's no -- it's not present in that well.

So it's -- it's just a matter of contouring option, if you -- if you will, how you contour that. And I think what CNRL has -- has done is they've pushed it as far out as possible. I would say it's probably less, you know, and I think it makes more sense, our contouring, which is Figure 4 of -- could you get me a -- 63.09, Figure -- and what's the PDF? Do we have a PDF number? Oh, PDF 14 of 63.01.

MS. TURNER: Sorry, Madam Chair.

Mr. Mathison, who were you conferring with?

MR. MATHISON: Oh, my -- my apologies. I was conferring with --

MR. LEWIS: Sorry. He was asking me for the PDF number for one of our maps, which I mentioned -- yeah.

MS. TURNER: So that's Mr. -- just for the record, that's Mr. Lewis.

MR. LEWIS: Yes. Owen -- Owen Lewis. Mr. Owen --

Q MS. JAMIESON: Mr. Mathison, I don't have any further questions on the A2 mudstone.

If we could move on, I'd like to talk to you about the Mid-B1 mudstone now. Is that okay?

A MR. MATHISON: Certainly.

Q Okay. Thank you.

And, again, we don't need to bring this up, but there is a statement in ISH's reply submission with respect to the B1 mudstone, and it states: (as read)

> The B1 mudstone is a thin but regionally extensive silty, sandy mudstone similar to the McMurray A2 mudstone.

Do you agree?

A I agree that it is thin. It is silty, highly bioturbated mudstone. Very recognizable. Regionally mappable, I agree. But in the KN06 box, I do not agree that it is present throughout.

Q Understood.

The words "similar to the McMurray A2 mudstone", do you mean that where it's present, the B1 mudstone would be effective as a barrier to steam in the same way that A2 mudstone would?

A Provided it's thick enough, yes, and -- and present throughout the steam flood area and not breached by a later fracturing or faulting.

Q All right. Okay.

So I don't have your exact words, but I do recall in your opening statement that you were acknowledging that the B1 mudstone is present over the KN06; correct?

A If we can go to my -- now, I'm going to confer with Mr. Lewis, the map of the B2 -- B1 mudstone.

MR. LEWIS: Sure. Just a second. That is in PDF -- no. Sorry. That's in 63.01, PDF 12. Sorry?

A MR. MATHISON: Let me talk with the --

MR. LEWIS: Oh, okay. Yeah. So that is in 63.01, PDF 12, I believe, is that map, Figure 3.

MS. JAMIESON: Yes. Page 12, Figure 3. Yes, I think that's right.

MR. CAMPBELL: Do you mean 63.02?

MR. LEWIS: I have it up at 63.01 here.

MR. CAMPBELL: I have -- sorry. We may have cross documents here. I have --

MR. LEWIS: No, it's all right.

MR. CAMPBELL; -- 3.02 as the ISH reply submission.

MS. JAMIESON: Yes. I believe that's the right document, and the question might be whether or not -- it might be 63.02 if the cover letter was given 63.01.

MR. CAMPBELL: Yes. The cover letter --

MS. JAMIESON: That might be --

MR. CAMPBELL: -- is 63.01. Okay.

MS. JAMIESON: Yeah.

MR. CAMPBELL: Sorry. And the page number, sorry, was 12?

MS. JAMIESON: We're looking at page 12 of the PDF.

MR. LEWIS: Yes. With the Figure 3 McMurray B1 mudstone isopach map, I think, yes.

Q MS. JAMIESON: And, sir, are you agreeing with this? This is your isopach map?

A MR. MATHISON: I'm agreeing that it was done under my supervision, and I'm agreeing -- in agreement with it.

Q Okay. So if we could, I would like to go to one of the aids in cross-examination that we filed prior to.

MS. JAMIESON: Ms. Turner, this would be Number 1, and this is an annotation of the earlier depiction. So I'd like to have it marked as an

exhibit, if we could, please.

MS. BERG: If we could mark it as an exhibit for identification at the moment, and let's see what he has to say about it, if that's all right.

MS. JAMIESON: Yeah. That's fine with me.

THE CHAIR: And, sorry, is this one of the -- we -- the Panel received three documents earlier that were identified as aids to questioning. Is what you're referring to now one of those, or is this something different?

MS. JAMIESON: No. Yes, it is. It's the first one.

THE CHAIR: Okay.

MS. JAMIESON: And the title would be "Stratigraphic Interpretation of the Upper McMurray".

THE CHAIR: Okay. I thought that's what we were looking at the first -- the -- your very first --

MS. JAMIESON: It is, but this one has been annotated just to try to facilitate the question.

THE CHAIR: Okay. Thank you.

Q MS. JAMIESON: Okay. So just to orient you, Mr. Mathison, if I could, this is the same stratigraphic interpretation we were just discussing.

A MR. MATHISON: Yes.

Q I want you to focus in figure -- on Figure B, and we've

annotated with a round circle. It's blue, and it is on the gamma log there on the left-hand side of Figure B.

A Yes.

Q All right. And just so that we're on the same page, do you see the dash line going through the middle of the blue circle?

A Yes, I do.

Q Okay. Do you acknowledge that that is what Canadian Natural asserts is the Mid-B1 mudstone?

A Yes. And that's what I call the "B1 mudstone."

Q Okay. All right.

So the question is: Do you agree that the gamma log indicates that the regional upper B1 sequence is mudstone rich?

A In this well, it is. Yes.

Q And could -- this mudstone-rich area within the regional upper B1 sequence over the KN06 box, could that result in a misinterpretation that the Mid-B1 mudstone has been removed?

A Not in this well. I think that it's -- usually, the -- the -- both the A1 or the A2 mudstone and the Mid-B1 come through as a high gamma ray pick, and it's -- it's pretty obvious. And -- and where you lose that character, you have to question yourself of whether that is there or not, and so it's not related to the overlying strata. It's more a matter of the actual

character on the well log.

So once -- you know, the -- the question, of course, is: What's causing that? And you could get thin-bed effect. That -- even -- even when you get down into the half metre or even less, it's still a highly recognizable mudstone. And so I don't think that would cause any -- I recognize that in certain portions of the -- the KN06 area, the B1, the overlying B1, upper B1, is a muddy unit, but as we go elsewhere, it's also a sandy -- predominantly sandy unit.

Q I'm hoping to follow up. Are you speaking about the uncertainty of the pick when you give that answer?

A Well, that's -- is that not what you asked me? Because you mentioned that they said because it was -- it was -- the upper B1 was predominantly muddy in this well. Would that make -- not make you interpret that -- that it was -- that the 'B' -- B1 mudstone, Mid-B1 mudstone, was absent? And I -- to -- in reply to that, I said I -- no, I do not believe that because the reservoir -- or the log characteristics are quite distinctive and distinctively different from the B1 mudstone -- or overlying B1.

Q Okay. I think I understood that. I think I have a more basic question.

A Sure.

Q Do you agree that mud can act as a barrier?

