JOINT REVIEW PANEL FOR THE ENBRIDGE NORTHERN GATEWAY PROJECT
COMMISSION D’EXAMEN CONJOINT DU PROJET ENBRIDGE NORTHERN GATEWAY

Hearing Order OH-4-2011
Ordonnance d’audience OH-4-2011

Northern Gateway Pipelines Inc.
Enbridge Northern Gateway Project
Application of 27 May 2010

Demande de Northern Gateway Pipelines Inc.
du 27 mai 2010 relative au projet
Enbridge Northern Gateway

VOLUME 87

Hearing held at
Audience tenue à

Columbus Community Centre
7201 Domano Blvd.
Prince George, British Columbia

October 11, 2012
Le 11 octobre 2012

International Reporting Inc.
Ottawa, Ontario
(613) 748-6043
This publication is the recorded verbatim transcript and, as such, is taped and transcribed in either of the official languages, depending on the languages spoken by the participant at the public hearing.
IN THE MATTER OF an application filed by the Northern Gateway Pipelines Limited Partnership for a Certificate of Public Convenience and Necessity pursuant to section 52 of the National Energy Board Act, for authorization to construct and operate the Enbridge Northern Gateway Project.

HEARING LOCATION/LIEU DE L'AUDIENCE

Hearing held in Prince George (British Columbia), Thursday, October 11, 2012
Audience tenue à Prince George (Colombie-Britannique), jeudi, le 11 octobre 2012

JOINT REVIEW PANEL/LA COMMISSION D’EXAMEN CONJOINT

S. Leggett Chairperson/Présidente
K. Bateman Member/Membre
H. Matthews Member/Membre
APPEARANCES/COMPARITIONS

APPLICANT/DEMANDEUR
Northern Gateway Pipelines Inc.
- Mr. Richard A. Neufeld, Q.C.
- Mr. Ken MacDonald
- Mr. Bernie Roth
- Ms. Laura Estep
- Ms. Kathleen Shannon
- Mr. Dennis Langen
- Mr. Douglas Crowther

INTERVENORS/INTERVENANTS
Alberta Federation of Labour
- Ms. Leanne Chahley

Alberta Lands Ltd.
- Mr. Darryl Carter

Alexander First Nation
- Ms. Caroline O’Driscoll

BC Nature and Nature Canada
- Mr. Chris Tollefson
- Mr. Mark Haddock

Doug Beckett

Province of British Columbia
- Ms. Elizabeth Graff
- Mr. Christopher R. Jones

Nathan Cullen

C.J. Peter Associates Engineering
- Mr. Chris Peter

Canadian Association of Petroleum Producers (CAPP)
- Mr. Keith Bergner
- Mr. Lewis L. Manning

Total E&P Canada Ltd.
- Mr. Don Davies

Coastal First Nations
- Ms. Brenda Gaertner

Council of the Haida Nation
- Ms. G.L. Terri-Lynn Williams-Davidson
INTERVENORS/INTERVENANTS
Daiya-Mattess Keyoh
- Mr. Kenny Sam

Douglas Channel Watch
- Mr. Murray Minchin
- Ms. Cheryl Brown
- Mr. Kelly Marsh
- Mr. Manny Arruda

Driftpile Cree Nation
- Mr. Amyn F. Lalji

Enoch Cree Nation, Ermineskin Cree Nation and Samson Cree Nation
- Mr. G. Rangi Jeerakathil
- Mr. Sean Fairhurst
- Mr. Brock Roe

ForestEthics Advocacy, Living Oceans Society and Raincoast Conservation Foundation - “The Coalition”
- Mr. Barry Robinson
- Mr. Tim Leadem, Q.C.
- Ms. Sasha Russell
- Ms. Karen Campbell

Fort St. James, District of
- Mr. Kevin Crook

Fort St. James Sustainability Group
- Mr. Lawrence Shute
- Ms. Brenda Gouglas
- Ms. Candace Kerr

Friends of Morice-Bulkley
- Ms. Dawn Remington

Gitxaala Nation
- Ms. Rosanne M. Kyle
- Mr. Robert Janes

Government of Alberta
- Mr. Ron Kruhlak

Government of Canada
- Mr. Kirk Lambrecht
APPEARANCES/COMPARUTIONS  
(Continued/Suite)  

(iii)

INTERVENORS/INTERVENANTS
Haisla Nation  
- Ms. Jennifer Griffith
- Ms. Hana Boye
- Mr. Jesse McCormick
- Mr. Allan Donovan

Kelly Izzard

Kitimat Valley Naturalists  
- Mr. Walter Thorne
- Mr. Dennis Horwood
- Ms. April MacLeod

MEG Energy Corp.  
- Mr. Loyola Keough
- Mr. David A. McGillivray

Northwest Institute of Bioregional Research  
- Ms. Patricia Moss

Office of the Wet'suwet'en  
- Mr. Mike Ridsdale

Swan River First Nation  
- Mr. Jay Nelson
- Ms. Dominique Nouvet

United Fishermen and Allied Workers' Union  
- Ms. Joy Thorkelson

Terry Vulcano

Josette Wier

National Energy Board/Office national de l’énergie  
- Mr. Andrew Hudson
- Ms. Carol Hales
- Ms. Rebecca Brown
- Mr. Asad Chaudhary
ERRATA

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Paragraph No.: 4720:
“…Alfaruq, Mr. Louis McIvers -- sorry, I have them backwards. Mr. McIvers is first…”
Should read:
“…Alfaruq, Mr. Louis McIver -- sorry, I have them backwards. Mr. McIver is first…”

4750:
“Mr. Callele, you were the Director of Pipeline…”
Should read:
“Mr. Callele, you are the Director of Pipeline…”

4841:
“…design for the bank of both feasibility study…”
Should read:
“…design for the Bankable Feasibility Study…”

4888:
"...a Master’s of Science and Sanitary Engineering and Mechanical Engineering from…”
Should read:
"... a Master of Science In Sanitary and Mechanical Engineering from…”

4808:
“…Mrs. Rathje and Mr. Malhortra filed…”
Should read:
“…Mrs. Rathje and Mr. Malhotra filed…”

4900:
“…today is Mr. Martin Gertsma who’s a…”
Should read:
“…today is Mr. Martin Geertsema who’s a…”

4933:
“…east into the plateaux, we have…”
Should read:
“…east into the plateaus, we have…”

4938:
“…moving beyond the feed phase of…”
Should read:
“…moving beyond the FEED phase of…”

4974:
“…saw the title correctly – their access environmental…”
Should read:
“…saw the title correctly – Axys Environmental…”

4988:
“…with APEGBC?”
Should read:
“…with APEGGA?”
ERRATA

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Paragraph No.: 4990
Should read: “…wouldn’t necessarily be APEGBC.”

5045: “…that I’d have no expertise on…”
Should read: “…that I have no expertise on…”

5097: “So we are between KP111 and KP1110…”
Should read: “So we are between KP1111 and KP1110…”

5221: “…the overall geotechnical report…”
Should read: “…the Overall Geotechnical Report…”

5228: “…framework that formed our hazard assessment…”
Should read: “…framework that formed a basis for our hazard assessment…”

5229: “And then, if we – also in that – of course, in that overall geotechnical report – and I don’t think we’ll both going to the reference…”
Should read: “And then, if we – also in that – of course, in the Overall Geotechnical Report – and I don’t think we’ll be going to the reference…”

5229: “…the quantitative geotechnical hazard assessment, which was filed as B75-2.”
Should read: “…the Quantitative Geotechnical Hazard Assessment, which was filed as B75-2.”