A Yes. Yes. I'm --
Q All right.
A I'm not in disagreement, but these are mudstones.
Q Thank you.
A They're -- they're -- they're -- they're indurated, and they can be broken and fractured. They're not just simply muds. That's why we call them "mudstones".
Q Okay. Let's move forward, if we could. So here's another statement. Actually, I think that in your opening statement you spoke to the 12-01 well. So I think we should -- actually, I'm going to leave those questions for the moment.

I need to just talk to you generally about the datum that you picked for identifying the depositions. So my question is: Do you agree that a datum must be a continuous unambiguous pick that was horizontal at the time of deposition?

A I believe those are my words.
Q Those are not your words. I'm asking --
A Oh, they aren't?
Q -- if you agree --
A Well --
Q That's the --
A -- I certainly --
Q -- conclusion --
A -- agree with them. I absolutely --

Q Okay.
A -- agree with them.
Q Okay. Thank you.

Are you aware that the top Wabiskaw marker is consistently chosen by operators to hang stratigraphic sections from -- in this area to best allow them to understand the regional upper McMurray stratigraphy? Are you aware of that?

A I am aware of that, but I don't think that that necessarily makes it the best pick. It depends on what you're using it for.

And the reason we use the -- the B1 and Mid-B1 mudstone was -- for the most part, it can be correlated in that area, and it's closer to the -- the actual reservoir level. And, therefore, any -- if there's any distortion structuring differential compaction and you choose an overlying datum such as the -- you know, the basic Clearwater or the top of the Wabiskaw, it's going to -- going to distort your image of the -- the stratigraphy.

You want to choose something that's as close to the layers that you're interested in in order to -- to -- but that you're -- you're pretty confident was -- was a horizontal unit and can be picked with -- with a great deal of certainty to avoid any distortion in the data.

Q Right. And so it would follow, then, that if you pick a poor datum or the datum's not verifiable, then that creates uncertainty. Yes?
A That's true. And as I say, with the B2, there are places where we interpret it. And -- and when we built these first cross sections, I hadn't looked at -- at much of -- any of the core, in fact.

And so what -- now, I wasn't aware at that time that -- that I -- that the B1 -- or, yeah, that the B1 mudstone is absent over portions of -- of the pool. But the -- the overlying B2, the base of the B2, acts as a very good proxy, and it's a good pick also.

So we're not -- we're not distorting things too much. You know, we're -- even if the B1 is absent in a few wells. Because we're -- we're picking the top of the B1, which is also coincident with the base of the B1, upper B1, we're not actually causing any distortion.

Q Okay. My understanding, then, is by using the top of the Wabiskaw as the stratigraphic datum, then the underlying A2 mudstone is --
A Yeah.
Q -- also flat relative to this datum and that that would demonstrate that the effect of the Wabiskaw D unconformity is negligible. Do you agree?
A I guess what are you referring to in the KN06 box? Are

you referring to the -- the larger KN06 area?
Q I think the large --
A Go ahead.
Q The larger KN06 area.
A Yeah. Well, now, if I understand your -- your question correctly, the unconformity, which is the other one that I identified in my paper, at the base of the Wabiskaw is a very high -- has a high -- it's a -- it's an unconformity that cuts all the way down in this instance just north of the KN06 area -- I've lost your feed -- in the KN06 area.

It actually truncates down to where it's truncating regional strata as opposed to the post B2 reservoir unit. It truncates down all the way into what -- what CNRL and the RGS would -- would call the "McMurray C." So these channels can be up to well -- in the 11-02 well just to the north of it, which I had in the core. It's -- it's actually 27 metres thick.

So -- so that -- there is a large amount of -- of erosion at the base of the Wabiskaw B. And in -- in the KN06 box, that takes away the entire upper A2 sequence and -- and down into the regional and removes the regional A2 mudstone. So it's truncated all the way down to the top of the B1.
Q So I'm confused by that 'cause I thought we already established that the A2 mudstone is still present over

the KN06 except for the one -- a small portion based on the one well in the northwest corner; right?

A It's not based on one well. It's based on the wells also to the north with the 1AC. In fact, we can show you -- I can show you the core in that 1AC/11-01 well just on the northern border of the KN06 box. And I can -- I think I can demonstrate -- yeah, demonstrate that the A2 was not there, if you would like me to do.

Q I think just in the interest of time, keep moving forward. I did file a second aid to cross-examination. This was a paper that was referenced by ISH -- a 14 paper ISH -- referenced by ISH in -- by Jablonski, et al., and I'd like to bring it up, if we could, and move to the second page. Now -- yeah. I'll give that a moment.

So, sir, we did highlight the yellow portion that I would like to ask you about. But before we get there, I believe the first sentence of the same paragraph, so the third paragraph down, is the one that ISH was referencing or using this paper for support. So it's: (as read)

> The initial analysis of this quantitative data suggests that individual silt beds, 1-to-10 centimetres thick; millimetres laminated to structureless; relatively low permeability compared to the sand beds, at

selected outcrops, type section particularly, are less continuous, less than 10 metre lateral extent than originally thought before undergoing the study.

So I believe that that's what the reference was based on. Is that correct?

A That is correct.

Q All right. So we're talking now about the -- the post B2 non-reservoir, and the concept is that, you know, certainly, in Canadian Natural's view, that that non-reservoir (INDISCERNIBLE), the interbedded -- or the IHS, so the inclined heterolithic strata, at the stop of the steam chamber can act as climate strata due to its low permeability.

And we think that ISH didn't go far enough in reviewing this reference because starting just above the yellow highlighted statement -- and I'll ask your thought about this, but it states: (as read)

Even though silt beds appear to be discontinuous in the outcrop samples, it appears that there are zones within the IHS stratigraphy where silt beds are more abundant. These zones vary in thickness, 50 to 200 centimetres in thickness, and are laterally continuous across an entire outcrop bowl and can often be traced for over a

hundred metres across numerous outcrop bowls. The abundance of the silt beds and the resulting complex tortuous permeability pathways, due to the individual mud beds within the zones, are laterally discontinuous. It likely indicates that these zones will be barriers to steam chambers development and SAGD over the life of a well-pair.

Can you please explain why you state the position that the IHS will not act as an effective barrier.

A Okay. I can -- several lines of that notes to indicate that -- that they probably are not barriers, at least in portions of the reservoir. And if we could look at the core from the A/11-01 well. Go down to the -- no. That's -- okay. It's -- to eleven --

MR. LEWIS: I'll search for the --

Q MS. JAMIESON: Sorry. Mr. Mathison, maybe I wasn't clear with my question, and I'm happy to look at that core. But my question is just: Speaking in general terms, do you agree that IHS can work as an effective barrier to steam in this area even though they're discontinuous? That's my question, and that's what this abstract seems to indicate.

A MR. MATHISON: Well, I -- I -- first of all, I think we have to understand we're looking at very

different -- different fish here. The outcrop samples are from very large channels. The very large channels have very -- have very -- the IHS is very thick, up to 17 metres, that -- in the Fustic paper.

You know, so we're looking at -- at -- at mudstone intervals and beds because -- because they have -- typically have an 8-degree dip, and that's taken right out of Fustic. Their lateral extent is -- is far larger than we see in the IHS that we see overlying the top of the B2 -- what they call the "B2 reservoir unit." And so -- so that -- that's one thing.