5233: “…overall geotechnical report but…”
Should read: “…Overall Geotechnical Report but…”

5257: “…terrain – on terrain surficial geology mapping actually…”
Should read: “…terrain – on terrain surficial geology mapping, actually…”

5264: “…question on glacier marine sediment…”
Should read: “questions on glaciomarine sediment…”
## ERRATA

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<td>5267:</td>
<td>“…of glaciomarine sediments…”</td>
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<td>5268:</td>
<td>“Certainly glaciomarine sediments…”</td>
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<tr>
<td>5269:</td>
<td>“…of glaciomarine clay…”</td>
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<td>5270:</td>
<td>“…of glaciomarine clay…”</td>
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<td>5295:</td>
<td>“…of glaciomarine sediment…”</td>
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<td>5297:</td>
<td>“…WG, is the glaciomarine clay mapping, the glaciomarine clay…”</td>
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<td>5298:</td>
<td>“…properties of the glaciomarine clay… say glaciomarine clay… deposited in a glaciomarine, that…”</td>
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<td>5300:</td>
<td>“So the glaciomarine clay…”</td>
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<td>5313:</td>
<td>“…a glaciomarine – a glaciomarine deposit.”</td>
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<td>5318:</td>
<td>“…properties of glaciomarine clay.”</td>
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<td>5319:</td>
<td>“interbeded glaciomarine deposits…”</td>
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<td>5324:</td>
<td>“…the glaciomarine clay…”</td>
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<td>5341:</td>
<td>“…Clague’s map – doesn’t use the word…”</td>
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<td>5341:</td>
<td>“But specific areas of clay are discussed and that, we speak in terms…”</td>
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<td>5342:</td>
<td>“…the glaciomarine clay.”</td>
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<td>5346:</td>
<td>“That was 45-1026.”</td>
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<td>5347:</td>
<td>“…the glaciomarine clay.”</td>
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<td>5349:</td>
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<td>5350:</td>
<td>“…certain glaciomarine clay…”</td>
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<td>5357:</td>
<td>“…I would further indicate that if you could at that – if that – at that clay…”</td>
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<td>5357:</td>
<td>“…avoid glaciomarine clay…”</td>
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<td>5358:</td>
<td>“…of glaciomarine clay…”</td>
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ERRATA

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Paragraph No.: Should read:
5364: “…in the quantitative hazard assessment…” “…in the Quantitative Hazard Assessment…”
5364: “…of glacial marine clay…” “…of glaciomarine clay…”
5403: “MR. DARRYL CARTER: …” “MR. DRUMMOND CAVERS: …”
5405: “MR. DARRYL CARTER: …” “MR. DRUMMOND CAVERS: …”
5452: “MR. DARRYL CARTER: …” “MR. SHANE KELLY: …”
5507: “…in a somewhat different area – a different way by saying…” “…in a somewhat different way – a different way by saying…”
5512: “…some of the underground work…” “…some of the background work…”
5511: “I might say as members of the government it’s…” “I might say to members of the government that it’s…”
5570: “…the copper and limonite creek valleys…” “the Copper and Limonite Creek valleys…”
5576: “…report, earthflows for example…” “…report, earthflows for example…”
5585: “…deep-seated or in the earth flows…” “…deep-seated slides or in the earthflows…”
## ERRATA

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<td>“…Limonite, Copper River, Skeena corridor…”</td>
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<tr>
<td>“…the Limenite, Copper River, Skeena corridor…”</td>
<td>“…Limonite, Copper River, Skeena corridor…”</td>
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<tr>
<td>5628:</td>
<td>“…and similarly with other things like deep-seated slides.”</td>
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<td>“…and similar with other things like deep-seated slides.”</td>
<td>“…and similarly with other things like deep-seated slides.”</td>
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<td>5631:</td>
<td>“…the Quantitative Hazard Report…”</td>
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<td>“…the quantitative hazard report…”</td>
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**Enbridge Northern Gateway Panel 2**

- Mr. Ray Doering
- Mr. Peter Acton
- Mr. Barry Callele
- Mr. Drummond Cavers
- Mr. Tom Fiddler
- Mr. Shane Kelly
- Mr. Clive MacKay
- Mr. James Mihell
- Mr. Peter Wong

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- Examination by Mr. Leadem                                                  | 7217                            |
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Transcript

Hearing Order OH-4-2011
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## RULINGS/DÉCISIONS

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Ruling of the Board on objection raised by Ms. Estep, on behalf of Northern Gateway, to questions from C.J. Peter Associates Engineering regarding material that was classified as confidential in this proceeding.
## UNDERTAKINGS/ENGAGEMENTS

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<td>U-31</td>
<td>For Mr. MacKay to prepare a better diagram depicting the area of the waste rock, where it will be deposited, as well as the area of the camp and staging area for the construction at the east portal of the Clore Tunnel.</td>
<td>7492</td>
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--- Upon commencing at 8:58 a.m./L’audience débute à 8h58

RAY DOERING: Resumed
PETER ACTON: Resumed
BARRY CALLELE: Resumed
DRUMMOND CAVERS: Resumed
TOM FIDDLER: Resumed
SHANE KELLY: Resumed
CLIVE MacKAY: Resumed
JAMES MIHELL: Resumed
PETER WONG: Resumed

6909. THE CHAIRPERSON: Good morning, everyone. I believe we’re ready to get underway.

6910. Mr. Beckett raised, as a preliminary matter on Tuesday, that he would like to be able to question a Panel outside of his work hours.

6911. Secretary and staff have been able to confirm that he wants to question this Panel and so we will be allowing him to question this Panel on Saturday morning when we sit this week. So I just wanted to make sure everybody was aware of that.

6912. Are there any other preliminary matters that parties would like to raise this morning?

6913. Ms. Brown…?

6914. MS. BROWN: Yes, good morning, Madam Chair, Members of the Panel. Rebecca Brown, counsel to the Joint Review Panel.

6915. Northwest Institute is not able to be in attendance today and have asked that we advise that, in relation to Ruling 115 of yesterday, that the institute wants to be moved to the end of the order of appearances so that it is last to question Northern Gateway’s Panel number one.

6916. THE CHAIRPERSON: Thank you, Ms. Brown.

6917. Seeing -- oh! Ms. Estep…?
6918. **MS. ESTEP:** Good morning, Madam Chair.

6919. I have a quick preliminary matter and then I understand that the witnesses have a couple of quick preliminary matters as well.

6920. So the matter that I would like to address, I’ve spoken with my friend, Mr. Leadem, counsel for the Coalition, and he was inquiring about Northern Gateway’s intentions for cross-examination of Dr. Zickfeld, one of the witnesses scheduled to appear for the Coalition later in Prince George here.

6921. And we’ve considered that matter and wanted to put on the record what our intentions would be in that regard.

6922. So Dr. Zickfeld has prepared a report entitled “Greenhouse Gas Emission and Climate Impacts of the Enbridge Northern Gateway Pipeline”. It has been marked as Exhibit D66-3-18.

6923. And as Northern Gateway previously noted in its cross-examination estimate letter which was B -- Exhibit B84 in respect to Mr. Mark Lee’s GHG evidence, this evidence is outside of the scope of the hearing and, therefore, we will not have any further questioning or any questioning for Dr. Zickfeld.

6924. **THE CHAIRPERSON:** Thank you, Ms. Estep.