And the other thing is that what is termed "non-reservoir" -- and I would interpret as -- as -- in -- in -- I would interpret it actually as a reservoir because it's -- it's -- it is sandy IHS even though they have -- they have termed it as "non-reservoir", and -- and -- you know, and -- and it has significant thicknesses, and that's what I wish to show you in the -- the AA/11-01 well, which is the -- the type well that -- that CNRL likes to present, and it's the only well that they've presented any core or well logs information on.

And -- and in that well, where they place the top of the reservoir, there are clearly thick sandstone beds, and these beds would be dipping at an 8-degree angle. So these -- these sandstones would go from the

top of what they consider reservoir all the way up to the top of the 'B' -- to the base of the overlying -- overlying what -- what they referred to as the "B1."

So, clearly, there are communication pathways, and to use their Collins paper, the Collins paper that they -- Collins, et al. paper, the 2001 paper, he refers to this -- these as spill points where you have inclined strata that has coarse -- both coarse-grained. In this instance, sand and mudstone intervals can act as spill points.

And so what I'm saying is there are spill points within that KN06 area, and I can point to wells where you have sandy strata that goes all the way up to just below the -- or right up virtually to the top of the 'B' -- the -- just underlying the B1 unit. And, in fact, in -- in the -- the modelling that CNRL did -- and it's -- excuse me. Can I confer with my compatriots?

MS. TURNER: I understand Mr. Mathison is conferring with Mr. Lewis for the record.

A MR. MATHISON: So it's PDF 0201.

Q MS. JAMIESON: Mr. Mathison, I'm growing concerned about time, and I have a number of questions I'd still like to answer, so I don't need to look at that PDF.

A Okay.

Q I'm satisfied with your answer.
A Yeah.
Q And if I could ask you one last one on the confinement strata --
A Sure.
Q -- I -- I have a few more I'd like to get to, if I could. Thank you.
A Yeah.
Q So -- and this is a general -- I want us to just take a step back. So I understand your evidence to say you're finding fault with all three of these strata layers that Canadian Natural's put forward. They're putting it forward as a package. But if I understand your evidence, you're saying, None of this is effective; it's not going to work as a confinement strata. So I want to understand how you can explain the literally hundreds of wells in the Kirby area, the SAGD wells, that have been successfully started up, and they're operating without any loss of steam, with the same confinement strata. So how does that go around with your evidence, sir?
A Well, first of all, I'm not saying that those layers always provide containment in -- you know, provided they're continuous throughout the reservoir and have -- have a, you know, minimum thickness, whether it's a half metre or a metre. What I'm -- so it doesn't meet

those criteria in the KN06 box. And that's the issue. It's not what is happening next door but what is happening in this box. And the -- the -- sorry. I've lost my train of thought, but I will get it.

So we -- we can demonstrate or -- that -- that these -- these strata are within the KN06 box. All of those units are either largely sandy and -- and -- which would go all the way up to the -- you know, let's -- for instance, the IHS, or the B1, the regional B1, upper B1, and the lower B1, so within that box. You know, we have mapped them out. I would map them out if I was an operator. I would like to know. I'm -- I'm actually going -- using a lot of things from -- that -- that CNRL has -- has provided, and I don't think that they've fully read them and -- and taken it to heart and really tried to understand that -- that IHS -- not calling it "IHS" but calling it "non-reservoir" isn't good enough. You need to map out which -- where are your sandy -- sandy IHS 'cause that's a spill point according to Collins, or where in the B1 -- the lower B1, where is it sandy versus shaley? It's usually a sandy unit and -- and would -- would therefore be transmissible to steam. And -- and -- and, again, the B1, where it's very thin or where it's fractured, we're looking at things that go down to .1 metres, 10 centimetres. Now, it wouldn't

take much to break through that with steam. I don't think you even need any fracture. And, again, we know that the A2 has -- is truncated. It's eroded completely at a small portion to the north.

So what -- what you can do is you may not get that chamber rising up like a -- chambers don't rise up vertically. If you have inclined strata, it will go up that -- that inclined strata provided you've got a good reservoir. And these -- every one of these units has bitumen saturation. All of the sands in them are bitumen-saturated. So it can get through any -- and as long as it can -- it can encounter a sandy unit in the overlying strata or a missing strata or fractures or where it's very thin and can get through, it can break through that barrier. So we can get spill points. I'm saying it doesn't necessarily have to be vertical propagation. I don't believe that that -- when you get into this sort of strata, it's going to follow the stratigraphy. And the stratigraphy is telling me that there could be lines of communication and very probably are.

Q Thank you, sir.

A You're welcome.

Q Again, in the interests of time, if I could move you to -- I'd like to look at some of these -- what ISH is alleging to be faults and fractures. Could we start

with Exhibit 63.01. It's ISH's reply submission. Figure 6, page 17 of 102, I believe.

MR. CAMPBELL: So that is 63.02, page 17.

MS. JAMIESON: Yeah. So Figure 6 -- yeah. Thank you, Mr. Campbell.

Q MS. JAMIESON: All right. Sir, so Figure 6, I believe, was put forward by ISH to show wells where cores -- it shows clear verticals of sub-vertical fractures and faulting. Which of the faults and fractures on the core photos referenced in this figure are actually located in the KN06 box?

A MR. MATHISON: As it's very clear, there are -- we didn't at that time have any -- any in that area. We chose only to provide the -- what we thought was the strongest evidence. Now, we have lots of evidence in the KN06 box. In fact, I can -- I would be willing to provide a list of -- of those wells and a map such as this if you would -- would like to. If you want me to go through which wells have it, I -- I'm certainly willing to do that.

Q We just don't understand why they weren't shown in evidence, sir, if you have --

A Well, first of all -- okay. We -- I actually -- it was just a -- a mix-up and a timing issue. We had -- I don't know what -- how many pages to go through here, and I've gone through that -- and I've gone through

that, the core photographs, a number of times, and the more you look at them, the more things you see.

And -- and especially on core photographs, it's difficult to tell with actual certainty what you're looking at. And so what we initially provided was what we felt we had the -- the clearest evidence, and, in fact, some of these we -- outside of the box, 15-02 is probably one of the strongest cores. But within the box, I've also shown you some evidence of -- of fracturing in the AA/11-01 well, which is the -- the well that CNRL always uses as their type well. And I've also -- and 5 -- AB/05-01. So those are two I've already presented to you. So -- but, as I say, we can provide lots of evidence of faulting and fracturing within that box, and we would be happy to provide a list of those wells if you'd like.

Q Well, that's fine. I think we can just agree, though, that the -- that the evidence of faults and fractures over the KN06 box would be more relevant, correct --

A I --

Q -- to the proceeding?

A I agree with you, and I tried to get it in, but unfortunately we were rushed with this, and we didn't have that map prepared at the time, so ...

Q Okay. Thank you, sir.

And are you familiar, sir, with the difference

between drilling-induced fractures and natural fractures?