6925. **MR. LEadem:** Good morning, Madam Chair, Leadem. T appearing as counsel for the Environmental Coalition.

6926. I just simply wanted to close the loop on whether or not Dr. Zickfeld would be required to come here for questioning and I thank my learned friend, Ms. Estep, for her advice.

6927. And I just simply want to put on the record that, obviously, there are other parties that may wish to cross-examine her. We haven’t heard from them but I am going to take the position that, given the lack of anyone else indicating that they wish to cross-examine her, I’m going to ask that she be excused from appearing in Prince George and that we will file her evidence by way of affidavit.

6928. **THE CHAIRPERSON:** Thank you, Mr. Leadem.

6929. Given that no other parties wish to cross-examine her, I can advise that
the Panel also has no questions of her and so filing her evidence by affidavit would be appropriate.

6930. Thank you.

6931. Ms. Shannon…?

6932. **MS. SHANNON:** I believe Mr. Callele and Mr. Mihell both have preliminary matters they’d like to address.

6933. **MR. BARRY CALLELE:** So there are some changes to what is on the record.

6934. I was looking at a multitude of different things in front of me so I got a little bit off topic on a couple of things.

6935. So, in paragraph 5786, the last sentence should be basically:

   "So at this point in time the best estimate of future performance given an assumed 1 percent accuracy of the ultrasonic flow metre”.

6936. Or:

   "...that’s the best estimate of future performance given an assumed 1 percent accuracy of the ultrasonic metres”.

6937. So it’s the last sentence on that paragraph and I can give the text of that to Madam Clerk later.

6938. As well, change 2 relates to 5952 and 5953 in the record.

6939. I think I went a little bit beyond. I was talking about foot patrols with respect to potential incident on the pipeline and what Operations might do in that instance, which could be fly the right-of-way or actually go out and walk the right-of-way.

6940. So, I’d like to correct the record and, basically, at the end of the 5952 say -- or 5952 would say:
Preliminary matters

“I think you also want to take a look at what we’ve committed to for Northern Gateway pipeline which also includes manning the pumping stations, dual leak detection systems, and increasing the inline inspection frequency”.

6941. The last change relates to paragraph 6241 and I’d like to -- again, I was looking at my spreadsheet. I had 1 percent and 2 percent sitting in front of me so I got a little bit off topic.

6942. It should read:

“So we estimated our 1 ½ to 3 percent based upon accuracy predominately of the flow metre instrumentation we used. The reason why there’s a range in that table is due to the variance and sensitivity of the volume balance segments, not in the variance of the metres”.

6943. And that concludes my revisions. Thank you.

6944. MR. JAMES MIHELL: And I have some changes as well to the transcript, starting with paragraph 6209, please.

6945. And in that paragraph, it says:

“And, in addition, these estimates here were not informed by the DTL geotechnical engineering”.

6946. It should have read instead of, “DTL”, it should’ve read, “detailed”.

6947. The next paragraph is paragraph 6210.

6948. A simple change here:

“The risk assessment the Mr. Bercha performed...”

6949. Should have read…

“The risk assessment that Mr. Bercha performed...”

6950. And the next correction is on paragraph 6676…”
“But it’s not clear, based on this information here, whether they’re talking about basic sediments in a water contents ...”.

6951. Should have read…

“... basic sediment and water contents ...”

6952. Paragraph 6749, there’s a couple of corrections and I’ll stop at each point.

“... And it’s the relative percentage, I think, here that’s important in terms of how those solids in water...”

6953. Instead of “in” it should say “and”. So:

“...how those solids and water will behave in the oil mixture to ensure that the sediments in water...”

6954. And again, it should be “and”. Apparently I need to enunciate more clearly here. And finally paragraph 6760, there’s a reference there to a 360-inch Line 4 and that should be 36-inch Line 4. And last little bit after line 4 says:

“I don’t think that your speculation is veering out in that pipeline.”

6955. I believe I said:

“I don’t believe that your speculation is proving out in that pipeline.”

6956. And that’s all the changes I have. Thanks.

6957. THE CHAIRPERSON: Thank you, Mr. Mihell.

6958. So as we get ready to resume the questioning from C.J. Peter Associates Engineering, at the conclusion of yesterday’s session, Ms. Estep, on behalf of Northern Gateway had raised an objection to questions from C.J. Peter Associates Engineering regarding material that was classified as confidential in this proceeding.
6959. The Panel notes that the ruling of the -- on the filing of this material as confidential was made after a process during which comments from parties were sought.

6960. Mr. Peter, the Panel will allow you to proceed with your questions provided that they don’t seek to elicit information that has been deemed by the Panel as confidential.

6961. So on that basis we invite you to continue your questions of this panel.

6962. MR. PETER: Thank you very much. Madam Chair.

6963. THE REGULATORY OFFICER: Sorry ---

6964. THE CHAIRPERSON: Sorry just -- we’ll get a ruling number on that.

6965. Thank you, Ms. Niro.

6966. THE REGULATORY OFFICER: Yes that would be Ruling 116

--- RULING NO./ DÉCISION No. 116:

Ruling of the Board on objection raised by Ms. Estep, on behalf of Northern Gateway, to questions from C.J. Peter Associates Engineering regarding material that was classified as confidential in this proceeding.

6967. THE CHAIRPERSON: Thank you.

6968. Mr. Peter, please continue.

6969. MR. PETER: Thank you very much, Madam Chair.

6970. The -- we have rewritten our questions to take the anticipated ruling into account. We’ve removed anything that seeks to elicit information that was redacted. But we will -- we will refer to it inferentially without trying to elicit what the numbers are. If that’s permissible.
6971. THE CHAIRPERSON: Let’s see where we go with that.

6972. MR. PETER: Thank you very much, Madam Chair.

6973. Madam Chair, I would like to introduce my colleague, Dr. Hugh Kerr who is advising me he’s a -- will be present here and I just wanted to introduce him to the Panel and we received permission to have him sit here and potentially advise me or even ask some of the questions if that’s all right.


--- EXAMINATION BY/INTERROGATOIRE PAR MR. PETER:
(Continued/Suite)

6975. MR. PETER: Just to recapitulate, Madam Clerk, if we could have Exhibit B64-9, Adobe page 3, please.

6976. In Adobe page 3 -- down towards the bottom -- is found the list of publications reference’’


6977. Now, the question is on which standard should we base our examination, the public reviewing the application of Enbridge pipe safety, should we base it on the redacted Enbridge pipe specification EES102 or should we base it on the examination of CSA Z245.1 steel pipe, on API 5L specification for line pipe or on ASME B31.3 process piping?

6978. MR. JAMES MIHELL: I’ve been involved in a lot of standards writing and I can tell you that this is a very common practice in standards writing to simply reference the publications -- just to list the publications that you’re referencing, up front, so that all the referenced publications are contained in one location.

6979. I’ve reviewed Enbridge’s pipe purchase specifications, and what I can say is that the -- the format in which the specification is written is one where it
adopts the base specification, in this case Z245.1, as a minimum standard, and then imposes additional requirements over and above that standard.

6980. So for instance, I could read from a -- a clause in their standard here that says:

“In case of discrepancies between this specification CSA...”

6981. Sorry, I’m going to start over.

“In case of discrepancies between this specification, CSA Z245.1-07, referenced publications, purchase orders or any other related documents the more stringent requirement shall apply unless otherwise agreed by the company.”