A Absolutely, absolutely.

Q And is ISH really claiming that all the faults and fractures that you're putting forward in all these wells are natural as opposed to drilling-induced? Did you see any sign of drilling-induced?

A Oh, yes. And I've -- I have edited out and tried to stick to the ones that I felt had clear evidence. Now -- and -- but sometimes it's very difficult to say then -- and especially where you can see direct evidence that there is some sort of -- there is fracturing. And then above this, you see a -- an open fracture, which you're -- you know, could -- could be drilling-induced; it's hard to say. But it's -- the weight of evidence would suggest that this is a fracture related -- and I -- I've got examples where you can see highly distorted strata. In fact, I showed that, highly distorted strata, with an overlying fracture coming up, vertical fracture. So we know that they exist.

Now, not having the ability to actually look at these in core makes it very difficult to say with any certainty whether they're drilling-induced or whether they're actually vertical fractures. Both would look very similar in -- in core.

Q Well, I'm going to suggest, sir, that Canadian Natural will speak to that in its evidence.

I'd like to understand if this concept that -- my understanding is this, that a fault or a fracture needs to be open and wide enough and sand-filled or permeable in order to act as a conduit. So do you have any of your fractures or faults that are actually of a sufficient circumference -- or, first of all, let's break this down. What circumference would you agree to is required in order for a possible fracture or a fault to start to act as a conduit?

A Well, first of all, what I would argue is I don't believe that -- first of all, that this necessarily has to be an open fracture that is, you know, wide enough that you can get steam flow. What you need is a zone of weakness, a zone that is broken. If the -- if the -- the core has been broken or shattered -- and I do see that in some instances -- then the -- the pressure and the -- and the -- from the steam could fracture that and induce -- and then would allow steam to propagate up through that fracture system.

Q Okay. So let's just follow that along if I could, a zone of weakness. How long would this zone of weakness -- would you -- wouldn't it not -- would it need to be -- or I'm going to suggest to you it would need to be the length of the confinement strata in

order to actually act as a conduit; correct?
A No. It just needs to be enough to get one through, let's say, the B1 mudstone. If that's the confining strata over a portion of the field -- pool, then all it needs is to be able to get up through that to access the sand beds over -- overlying that. And once its -- once its accessed them, then it will expand from there and -- and cause more -- open up that -- that line of communication.
Q What about the ones that you feel you observed at depth? Are they closed?
A No, they're not. Not all of them. If you recall back to the 02-01 well -- the A/02-01 well, that's a Paleozoic. That one I referred to as a fault. It's open, and indeed it's -- it's -- you know, it's -- it would be significant.

The other thing that -- you know, I -- there are many lines of communication. Some of these fractures have been cemented, and I agree those -- those would be not lines of communication. But I've also seen wells where these have actually been fractured also. So, you know, I think, you know, we're -- the other thing is we're -- these fracture systems or -- or faults, as I would interpret them to be, are not a single, you know, fault coming up that's, you know, 'X' metre -- 'X', you know, centimetres wide. They are an array of

fractures, which means that any strata they go through will have multiple penetration points, which would certainly reduce the integrity of that layer, and therefore the whole thing could break through.

Q Okay. Understood.

On the fault that you're just referencing, how much offset are you seeing on that fault?

A We don't see -- we don't know. We can't match the -- the stratigraphy across. We don't see the other side. It could be metres. It could be tens of metres. We don't know. There's no way of telling from the -- the core. If -- if CNRL can demonstrate it on seismic and see it, that would be very, very, you know, helpful.

Q Thank you, Mr. Mathison. I believe those are all my questions for you.

Ms. Giry, I would like to speak with you if I could next, and this is just with respect to Hearing Issue 2, the risk of fractures. So, Ms. Giry, the second hearing issue that was set by the panel is the risk of fractures or other breach of the barrier/top seal, if present, resulting from Canadian Natural's operations in the KN06 box. And I have reviewed ISH's submissions in this proceeding. I couldn't find a clear statement as to what ISH believes the risk of fracture to the containment strata is. Can you please

state that clearly now.

A MS. GIRY: So if I read again the Issue 2: (as read)

> The risk of fractures or other breach of the barrier/top seal, if it is present, resulting from CNRL operations in the KN06 box.

On top of the fractures and faults that were identified by Mr. Mathison, we also looked at this other breach, which is Well 10-01. Well 10-01, looking at the pressure provided by CNRL, is clearly demonstrating a compromised well.

Q All right. Thank you.

In addition to 10-01 -- the 10-01 alleged breach, did you -- do you have a clear position on the risk of fracture to the confinement strata from the KN06 operation? So there I'm talking about the start-up pressure.

A Can you repeat your question. All I heard, "breach" and then "start-up pressure."

Q What does ISH believe the risk to the confinement strata is from the KN06 operation?

A The biggest risk is having 10-01 compromised.

Q Okay. Thank you.

Did ISH retain a geomechanical expert to evaluate the risk on Hearing Issue Number 2?

A We looked at fault and fracture with the review done by

Ed Mathison. We definitely looked at the pressures provided by CNRL on 10-01, and we understand geomechanics from an engineering level.

Q From an engineering level. Okay.

And was any analytical or quantitative assessment performed?

A We trust that CNRL, being the operator, would provide us with sufficient information on this simulation. We were provided with a geomechanical simulation performed by CNRL. We reviewed that geomechanical model. And that's my one -- my answer, I guess.

Q Thank you.

I'd like to just talk briefly about the field data that Canadian Natural filed to support its position that there was an extremely low risk of fracturing, and there I'm referring to the 96 wells that have already been drilled at Kirby. And Canadian Natural provided evidence that 95 of those 96 wells were started up with no fracturing in the McMurray sands, let alone the confinement strata. So based on that, would you agree with me that the risk of fracture to the McMurray reservoir, to the sands, is about 1 percent?

A No, I don't agree. It depends how you look at things, again. I will refer to CNRL's table, Tab 37, which is in the ...

Q I actually -- Ms. Giry, if I could try to help, I would

like to look at the Tab 37 as well. It is my third aid to cross-examination.

A Okay.

Q If we could have that up, I think it would help both of us.

A Yeah, because I think you are referring to it.

Q Actually, the reason I was referring to it is perhaps different than you are, so why don't you finish your comment on that. I was asking, just in terms of straight numbers, that this field data supports Canadian Natural's position that the risk of fracture would be extremely low, less than 1 percent, and that is based on the 96 wells already drilled. So I'd just like your response on that question. Do you agree?

A I would like as well to actually point out some -- which I guess would be further questions to CNRL tomorrow about that Table 37. Our understanding of the start-up operation is the requirement for CNRL to lift the liqueen [phonetic] in the vertical section of the wellbore and to face the hydrostatic pressure in those wellbores. You would expect hydrostatic pressure at a well of 500 metres to be more as 5 MPa, and if we look at this table or these 96 wells, maybe -- I don't have the bottom of the table. If you go below, you would see -- if you go below, below, below. That's good enough. Oops. Yeah. You would see more or less,

yeah, about 40 wells, probably, 30 wells have start-up pressure which are below hydrostatic pressure.