6982. So the philosophy behind this format of standard writing is that you adopt a base specification as a minimum, and that’s required by law as well. We have to maintain minimum standard when we build pipelines. In the case of manufacturing pipe to a base specification of Z245.1, the minimum requirements of Z245.1 always have to be met.

6983. **MR. PETER:** Following along on your comment, Mr. Mihell, we would like to refer to the aid to cross CSA standards additional, Adobe page 1, which is Table 5 from the very standard you just referred to.

6984. Thank you very much, Madam.

6985. Since Enbridge has filed its pipe specifications under a confidentiality order, now are we to believe that the maximum composition limit stated in this -- which is -- these are the composition limits for CSA Z245.1 for pipeline steel -- that the maximum composition limits will allow us to determine whether the pipe and welds will be safe i.e. will not leak, both in construction and during service?

6986. **MR. JAMES MIHELL:** What you see here is a minimum set of requirements as adopted by Z245.1. And I think you could even see from your redacted version of the pipe specification -- the Enbridge pipe specification, that there was a replacement table in here -- at this location and -- and again, with this particular format of specification you’re silent on any given clause unless there is a more stringent requirement that you want to impose.
In this case we could clearly see that there is a table of numbers present, implying that yes, there is going to be a more stringent set of figures to ensure, in part, weldability of the pipeline.

MR. PETER: Understood. But would you agree that, for instance, given the clause for -- the formula for carbon equivalent there, that different companies will use slightly different combinations of the different elements with individual ranges of each elements?

And would you also agree that possibly some of the companies will either have patented their compositions or kept them secret?

MR. JAMES MIHELL: So this particular carbon equivalent formula must stand as a minimum but in addition to that some research has been done to support the need to address other issues, such as the role of free nitrogen on weldability. And in that respect, you know, for instance, in addition to the requirements of this needing to be met there may be other carbon equivalent formulas that address the issue of weldability, using other formulas and considering other elements, such as nitrogen.

MR. PETER: Thank you.

But these companies who are bidding on providing steel for the Enbridge pipeline will have to reveal to you, since you will require compositional analysis as part of the materials test reports submitted to Enbridge in order to decide whether their compositions for each batch of steel from the different companies, for instance IPSCO might supply some, are acceptable. Is that correct?

MR. JAMES MIHELL: Yes. There’s -- it’s standard practice for both heat and product analysis to be reported by the steel manufacturer. And that heat and product analysis is reviewed against these limits that are stated here in Table 5 and the comparable limits that would be stated in the pipe purchase specification, including the carbon equivalent formulas.

MR. PETER: Does that mean though that your standard -- your table substituted for Table 5 in the ESS102 will have a range of compositions large enough to encompass the different steels from different companies, with each company possibly using a different range or a combination of elements.
MR. JAMES MIHELL: I was just conferencing just very briefly with my colleague partway through your question, I apologize for that. Could you please repeat your question?

MR. PETER: I'll roll the question together with the next one, which follows from it. Does that not mean that in fact, your standard, the table, will have a range of compositions large enough to encompass different steels from different companies with each company possibly using a different range and that therefore, your acceptable compositional range must be large enough to include all successful steels; is that right?

MR. JAMES MIHELL: Yes, with a caveat. There's typically prequalification of every manufacture, so typically, you would meet with a manufacturer. And I've been advised that was one of the things that I was learning here that that's Enbridge's practice to meet with manufacturers and engage with prequalification. And details of that nature are discussed during the prequalification.

MR. PETER: Then Mr. Mihell -- Mihell, sorry, does that not mean that in fact the pipe companies who keep the compositions of their own pipes secret but that the range of compositions which you deem acceptable has to be broad enough that if you reveal that range, it does not reveal the composition of any individual steel?

--- (A short pause/Courte pause)

MR. JAMES MIHELL: Sorry for the break, we were discussing amongst ourselves and the nature of the discussion is, quite honestly, we're trying to understand your question. So ---

MR. PETER: It hinges on the fact that if the acceptable composition range in Enbridge's substituted table for Table 5 in CSA Z245.1 uncovers many steels, does it make sense for Enbridge to keep it secret since it is the individual companies, not Enbridge, which each make their secret compositions of pipe?

MR. JAMES MIHELL: So I think I anticipate where you're coming from here. You're questioning why this is considered to be proprietary information specification. And my understanding, in discussion with Enbridge, is that they feel a whole lot of research and development and money, resources, has gone into the development of the standard as a whole.
7002. And so you're talking about one small element of the standard, but I believe they feel that the standard, per se, is considered to be a competitive advantage for them. They want to treat it as such, they certainly feel they've invested quite a bit of resources at this and would like to maintain that competitive advantage. That's -- I think quite simply, that's where they're coming from.

7003. **MR. PETER:** But would not the cost of that research be borne by the pipe companies and therefore Enbridge revealing the compositional limits is not something that is going to cause any -- or are you protecting the companies more by this proprietary standard than you are yourselves?

7004. **MS. ESTEP:** Madam Chair.

7005. **THE CHAIRPERSON:** Ms. Estep?

7006. **MS. ESTEP:** Thank you. Madam Chair, I think the witnesses have answered the question and so we object to continued repetition of the same question.

7007. **MR. PETER:** Madam Chair, we'll move on to the next question.

7008. **THE CHAIRPERSON:** Thank you, Mr. Peter.

7009. **MR. PETER:** Madam Clerk, if we could please display Exhibit B1-5, Adobe page 42. At the top of the page in the application, Volume 3, it states -- fourth paragraph, just before the second title there:

"The feasibility of using Grade 550 (X80) steel and associated reduced wall thickness for all, or a portion of, the oil pipeline will be evaluated during detailed engineering."

7010. Has that been superseded by subsequent filings?

7011. **MR. RAY DOERING:** Yes, that's correct. Northern Gateway is no longer considering the use of X80 grade steel for the oil or the condensate pipelines. And really, this is a follow-on to our provision of some of the design enhancements that you -- that were included in our reply evidence in July 20th.
And really, we made a commitment at that point to move to really a heavier wall pipe design as opposed to a higher strength steel design, necessarily. And that was really in an effort to address general concerns that we were hearing through the hearing process, oral statements, some of the oral evidence provided by the Aboriginal communities, just in general community sessions, just general community concern about the potential for a release into a sensitive environment.

You know, particularly we were thinking of tributaries to the Fraser and the Skeena and the Kitimat River, some of the important salmon rivers. And so we made a decision as a project at that point to move forward with an enhanced wall thickness design, which really then took away the need or the -- any reason to move to an X80 higher strength, thinner wall pipe design. So yes, that's correct.

MR. JAMES MIHELL: Perhaps I can add to Mr. Doering's comment. This is all part of Enbridge's commitment to performing a risk-based design. And a risk-based design is an iterative approach which is quite rigorous in nature.

It enables designers to be pre-informed during the design process of potential threats that might manifest themselves on a pipeline to identify the primary risk drivers, to develop risk mitigation methods and strategies to address those primary risk drivers, and then to go back through the design process after having implemented mitigations and re-evaluate risk.

And so we, in an iterative approach, eventually arrive at a design that is risk-optimized. And this is a very rigorous approach. You know, I'm in the business, I'm a partner and a risk-engineering firm, and we've been operating since 1996.

And what I can say is that we do a variety of risk assessments for a variety of purposes. This is the first time we've been retained to support a risk-based design to the extent and to the level of rigour that's being done here.