Q Yeah, I don't disagree with that.

While we're here, though, I might as well ask my question on it. So in your -- if I can find it. I'm a little bit out of order if you can bear with me now just for a moment.

So one of the statements that you made in your reply submission was that: (as read)

> It is extremely likely that Canadian Natural will push the start-up pressure at all KN06 wells above 6,500 kPa in 100 percent of the cases.

And you made that statement; there was no facts to support it.

MS. JAMIESON: If we could please, Mr. Campbell, scroll to the top of this exhibit.

Q MS. JAMIESON: What we've done here in the red markings is actually identified the ones that were started up out of those 96 wells above the 6,500 kPa, and we came up with 7, so that correlates to roughly 6 to 7 percent, which is a far way from the 100 percent that you're alleging, and I just -- I guess I'm asking if you would agree with me that that was an exaggeration.

A MS. GIRY: So there are seven wells that

are above 6,500 kPa with an average depth of 520 metres. So the pressure gradient for those wells would be around 12.5 kPa, maybe 12.6 kPa, the pressure gradient for this well. If we use 12.5, 12.6 kPa per metre at the level and the depths of the injector wells in KN06, which is 480 metre, we would be at 6 MPa. So our concern is that -- it's to compare apples to apples. We've got to take into account that seven wells above 6,500 in all the parts drilled so far do not compare with KN06. KN06 is shallower. KN06 doesn't have continuous layers. KN06 has faults and fractures and a compromised well.

Q I'm just speaking strictly to your comment that -- or ISH's belief that in 100 percent of cases, Canadian Natural will be starting up the KN06 wells above the 6,500 kPa, and I'm just asking, you know, what you're basing that assertion on when their evidence is clearly the opposite.

A Well, I will get back, probably, to my first point, which is getting a better understanding of the definition of maximum bottomhole pressure for the circulation phase when I honestly don't understand how we can have pressures below hydrostatic. The reason why I don't understand that is because we are showed that the maximum bottomhole pressure is reached when we have to applaud -- or unload -- offload the well -- the

vertical section of the well.

Q So if I'm following you, your belief is that Canadian Natural could start up much lower. Is that what you're trying to get at? Is that why you're pointing out the pressures closer to 5 MPa?

A The table said that -- where it started up, if you go back to the bottom of the table, at 3,293.

Q Okay. Thank you, Ms. Giry. I don't think that I'm the right person to be discussing that. Canadian Natural's going to address their start-up pressure in their evidence and why they need to go up to the 7 MPa.

I'd like to move to some of the comments you made on ISH's -- or, sorry, on -- some of the comments you made on Dr. Boone's risk assessment that was filed in the proceeding. You make a number of comments there in terms of, well, really criticism. Did you have a geotechnical engineer or someone else trained in risk assessment to review Dr. Boone's report?

A I have personally been trained in risk assessment as part of my experience, 25 years with Total Energy, a large, major international oil and gas company. And then with the AER, we had numerous training there. It's -- it's an organization which is very much into risk-based analysis.

Q I agree with that.

Would you agree with me that the APEGA "Guideline

for Management of Risk in Professional Practice" is a good starting point?

A I will probably not fully agree with that, particularly if you refer to the metrics used by the APEGA. A risk assessment is part of a larger risk framework, and each company has to give their own framework.

Q Understood. I've read your view on that.

There is a statement in the APEGA guideline that states that: (as read)

> If there are specific historical data related to the specific project or activity, [that] these are often the better to use.

Do you agree with that statement that that's a good idea?

A I couldn't hear your statement, what you read, and I don't have the evidence for that one. Sorry.

Q Yeah. I'll repeat it, if that's okay, a little slower. It's not long. The recommendation at page 16 --

A Sorry. The sound is not super good. Page 16? Okay.

UNIDENTIFIED SPEAKER: I don't know what document.

A MS. GIRY: Yeah. Me neither.

What document? Page 16?

Q MS. JAMIESON: I'm talking about the APEGA guideline.

A Oh, that one. Okay.

Q The base for assessing risk, the concept, is that

historical data should be taken into account. So I don't need you to turn anything up. I just -- I'm asking if you agree that historical data would be relevant and a good thing to consider on a risk assessment.

A Well, a risk assessment -- the primary activity of a risk assessment is to identify the risks. Identification of the risks does not require necessary data because you can have risks that are invisible; we call them "phantom risks." And you have risks where you have a lot of data on them, and those ones are generally high likelihood, low -- low impact. So data are necessary to quantify the risk, but there's -- you really need to have your -- well, leave the analysis open to all the risks that can happen in -- in -- in the development.

Q Can I just confirm -- and I think I understand this from your earlier comment, but what -- ISH also offered its own risk assessment, and that was based -- my understanding is the $2 million consequence that you identified was based on the idea of contamination of the Mannville II and Mannville HH pool. Do I have that correct, that that was the basis for that $2 million consequence that ISH put forward?

A It definitely impacts the GOB zone, and it could be more than that if it -- yes, when it goes to the

Mannville HH.
Q And the way that the zone would be contaminated, from ISH's viewpoint, would be up through this 10-01 well; is that correct?
A That is correct.
Q All right. So let's talk about that a little bit.
Actually, these questions maybe I'll start with Mr. Leech just in terms of his well-test evidence, and then, Ms. Giry, I might have a couple more questions for you if that's okay.
A Absolutely.
Q All right. If I can just take a moment to get organized.
So, Mr. Leech, you filed a report, and I believe it is attached to Exhibit 63.01. And if my page count is correct, it should be at -- I'd like to look at your executive summary, sir. It's located at page 53 of the PDF, 53 of 102 pages.
A MR. LEECH: Right.
Q So, sir -- and I -- I'm just going to get up your opening statement because I want to make sure that I understood some of your comments, but since you filed your report, you've now, I assume, received a copy of the cement bond logs that Canadian Natural filed last week; is that correct?
A I've looked at them.

Q Did you review the third-party independent assessment of those logs, sir?
A I have looked at that, yes.
Q I'm going to suggest that those cement bond logs confirm that there is no integrity issue at the 10-01 well. Do you agree?
A Not necessarily, no.
Q Why is that, sir?
A It's possible for cement bond logs to read a good connection with the casing and not read a miscommunication between the cement and the formation.
Q Okay. Thank you.

So I'd like to look at your report, the page that we've got up. And it is small, at least on mine. But you started, sir, with a couple of statements. You state that -- and I'm going to find you the paragraph so we can try to stay on the same page. So the third paragraph down, you have a statement that: (as read)

> ISH management reports that the wellhead is chained and locked, the pipeline has been disconnected, and they have no knowledge of or involvement in any communication, interference, or production operation at the subject 10-01 well.

Correct?
A That's correct.

Q And you also state in the following paragraph that: (as read)

> The operational data were minimal and somewhat piecemeal.

You acknowledge the circumstantial nature of your conclusion: (as read)

> The interpretation is subjective, the analysis is speculative, and quantitative values are considered best estimates only, and thus the results cannot be warranted.