So in terms of effort, in terms of assiduousness and conscientiousness in their desire to try to be pre-informed of risk, to identify threats in advance and address those threats upfront, I think that speaks to what's going on here.

And so the iteration that we saw earlier on, just a few weeks ago, where we moved to a higher wall thickness, X80 wall thickness -- sorry, X80 pipe
with a higher wall thickness, was an outcome -- sorry, X70 pipe with a higher wall thickness was an outcome of that risk-based design process.

7020. **MR. PETER:** So, Mr. Mihell, that had nothing to do with the CSA requirement that for sour service grades higher than 483 are not within the scope of the standard?

7021. **MR. JAMES MIHELL:** No. Quite simply, the answer to that is no.

7022. **MR. PETER:** Okay. Then I will drop any further questions on sour service, thank you.

7023. **MR. JAMES MIHELL:** This is not a sour service pipeline.

7024. **MR. PETER:** We could engage in a debate on that with aids to cross-examination, but we'll refrain from doing so in the interests of time.

7025. Turning to toughness tests. Another aspect of the pipe specifications is toughness, which is the ability of the pipe to resist impact loads, such as being hit hard with a hammer or a backhoe without breaking in a brittle manner. Exhibit B64-9, Adobe page 10, if we could, please, have that? Thank you.

7026. Section 7.6 at the bottom states:

“Charpy V-Notch Impact Tests: Applicable”

7027. Does it not?

7028. **MR. JAMES MIHELL:** Yes. That’s correct. Clause 7.6 does say that.

7029. **MR. PETER:** And moving to Adobe page 12, Clause 8.4.2 indicates:

“Test Temperatures: Applicable”

7030. Is that correct?

7031. **MR. JAMES MIHELL:** Yes, that’s what Clause 8.4.2 does say.

7032. **MR. PETER:** Then below, in Sections 8.4.3, 4.4 and 4.5, do we not
find titles for all three sections which refer to either notch-toughness tests or notch-toughness requirements?

7033. Is that correct?

--- (A short pause/Courte pause)

7034. **MR. RAY DOERING:** Yes, it does indicate that it’s applicable here in this case for Category III pipe.

7035. **MR. PETER:** Thank you, Mr. Doering.

7036. Now, do you recall that, in Exhibit B1-5, Adobe page 41, and the update to Volume 3 which reiterates this with some minor changes, that the Table indicates i CSA Notch-Toughness category is Category I?

7037. Does it not?

7038. **MR. RAY DOERING:** Yes, that’s what that Table describes.

7039. **MR. PETER:** Thank you, Mr. Doering.

7040. Moving, Madam Clerk, please, to aid to cross CSA Z245.1 excerpts, Adobe page 1.

7041. The original Section 8.4.3 reads:

“8.4.3 Category I Pipe Notch-Toughness Requirements
Category I pipe has no requirements for proven notch-toughness”

7042. Do you agree that, in other words, Enbridge is stating in the Application that it will use Category I pipe which, according to CSA Z245.107 specification, does not require any proven notch-toughness requirements?

7043. **MR. JAMES MIHELL:** Perhaps this might be a good time to pull up a previous Information Request response that we provided to the JRP.

7044. It’s JRP IR 3.1(c) which I believe is B32-2.
Okay, so the challenge for me now is to find the Adobe page. I apologize. Oh, are you there? Okay.

So I guess what we’re looking at here is Item (c):

“The pipe Category specified shall be in accordance with the requirements listed in Table 5.1 of CSA Z662-07 and CSA Z662-11. When Category II pipe (pipe with proven notch toughness) is required or in situations where fracture initiation is of concern, the exact requirements will be determined during detailed engineering. The notch toughness requirements will be based on some high percentage (typically 90%) of the flow stress dependent criteria. This approach has been applied and accepted on other major pipeline projects. Preliminary calculations, utilizing the Battelle fracture initiation model, suggests that critical through-wall defect lengths would be in excess of 100 mm for all pipe thicknesses currently being considered. The preliminary calculations also indicate that a through-wall defect with a length of approximately 50 mm can be sustained with Charpy V-notch absorbed energy values of less than 10 Joules.”

So they’re talking about critical flaw lengths and a process by which minimum notch-toughness values could be determined for the purposes of fracture initiation control. Maybe at this point we’re heading into an area, that I’m sure, Mr. Peter, your colleague is well-versed in, of fracture control and it employs a science called “Fracture Mechanics” which can get pretty detailed. It leaves a lot of people in the dust sometimes.

And so, at this point, maybe I should just take a moment and explain the major issues of fracture control as they pertain to oil pipelines and as they pertain to gas pipelines. Two very different types of requirements.

Essentially, there are two primary issues to be addressed with fracture control. One is fracture propagation resistance. Fracture propagation is an interesting phenomenon and it occurs only in gas pipelines and it can occur where -- in a full bore rupture, what can happen is the fracture front can get out ahead of the gas decompression front resulting in long propagating fractures that can run for over a kilometre in some cases.
7050. And that has to -- in order for that to happen, you need to have the fracture velocity which is typically in ductal materials or, actually -- yeah, in brittle materials it can be as high as about 600 metres per second -- get out ahead of the gas decompression front so that, in a gas pipeline, the fracture front is only seeing the full-line pressure and that will drive the fracture front.

7051. In oil pipelines, the gas -- sorry, the product decompression wave -- the pressure decompression wave is maybe two to three times the velocity that of gas and so this phenomenon never occurs in oil pipelines.

7052. So you always have the decompression wave in oil pipelines outrunning, if you will, the fracture front. And you have instant decompression, instant unloading of the fracture front and, quite quickly, the fracture front runs out of gas. You never have fracture propagation issues in oil pipelines. It’s something that is unique to gas pipelines.

7053. One of the major distinctions between the Canadian and American pipeline codes for many years was the way the fracture control issues were addressed. And, to that end, in Canadian codes, we talk about Category I, Category II and Category III pipe.

7054. Category II pipe, in simple terms, is pipe that has proven notch-toughness and ductility to resist fracture propagation. And so you saw a reference earlier to the various categories of pipe: Category I, Category II and Category III.

7055. Category I pipe has no resistance, no proven notch-toughness requirements and, as a result, under CSA Z662, if you are operating an oil pipeline, you can use Category I pipe. Category I pipe, again, although it has no proven notch-toughness, it doesn’t need to resist fracture propagation events.

7056. And so, based on successful operating history of oil pipelines in the past, the CSA Code Committee sanctioned that Category I pipe would be adequate for low-vapour pressure pipeline such as oil pipelines.

7057. So that’s a little bit of background. A little bit of a historical basis and just putting things into context.

7058. What this clause here is saying is that, although it is acceptable under CSA Z662 to use Category I pipe for a low-vapour pressure pipeline such as oil pipelines, there will be some engineering to determine a minimum toughness
MR. PETER:  Thank you very much, Mr. Mihell.

Turning back to the aid to cross CSA Z245.1 excerpts, Adobe page 1, under section 842 it says:

"Test temperature 8.4.2.1 the applicable drop weight test -- tear tests and Charpy V impact tests required by clauses 8.4.4 and 8.4.5 shall be conducted at the test temperature specified in the purchase order, except as required by API RP 5L3 or allowed by clause 8.4.2.2." (As read)

Now, the redacted Enbridge spec, Exhibit 64-9, Adobe page 12 for the same section, the corresponding section 8.4.2, simply states the word, "Applicable"; does this mean that the Enbridge pipe specification requires that a certain absorbed energy is required at a specified test temperature?

--- (A short pause/Courte pause)

MR. RAY DOERING:  We'll just do a quick review here and provide that response.

--- (A short pause/Courte pause)

MR. JAMES MIHELL:  So just to explain, the way this specification works, once again, is that where no change to the existing specification is made, you adopt Z245.1 as a minimum requirement.  And in that case, the word applicable seems to be used here to indicate yeah, the original Z245.1 requirements are applicable.

In this case, Z245.1, Clause 8.4.3 entitled, "Category 1 Pipe Notch-toughness Requirements" simply says: “Category 1 pipe has no requirements for proven notch-toughness properties”.  So that's the basis of what we're discussing here.

And then if we were to look at the current Enbridge specifications it says on that, it's currently saying that Category 2 pipe may be used to replace Category 1 pipe when commercially suitable.
And I don't know that I would draw a lot of inference from that because I mean, by definition, Category 1 pipe doesn't have proven notch-toughness. And so, hard to change that definition that's entrenched in Z245.1.

MR. PETER: So the absence of any reference to Category 2 pipe in the Enbridge spec is not visible to us, but it actually occurs in there does it?

--- (A short pause/Courte pause)

MR. PETER: The 8.4.4 section has been completely redacted from the specification.

MS. ESTEP: Madam Chair, I think we covered this this morning in the ruling. My understanding of the ruling was that we were not going to pursue information that had been confidential. We are not going to try and elicit that information, I believe that's what Mr. Peter is now attempting to do. So we object.

MR. PETER: On the contrary, Madam Chair. We are referring to a clause in the CSA Z245.1 specification that has been completely removed from the Enbridge specification that concerns Category 2 pipe. Eight point four point four (8.4.4) is entirely absent from the Enbridge specification, if in fact the redacted portion under 8.4.3 is regarding 8.4 -- regarding Category 2 pipe.

We're not attempting to elicit anything, we're just wondering where the critical CSA clause regarding Category 2 pipe has gone in the Enbridge specification.

Perhaps I could elaborate on this by asking Madam Clerk to put up aid to cross CSA Z245 excerpt, Adobe page 1.

THE CHAIRPERSON: Mr. Peter, let's first deal with the objection.

Ms. Estep?

MS. ESTEP: I just want to be clear on what my objection is. If we're trying to understand what's under the black box, then I object.

THE CHAIRPERSON: And Mr. Peter, that was covered in our ruling this morning. And so it appears from the line of questioning that that is
what you're trying to do. If that's the case, we'd ask you to move on. If there's another aspect of this that isn't seeking to elicit that information that's in the redacted section ---

7077. MR. PETER: We are ---

7078. THE CHAIRPERSON: --- perhaps you could try reframing the question.

7079. MR. PETER: Yeah. Thank you, Madam Chair.

7080. We are not endeavouring to find out what is in the blackened box. As you see in the CSA standard, there is a large section here, section 8.4.4 -- if you could scroll down please, Madam Clerk -- and it covers a lot of very strict requirements for absorbed energy, fracture appearance, notch-toughness requirements for Category 2 pipe. This entire section is absent from the Enbridge specification. They jump directly from 8.4.3 to 8.4.5.

7081. If we could look at 8.4.4.2, for instance:

"Absorbed Energy: Based on full size test specimens for each Charpy V notch impact test shall be equal to or greater than 27 joules for pipe smaller than 457 millimetres outside diameter, which is not applicable to this pipeline; (b) 40 joules for pipe 457 millimetres outside diameter or larger, or (c) such higher value as specified in the purchase order." (As read)

7082. Also, at the top of page -- Adobe page 2, Clause 8.4.5, Category 3 pipe notch-toughness requirements it lists:

"8.4.5.2 Absorbed Energy: The absorbed energy based on a full size test specimen for each test shall be equal to or greater than 18 joules or such higher value as specified in the purchase order." (As read)

7083. Now going back to Exhibit B64-9, Adobe page 12 ---

7084. THE CHAIRPERSON: Mr. Peter, perhaps you could frame your question. I believe you did, initially, before you started reading out the standard. And perhaps you could frame that question for the panel and see if you can get a
response to the question.

7085. **MR. PETER:** The question is that the entire body of the copious and specific requirements of Clause 8.4.4 of the CSA Z245.1 standard have been redacted or are not even referred to in the Enbridge specification. And this refers to steel that has proven notch-toughness.

7086. Now, if as Mr. Mihell says, and as Mr. Doering says, they have revised their intent in designing the pipeline to using X70 steel with thicker wall, some of which may have proven notch toughness and be Category 2 pipe. Why does their specification make absolutely no reference to the specific requirements for Category 2 pipe? Is that ---

7087. **MR. JAMES MIHELL:** I think I can answer that without having to speak to what's under the black box, Mr. Peter.

7088. And perhaps there's some confusion about how this style of specification works. Basically, and simply put, unless stated otherwise, Z245.1, and the requirements thereof prevail. Otherwise, where we want to impose more restrictive requirements, we'll say so.

7089. However, in the absence of any comment, then the inference is that the minimum requirements of Z245.1 prevail. That's -- it's as simple as that. It doesn't mean that there is -- you know, you're deleting the definition of Category 2 pipe or somehow trying to countermand the minimum requirements of Z245.1. That's not possible. It simply means that by you're, by being silent, accepting the minimum requirements of Z245.1.

7090. In IR -- I guess, JRP IR 3.15(b), there has been some commitment to the use of Category II pipe and that would be established -- the need for use of Category II pipe would be established during detailed engineering.

7091. I might also point out, once again, that the whole need for Category II pipe was developed under the guise of the CSA Code system to address the issue of fracture propagation. Category II pipe requires not only minimum notch toughness but shear area appearance requirements that address the potential for long-distance brittle propagation events.

7092. Now, that doesn’t mean that Enbridge won’t be using Category II pipe. In fact, they have said under the Response to IR -- JRP IR 3.15(b) that -- yes,
Category II pipe would be considered.

7093.  **MR. PETER:** Thank you, Mr. Mihell.

7094.  However, when structuring Enbridge’s specification, if there is a clause in the CSA Z245 standard, or indeed any other standard, that wishes to be reiterated, it simply states the clause title and writes “Applicable” next to it.

7095.  It would probably reassure Canadians that -- who live in a cold climate where Category II pipe has some very important ramifications for toughness at low temperatures, to actually see that clause in the Enbridge standard somewhere because they can only infer that the absence of any reference to Category II pipe in the redacted Enbridge Pipe Specification means that no Category II pipe will be used in the proposed Gateway Pipeline and that no pipe will be required to have an absorbed energy value as high as 40 joules at any temperature.

7096.  **THE CHAIRPERSON:** Mr. Peter, you’ll have your opportunity to present final argument.

7097.  At this point, your opportunity is to test the evidence of the witnesses and so we’d ask you to move on to your next point, please.

7098.  **MR. PETER:** I would now, please, like to request, Madam Clerk, that the aid to cross labelled “CVN Schematics Adobe page 1” be displayed on the screen? Thank you.

7099.  Can we possibly see it a little bit smaller just to get the full picture? Thank you very much.

7100.  This is the core of the physics of the Charpy impact test and the toughness of pipe. My colleague here could elaborate on it at much greater detail, but we’re not allowed to present evidence, so I’ll restrict myself to questions.

7101.  Would you agree that for one of the toughness tests often specified for steels -- the so-called Charpy V-notch toughness test which determines the amount of energy absorbed by a material during fracture -- that the measured toughness begins to decrease below a certain temperature in steels which are likely to be used in the Gateway pipeline?