I'd like to understand, based on those qualifications, what confidence we can have in your results.

A We have good confidence in some particular pieces of the results, and then some other pieces of information are rather ambiguous, so it's -- it's variable throughout the data that I've looked at.

Q Okay. Thank you.

So let's move to your conclusion. The first one is that: (as read)

> The GOB gas has been flowing around or through the 10-01 perforation.

Do you still agree with that, or after reviewing the cement bond logs, does that change at all?

A I still agree with this.

Q And next you point to three possibilities for this gas migration. First, "gas channelling behind the 10-01

casing," and this one you're saying -- you're characterizing it as your most probable case: (as read)

> ... given apparent correlation of 16-35 production data to the 10-01 temperature and pressure data.

And are you still standing by that statement, sir?

A I still think that's a probable cause -- a probable possibility, yeah, yeah.

Q Just on that first one, sir, if -- well, let's -- let's review the second and the third just so that we have all the possibilities. So the second one was that: (as read)

> The 10-01 well has been tied in, and gas has been stolen,

which you state is: (as read)

> ... less probable except that (a) pressure dynamics appear more hydraulic in nature than via dampened reservoir communication, and (b) the hard shut-in does not reflect typical hydrating effects.

Do I have that right?

A Yes.

Q And then third: (as read)

> The leaking packer at 16-35 possibly is allowing gas migration into the Upper

Mannville HH from the Upper Mannville II. And just to be clear before I go on, on your second one, when you -- what you call a "hard shut-in" is just another way of saying that the valve's been closed; correct?

A Instantaneous shut-in. I cannot discount that a hydrate could have caused that.

Q A hydrate or a valve closing?

A A hydrate or a valve closing.

Q Yes?

A Correct.

Q You're agreeing with me?

A Yes.

Q Okay. And so why is it not listed here in your possible explanations for the gas migration simply that the 10-01 well was flowing itself?

A Flowing itself where?

Q Well, just that it was flowing, that that would explain the temperature and the readings that you saw.

A I don't think there -- I don't -- I think there's a very high level of confidence that 10-01 is indeed flowing, yes.

Q Okay. And then if ISH's management hadn't ruled out the possibility for you, would you agree that another explanation for the pressure and temperature behaviour that you analyzed from the 10-01 well could be

production from the well itself?
A I suppose it could be. Except that I've been -- you know, my professional colleagues have told me that the well is blocked off and not flowing, so --
Q Understood. I understood.
But if you hadn't received those instructions, would you have listed it as one of the possibilities and perhaps the probable cause?
A I could have, yes.
Q Thank you.
Would you agree with me that -- would you agree that if it was assumed that the 10-01 could flow at surface, then the January 7, 2020 -- do I have that date right? 2020? Yes. That hard shut-in measured on the -- measured at the 10-01 well is unlikely to be explained by gas channelling behind the 10-01 casing?
A If the -- if the hydrate was close to the wellbore, somewhere within the wellbore, it could have caused a hard shut-in.
Q Would another explanation just be the valve closing, sir?
A Could be the valve closing.
Q And just on those hydrate formations -- and assuming I know what I'm asking -- I understand that they only show up in a certain hydrate regime, meaning you need the right pressure temperature in order for them to

show up and that this 10-01 well is not in that range. Do you agree?

A No, I do not agree. We -- I can demonstrate a hydrate was formed within 10-01 during the Joule–Thomson cooling event. There was a slug of liquid. There was a sudden drop in pressure. A slug of liquid was produced. And that created a hydrate, causing the Joule–Thomson event. So that is -- suggests to me that hydrates can occur within this well.

Q Sorry. Can you please explain to me what that event looks like? What do you need for the -- sorry. What did you call it, the Jones ...

A Joule–Thomson cooling event?

Q Yes. Can you explain for me what exactly is needed for that to -- for that type of event to occur.

A Well, Joule–Thomson cooling occurs with any gas flow. It's a natural phenomenon of -- of gas moving through smaller orifices, so --

Q Okay, okay. And then you're saying -- your evidence is that -- that you have evidence that a hydrate could have been formed, and that would explain this blockage, I guess, and that's one of your theories, but I think you also agreed that it's also possible that the same behaviour could have been caused by a shut-in?

A Yes, it could have.

Q All right. Can I please --- Ms. Giry, if I could go

back to you.

Thank you, Mr. Leech.

MS. JAMIESON: I just need to moment, if I could, Madam Chair. Can I have just two or three minutes to confer with my clients here? We are sort of coming to the end of the cross, and I want to make sure that I'm covering the right material. Is that -- can I have a -- three minutes?

THE CHAIR: Yeah, that's fine. Turn off your mic so we don't hear you and confer away.

MS. JAMIESON: Thank you, Madam Chair.

Q MS. JAMIESON: Ms. Giry, I'm going to get you up on my screen so we can have a conversation. So, Ms. Giry, just to follow up those questions, how much gas does ISH think is flowing behind the 10-01 well? Just a ballpark.

A MS. GIRY: Let me confer with my team. I think it's somewhere.

So it is in David Leech's report, and I'm going to show you where it is. About -- an estimated -- so if you look at Mr. Leech's report, in 63.01, page 54, I will read the second from the bottom -- second paragraph from the bottom. Even -- yeah. Thank you. I don't have it on mine because it's so small there. Next page, please. Page 54. Yeah: (as read)

Even one year between 1,069 kPa and 753 kPa

would be a dramatic depression for an estimated migration outflow of only one (INDISCERNIBLE).

Q Okay. Thank you very much.

So I just want to confirm that it sounds like -- that ISH's evidence is that the most probable scenario is that the 10-01 well is connected up to the Grand Rapids; that would be the 16-35 well. The two wells are connected such that that is the flow. Is that correct? Is that what you're saying? I -- you did put a schematic in your reply submission, and we're just -- I just want to confirm we've understood it correctly.

A So the flow is that Mr. David Leech's report is demonstrating the flow behind the casing from the GOB zone to the Mannville HH -- HH formation.

Q Okay.

A The gas migrates to that zone, and 16-35 is a well producing from that zone -- is producing gas from the same zone.

Q Okay. So the idea is that it's the gas coming up to the 10-01 channel, in ISH's viewpoint, and it would be being produced at the 16-35, which is also a GOB well; correct?

A Just to make sure I understand, the gas which is channelling behind 10-01 into the Mannville HH is not -- like, 16 -35 is produced well -- gas from

Mannville HH. Just want to picture for you that it's not necessarily instantaneously. You know, there's a reservoir between the two wells.

Q At the 16-35, are you saying production from both wells --

A 16 --

Q -- or, sorry from (INDISCERNIBLE - OVERLAPPING SPEAKERS)?

A No. 16-35 is producing from Mannville HH. The GOB zone from 16-35 is shut down by order of the GOB shutting down.

Q Okay. Thank you. That's helpful. I understand that. Thank you.