7102.  **MR. JAMES MIHELL:** Yes, that’s a common characteristic of
steels.

MR. PETER: And would you agree that, above a certain temperature -- again, using the Charpy V-notch CVN toughness test -- the measured toughness in steel such as those to be used in the pipeline is fairly constant?

MR. JAMES MIHELL: Well, that’s not always the case.

There are some circumstances with modern pipeline steels where you run into a phenomenon of rising upper shelf and that’s associated with splitting behaviour that can be associated with -- mostly with full specimen -- full-thickness specimens but can also manifest itself on Charpy specimens.

That’s something that was noticed, I think, during the fracture propagation research during the 70s and 80s. And now with the drive to some of the higher-strength steels and the things that the steel manufacturers have to do to achieve those performances, we’re seeing it introduced again with this rising upper-shelf behaviour.

But, notwithstanding, there is an upper shelf and a lower shelf in a transition temperature, roughly speaking.

MR. PETER: And we understand that, for different pipe materials and for welds in a given material and for the region just beside the weld known as the “the heat affected zone”, the upper shelf can vary for these different materials?

MR. JAMES MIHELL: Yes, the heat -- sorry, the material properties in the heat-affected zone can be highly variable.

It depends -- on a large case, exactly which microstructure you might be putting your notch in, and that microstructure can vary greatly in the heat-affected zone.

MR. PETER: Would you also agree that the temperature below which the toughness begins to drop is not the same for all steels which might be supplied for the pipeline?

MR. JAMES MIHELL: Well, you would have to determine that using a transition test where you test a variety of temperatures.
Typically, when you’re talking about Category II pipe or Category III pipe, you’re testing at a specified temperature which is designated as the minimum design temperature.

MR. PETER: And might different potential suppliers supply steels with different toughness properties?

MR. JAMES MIHELL: Yeah, although, you know, these days what we’ve migrated to is a class of steel that, although each manufacturer has different ways of getting there, essentially what we’re dealing with here is going to be a fine-grained microalloyed steel that uses controlled rolling practices and that’s necessitated by the conflicting requirements that are imposed on the material by the demands of pipeline construction.

On the one hand, you have to achieve a fairly high-yield strength; in this case 70,000 psi or 483 megapascals. On the other hand, you need to be able to weld it and the welding can be very challenging. You are welding out of position. As you can imagine, you’re welding in a flat position, in a vertical position, in an overhead position, sometimes using cellulosic electrodes for which there is potential for hydrogen ingress and, sometimes, in Arctic and cold temperatures.

And so it puts large demands on material performance and, as a result, more or less universally, pipe manufacturers -- I shouldn’t say “more or less”, I should say “universally” -- pipe manufacturers have migrated to what’s called “high-strength low-alloy” or HSLA steel designs that use microalloying elements such as niobium and vanadium to achieve very fine-grain, very high-strength, while being able to use very low carbon contents.

And one of the outcomes of this strategy is that you tend to achieve extremely high toughness levels universally, whether you request them or not. If you’re asking for X70 steels, these days, you’re going to get HSLA steels with very high toughness levels.

MR. PETER: Would you agree that the graph of energy versus temperature, as shown here for two different steels, is like a step irrespective of whether there are variations in the upper and lower-shelf strengths and in the variations inside the weld metals, the filler metals, heat-affected zones, that there’s a general -- there is a general graph that shows the step -- a step from the lower-shelf energy to the upper-shelf energy with the transition occurring
gradually over a temperature range?

7120. **MR. JAMES MIHELL:** Yes.

7121. **MR. PETER:** And would you also agree that the temperature range over which the Charpy V-notch toughness drops -- i.e. from the upper shelf to the lower shelf -- can be a different range for different steels which might be supplied for the pipeline?

7122. **MR. JAMES MIHELL:** Yes, that’s true.

7123. **MR. PETER:** And would the values of both the lower-shelf energy and the upper-shelf energy being different from different steels or even for the same steel in the heat-affected zone as compared to the base metal, would those differ as well?

7124. **MR. JAMES MIHELL:** I’m sorry, could you repeat the last question?

7125. **MR. PETER:** Well, it’s simply we are reiterating what had already been agreed upon; was that within the actual weld itself there could be varying -- there could be varying values for this transition zone?

7126. **MR. JAMES MIHELL:** Yes, weld metal and heat-affected zone properties will be different from base metal properties.

7127. **MR. PETER:** So would you agree that the energy required to break a specimen of a specific shape at a given temperature, which is the so-called full-sized specimen of the Charpy V-notch toughness test, which is referred to in almost all of the relevant standards, that this energy is affected by many microstructural factors?

7128. **MR. JAMES MIHELL:** Yes.

7129. **MR. PETER:** Thank you.

7130. Madam Clerk, could we now display on the screen the aid to cross, labelled “PHMSA Special Conditions Keystone XL”, Adobe page 3?

7131. The U.S. Department of Transportation Pipeline Hazardous Material
Safety Administration, PHMSA, which is the equivalent regulatory agency to the National Energy Board here in Canada, sent a recommendation to the U.S. State Department, and if I may please read this into the record.

7132. Final PHMSA Recommendations for Keystone XL State Department Presidential Permit Document Version February the 10th, 2011:

"The Pipeline and Hazardous Material Safety Administration [...] recommends that the U.S. [State] Department of State impose the following conditions if a Presidential Permit will be granted to TransCanada Keystone Pipeline [...] to construct and operate the Keystone XL Pipeline. Specifically, the State Department should require Keystone to include all of the following in its written design, construction, and operating and maintenance plans and procedures:

Steel properties: The skelp/plate must be micro-alloyed, fine grain, fully killed steel with calcium treatment and continuous casting.

2) Manufacturing Standards: Pipe must be manufactured according to American Petroleum Institute Specification 5L, Specification for Line Pipe (API 5L 44th Edition), product specification level 2 (PSL 2), supplementary requirements [...] for maximum operating pressures and minimum operating temperatures. Pipe carbon equivalents must be at or below 0.23% based on the material chemistry parameter, carbon equivalent [...] Formula [...] or 0.4% based on the C-IIW formula..."

7133. Now, this recommendation by PHMSA references, of course, American Petroleum Institute Spec 5L, which I am unable to obtain as an aid to cross, but product specification level PSL 2, Section 6.9, gives various toughness energy level requirements which depend on the pipe diameter and the strength of the pipe.

7134. For the diameter of the proposed Gateway Pipeline, 914 millimetres, both possible grades being suggested in the Gateway proposal, i.e. X70, or as the Americans referred to it, L485, in API 5L nomenclature, or X80, which is again referred to as L550 in API 5L, the toughness requirements are: CVN Charpy V-
notch, 40 joules in the pipe material, and 27 joules in each of the weld and heat affected zone at zero degrees Celsius or lower.

Therefore, would you agree that the recommendations of the U.S. PHMSA is to include specific toughness requirements in all of the pipeline use in the Keystone XL?

MR. JAMES MIHELL: It appears that way. Now, it becomes a little bit complicated here, because we're dealing with an American specification using different terminologies to characterize toughness requirements. And in the API 5L world, when they talk about PSL 2s, that stands for Pipe Specification Level 2, it imposes a variety of additional requirements upon the pipe manufacturer.

One of the possible additional requirements might be increased toughness levels. They provide a means by which those toughness levels can be calculated, and the calculation is based on an empirical curve fit to what's called the Batel 2 Curve Model.