So let's just assume for a moment that there's not an integrity issue with the 10-01 well because Canadian Natural clearly disagrees with that. So if there's not an integrity issue, do you agree that the 10-01 well would be suitable for monitoring impacts to the GOB? So now I'm talking about Wabiskaw B from the KN06 box. If that was a good well, could it be used for monitoring that zone?

A So admitting that somebody can explain the Joule-Thomson effect that is observed in 10-01 -- so once we get another possible explanation than the one we provide, 10-01 well is equipped with special temperature gauges to monitor the well integrity of

10-01, the cement integrity of 10-01. I will remember [sic] the Panel that 10-01 is a thermally noncompliant well initially. That's why it's been reworked -- worked over by CNRL in 2015. So what is not thermally compliant in that well is the -- still the production casing is not thermally compliant. So CNRL in 2015 installed cement plugs -- thermal cement plug below the GOB perforations. So the -- the 10-01 well first objective is to monitor the thermal integrity of that well, and the second objective is to monitor the GOB zone.

Q Okay. Thank you.

So I think that was a "yes" if I understand you correctly, that assuming there's no integrity issue, it is -- it remains a suitable well for monitoring the would be Wabiskaw B. Yes?

A It's a dual objective for that well to monitor the thermal integrity of that well and the Wabiskaw B.

Q Thank you.

So if indeed the cement job is compromised, what steps has ISH taken to repair those cement channels?

A Well, we received data from CNRL between 2019 and 2020, so we are -- like you, I assume, like CNRL, analyzing the situation, and 10-01 is compromised; it's a joint well, and we'll have to discuss with CNRL.

Q Understood.

So you're saying you're analyzing. It is a joint well. Canadian Natural certainly agrees with that. But ISH is the operator of that well, so ISH would have responsibilities under the AER directives and guidelines to take steps to ensure the integrity of that well. Is your evidence that no steps have yet been taken?

A The -- as you could see, like the report from David Leech indicates, the -- the well is compromised, and we are hearing from CNRL that they still want to discuss that -- that possibility. We are very firm about -- that this well is compromised. When the two parties agree that the well is compromised, we will talk and discuss with the AER about the next steps.

Q Have you conducted a pressure test? Because, again, my understanding is that's going to tell us very quickly whether or not there's a problem.

A The GOB zone pressure, as you can see from the data acquired from these pressure builds, is actually around 800 kPa. So doing a pressure test of 7 MPa is not proving anything. We have to look at the CBL [phonetic] that would be done at the lower pressure. 7 MPa is not representative of the GOB zone.

Q And what about a shut-in test to the Grand Rapids. Has that been performed?

A The next steps that we should talk about with CNRL is

will they consider to run a chat log? Chat logs are logs that will help both parties to analyze if that well has been flowing, is flowing by showing if there are some gas storage behind or around the cement.

Q Okay. I believe Leech -- Mr. Leech recommended that test in his report. And it sounds like your answer is, yes, ISH thinks that should be done as well, and -- yes? Was that your answer?

A There are tests that need to be run or -- on 10-01, like I mentioned, running a chat log, and around 10-01 testing Mannville HH, particularly looking at 16-35.

Q Okay. So you agree that it needs to take place, but you have not performed that test to date; correct?

A We have not performed that test to date. We're in the process of procuring some pressure measurements at wellhead.

Q Okay. But there is a chance, then, that you're still producing the Mannville II gas; is that right? If you haven't taken the test and you don't know, is there still a chance that the Mannville II pool is being produced?

A I think with the conversation you had with David Leech, he mentioned that there was an instantaneous shutdown on January 7th on the 10-01, which -- he referred these things; it's likely a hydrate phenomenom.

Q Sorry. I'm not sure whether I'm not asking my

questions right or whether I'm getting confused, but it sounds to me like there's still a chance that a GOB well is out there being produced and ISH has not taken steps to confirm one way or the other?

A I don't understand your question. I think I just answered to you. We are talking about the 10-01 well. It has been proven to flow behind casing, particularly looking at the Joule-Thomson effect. That well is now not flowing according to the pressure temperature measurement. I am -- I think I understand -- I answered that question, but maybe you want to be more precise.

Q Yes. I'll try again. Sorry. Thank you for that. Yeah. I understood that's your evidence on 10-01.

On 16-35, our understanding is that the rate has not dropped, suggesting that that well is still flowing, it's a GOB well, and that ISH has not taken steps to shut it in or to confirm that one way or the other. Is that the case?

A 16-35 is --

MS. BERG: Well, sorry. I -- I think Ms. Giry has been very clear that the 16-35 is -- is not producing from the GOB. I don't know if she needs to say that again -- how many times she needs to say that, but the questions that continually suggest that 16-35 is flowing from the GOB when that's been

asked and answered, I -- I'm concerned about.

MS. JAMIESON: So if I can just respond to that, there is -- there is some confusion because there are two zones at the 16-35, and ISH is putting forward a theory that the 10-01 well is flowing to the 16-35. So my questions are really aimed at both of those zones and what's going on at the 16-35. Like, for ISH's theory to go around, then the production at 16-35 needs to be dealt with. That's where I'm coming from.

A MS. GIRY: Is it a question?

Q MS. JAMIESON: I think 16-35 -- sorry. If I could have another moment. This part is confusing, and I appreciate, Ms. Giry, you're being very patient with me. I appreciate that.

MS. JAMIESON: So, Madam Chair, if I could have -- I know our time is coming up -- just a couple more minutes, and I will confirm that we're -- our final question.

THE CHAIR: Okay. So that was going to be my question, is: Are we close to the end of your questions, depending on what you sort out here?

MS. JAMIESON: I'd like to sort out the 10-01 and just make sure it's clear and, in particular, how these two wells relate. And then I do have about five questions on the last question, which has to do with monitoring option.

THE CHAIR: We are at 5:23. I'm concerned about our court reporter, potentially also people who are participating from home, who at this time of day are going, I imagine, to begin to have other kinds of distractions and things going on. So if you think that after conferring you can wind it up in sort of five to ten minutes tops, then I'm fine with that. Otherwise maybe now would be a good time for the break for the day, and we can continue in the morning.

MS. JAMIESON: No. I will promise you that -- I think your clock is a little different than mine, but if yours says 5:23, I'll be done by 5:33.

THE CHAIR: That's good enough. I'm a minute ahead. Let's go.

MS. JAMIESON: All right. Thank you very much.

Okay, Madam Chair. I'm back.

Q MS. JAMIESON: If you'll humour me, Ms. Giry, I'm going to ask you one final question on the 10-01 well and then move on. And so this is the question: We're going to assume the 10-01 well is flowing the way ISH suggests, and then it must be flowing to the 16-35 well. It has -- it needs to be going somewhere. There are two zones at the 16-35 well. One is Mannville II, which is a GOB zone and shut-in; we understand that. That's ISH's evidence on that. But if the 10-01 is

flowing, it must mean it's going up into the Mannville HH and is producing. Do you agree, Ms. Giry?

A MS. GIRY: So the -- again, I will refer to the David Leech report. The 10-01 well was flowing, I will say, based on the pressure at that time until January 7th and David Leech's report indicates it was flowing behind casing into the Mannville HH -- into the Mannville HH reservoir. And then the well 16-35, which is (INDISCERNIBLE) metres away is producing from the same reserve well.

Q Are you saying that the Mannville HH -- the 16-35 at the Mannville HH formation is producing? Is that what you just said?

A 16-35 at the Mannville HH is definitely producing, yes.

Q At Grand Rapids.

And has the temperature dropped -- or, sorry, the pressure dropped because -- the gas rate dropped because the shut-in at 10-01 would have resulted in a drop at 16-35? So has the production rate at the 16-35 well dropped since that hard shut-in on January 7th?

A Let me confer with the team. I think we have a graph, and I want to ask them.

Q Thank you.

A Sorry for taking some time. I was searching for the evidence in David Leech's report. And I will point out that page -- page -- sorry, page 65, that's -- 66 is --

yeah. 66 is where we can see the 16-35 gas rate. And if I read that properly, it looks good. And operators are continuously working on the well to make sure -- yes. That's perfect -- to make sure that we are producing properly this way.

Q Ms. Giry, I think my clients are telling me they understand this graph, and because I promised Madam Chair that I would finish up, can I ask you instead my last question?

A You're the boss.

Q Thank you.

So -- and this just has to do with ISH's comments on the remaining reserves that you included in your opening statement and just that you didn't think that it was a relevant consideration. So my question is: Is it your view that the Alberta Energy Regulator should not be considering the value of the reserve when it's considering extra costs to Canadian Natural to monitor the GOB?

A Well, the mandate of the AER is to avoid wasteful operations of oil and gas resources and to protect all producers and allow them to gain from their -- from their -- to obtain production from their feeds. So I don't know if it answers your question, but that's the mandate of the AER.

Q Yeah, I understand the mandate of the AER. The AER's

also mandated to consider, you know, economic considerations, factors, costs, and benefits, and so I'm asking whether or not your view is that the costs of these proposed monitoring options that ISH has put forward -- and you've put forward several, the obs [phonetic] well, the 4D seismic. All of those cost money. And is it your view that that -- those costs should not be considered up against the value of the reserve?

A So let me confer.

So -- sorry. Thank you. It's getting late in the evening, and my brain tends to freeze after 5:30. So the question, I think, is about the value, but the question is also about who is impacted here. We are impacted, and CNRL gets the opportunities. And so we are saying we should not be the only one to carry the burden. We have resources, and we have to develop them at the time whenever we can. The costs for developing bitumen resources for CNRL and the cost to monitor their development belongs to that development. Every other operator is putting in place sufficient monitoring to enhance their own development and protect any other stakeholders, whether it's us, like oil and gas, or other stakeholders at surface, monitoring gas, monitoring water, everything. So it's always been my understanding that when you make a development and

you -- when you operate a development, you carry the cost -- all the costs of that development.

Q Yes. I think my -- my question that I -- it was a little more simpler than that, and I think that I just want -- you don't -- okay. Do you disagree -- or do you agree with me that the cost of these different monitoring options is a relevant consideration for the AER to take into account?

A I disagree. The --

Q Thank you.

A -- cost of monitoring this bitumen is part of the development of these bitumen resources.

Q Thank you very much.

MS. JAMIESON: So, Madam Chair, those are all of my questions.

Ms. Giry, thanks for your patience.

And I believe I can stand down. Yeah.

THE CHAIR: Okay. You got the nod from the team?

MS. JAMIESON: I got the nod. Thank you.

THE CHAIR: Thank you, Ms. Jamieson.

So with that, we will adjourn for the day. I believe we are scheduled to start tomorrow morning at 9, and we'll be starting with AER staff questions for the ISH witness panel.

ISH witnesses, I'm certain that Ms. Berg has

already gone over this with you, but as long as you are still under questioning by any party, we have to keep to the same no conferring with counsel or anybody other than who was on the panel with you practice.

So with that, unless --

MS. BERG: And -- sorry. And I did want to raise that issue because --

THE CHAIR: Okay.

MS. BERG: -- obviously, witnesses remain under oath. I can't discuss any of their evidence with them, but I still have work to do tonight on the CNRL cross, and given the technical nature of a lot of that cross, I -- I do need assistance from members of the team, and so, obviously, we all know; cannot discuss ISH evidence at all, but I -- I would like the ability to -- to speak to witnesses regarding the CNRL cross. We -- we have a fair bit of work. I've -- I've got about a day of cross for CNL -- CNRL right now, and -- and we need to cut it down to three hours this evening, so -- and I -- I will need assistance with that.

THE CHAIR: Ms. Jamieson, you're lit up there.

MS. JAMIESON: Yeah. So I would just -- I'm concerned about that for sure because some of that cross, I think, was probably prepared beforehand, which Ms. Berg would have had the benefit of her client's

input at that time. I'm noting that tomorrow there is opportunity for ISH, it looks like. Like, once that ISH panel stands down, it looks like there's at least one break in the lunch break that Ms. Berg could speak with her clients and get some last-minute direction. But we're doing this on the fly as well, so I -- those would be my comments.

MS. BERG: So just to respond, I anticipate that we'll be spending much of the lunch break reviewing the 1.5-hour opening statement that CNRL is going to be -- is going to be putting in. So what I would propose -- because, literally, we have the whole team here with the back-room support, so what I would propose is that I at least be able to confer with people providing back-room support with regard to the -- the preparation of cross. And just, again, in response to the -- being in a similar position to CNRL, yeah, I -- we -- we are the night before cross, and -- and there is work to do, so ...

THE CHAIR: So I'm not going to make this call on my own. I'm going to ask Commissioner Zaitlin and Commissioner McKinnon to join me in our breakout room for a minute or two. We'll be right back.

So thank you for your patience. We've had a discussion, and the Panel's view is that Ms. Berg's second suggestion, that is, that she be permitted to

work with the support side of the ISH witness panel to pare down the cross-examination, is a reasonable compromise, so with the understanding on her part and the rest of the ISH witness panel that the main ISH witnesses will not be participating in that process.

MS. BERG: Yes. Thank you.

THE CHAIR: And if everybody's clear on that, then we will adjourn for the day.

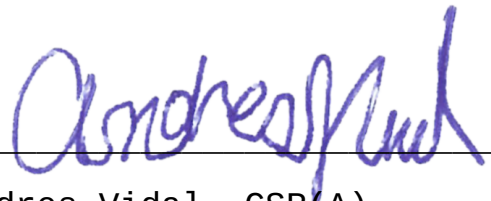
PROCEEDINGS ADJOURNED UNTIL 9:00 AM, OCTOBER 14, 2020

CERTIFICATE OF TRANSCRIPT:

We, Sarah Howden and Andres Vidal, certify that the foregoing pages are a complete and accurate transcript of the proceedings taken down by us in shorthand and transcribed from our shorthand notes to the best of our skill and ability.

Dated at the City of Calgary, Province of Alberta, this 13th day of October 2020.

Sarah Howden, CSR(A)
Official Court Reporter



Andres Vidal, CSR(A)
Official Court Reporter

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