The Batel 2 Curve Model is used in gas pipelines to determine when fracture propagation events might occur, and it establishes a minimum toughness level to prevent fracture propagation. And so comparably in the CSA code, we have Category 2 pipe that addresses similar issues. Again, these are fracture propagation events for which we are only talking about gas pipelines.

So it begs the question why might a regulator impose minimum toughness requirements on an oil pipeline. I can only speculate that perhaps Keystone was wanting to hydrostatically test with air, perhaps, and if that's the case, obviously, you don't want the potential for a fracture propagation event to occur while you're testing at high pressures with air.

And so in spite of the fact that Keystone -- and I'm speculating, but in spite of the fact that Keystone is obviously an oil pipeline, you have to speculate as to why you might need toughness requirements on an oil pipeline that are comparable to Category 2 pipe, and that's one of the reasons. I don't know, there may have been other motivations for the regulator to require toughness on the pipe.

MR. PETER: May it not be argued that this has nothing to do with air testing the pipe, but that this has something to do with weather, and would not
you admit, or concede, that the proposed Gateway Pipeline will traverse territory more hazardous, more extreme and variable in weather than the proposed Keystone XL Pipeline will encounter?

7142. MR. DRUMMOND CAVERS: We are suggesting a design temperature of minus five because this is a buried pipeline. We are dealing with temperatures which really don't vary substantially in that condition, very standard fluid temperatures within that and very standard temperatures sort of in the environment of the buried pipeline.

7143. MR. JAMES MIHELL: And I would just add a caveat, that, you know, obviously we are aware that there are aerial crossings and other aboveground portions, minor portions that are above ground, and as was indicated in the IR response, the JRP IR response, IR 3.15, yes, Category 2 pipe would be considered where required.

7144. So the detailed engineering will address those sorts of issues. You cannot put -- you have to address the potential for cold weather where there's potential -- by code -- for the temperatures to be below a certain threshold value. And, you know, I can assure you this pipeline will be constructed and designed to code. There's just no way around it.

7145. MR. PETER: A question for Mr. Fiddler. From your experience, when the pipe material, if it happens to be Category 2, is sitting out during construction, are there not occasions when it could be subject to temperatures at less than minus five during construction, and moreover, it could be subjected to all kinds of mechanical shocks while it is being fabricated, moved, realigned and placed in the trench at temperatures of less than minus five?

7146. MR. TOM FIDDLER: I'm not sure that I totally understand your question, but I'll take a shot at it here.

7147. Our experience is that there's no detrimental effect on the steel material itself. We certainly introduce and apply specific cold weather welding procedures, relative to the joining of the pipe but relative to the handling of the pipe, we impose some weather restrictions around bending. But again, it's fairly extreme and I can't quote offhand what that temperature restriction is, but it is extreme cold weather before we restrict the bending activities as well.

7148. MR. PETER: Thank you.
Returning to the question of the PHMSA 57 special conditions on Keystone XL, was Enbridge aware of the PHMSA recommendations to the State Department?

Mr. Ray Doering: Yes, we've seen these conditions.

Mr. Peter: And if yes, when did Enbridge know about them?

Mr. Ray Doering: Probably not long after they were made public. It's been -- I would say -- at least a year.

Mr. Peter: Were you perhaps hoping that no one in Canada would notice in that you had included Category 1 pipe as the primary material for the Enbridge Northern Gateway pipeline?

Mr. Ray Doering: Category 1 is the appropriate design toughness for this particular pipeline.

Mr. Peter: But there is a difference between the two standards, and that is not generally known to the public in Canada; that one pipeline is requiring proving -- proven notch-toughness and the other one is not. Were you hoping that no one in Canada would know the differences between the two standards?

Ms. Estep: Madam Chair, I think that's argumentative and I object on that basis.

The Chairperson: Mr. Peter, as you know from the workshops you've attended, your position here is to ask the questions to test the evidence, it isn't to argue with the witnesses.

You will be able to formulate your positions in final argument that you take based on the evidence that's on the record. So we would ask you to refrain from engaging in argument with the witnesses.

Mr. Peter: Thank you, Madam Chair.

Did Enbridge believe that the PHMSA recommendation was somehow excessive and if so, why?
MR. JAMES MIHELL: This is a special condition that's been imposed on another pipeline, we aren't privy to the special circumstances.

I've speculated, despite the fact that I don't know, that perhaps the need to have pipe that resists fracture propagation in an oil pipeline where that cannot physically happen might be due to the fact that Keystone has chosen to perform an error test. That's quite possibly the circumstance. And that would drive any operator to need to use Category 2 pipe to prevent fracture propagation.

But I'm here to tell you that fracture propagation, the need to guard against fracture propagation, has never occurred in an oil pipeline, the physics disallow it.

MR. PETER: Madam Clerk, if we could please look at Exhibit B32-4. Thank you.

Zooming in here, do you agree that originally, the -- this table shows the segments of the pipe and the wall thicknesses in the original application -- do you agree that originally here, Northern Gateway showed nine different wall thicknesses for its oil pipeline? The wall thicknesses ---

MR. RAY DOERING: Yeah, I believe that is correct for the original design that was proposed. That's correct.

And perhaps one of your hydraulics people would confirm that these wall thicknesses were required for pressure containment of the maximum operating pressure in that segment of pipe at a design factor of 0.8, as specified by CSA's Z662; is that correct?

That is correct. The original wall thicknesses were determined based on a design factor of 0.8.

So in Exhibit B109-29, filed on September the 14th, do you agree that Northern Gateway here is now showing only two separate thicker wall thicknesses for its oil pipeline, in keeping with its reply evidence promise to increase the pipe wall thickness?

MR. RAY DOERING: Yes, that's what we show in this revised table.
7171. **MR. PETER:** And these new wall thicknesses correspond to design factors of .72 and .80 respectively, in the CSA Z662 formula for maximum oil pipeline operating pressure of 2,430 psi; is that correct?

--- (A short pause/Courte pause)

7172. **MR. RAY DOERING:** Yes, the wall thicknesses determined in this table were on -- calculated on the basis of a design factor of .72.

7173. **MR. PETER:** Thank you. Are you also aware that in compliance with the 57 special conditions, all segments of the Keystone XL are being designed for its maximum operating pressure of 1,308 psi gage using a design factor of 0.72, and the only wall thicknesses change for the 36-inch pipe will be for using lower design factors at directionally drilled and road and rail crossings?

7174. **MR. RAY DOERING:** I would agree that they would have different design factors for certain crossings; that would also apply to Northern Gateway for design factors for railroad crossings and so on.

7175. We use two design maximum operating pressures here. And really, the difference being that Northern Gateway has fairly substantial elevation changes associated with the profile of the pipeline. Whereas I can only assume that the Keystone XL probably does not and that's why they use a single maximum operating pressure.

7176. **MR. PETER:** But was Northern Gateway aware of Keystone XL going to a single pressure, single wall thickness design in response to PHMSA's 57 special conditions?

7177. **MR. RAY DOERING:** I guess I would just repeat my last comment. I -- for Northern Gateway, we are looking at two different design maximum operating pressures based on the need to address elevation differences. Again, I can only assume that they are dealing with a pipeline profile that's relatively flat.

7178. **MR. PETER:** So your two different maximum operating pressures will be met in all segments of the pipeline, i.e. this is a complete revision from the original hydraulic design which had each segment only designed for its own maximum operating pressure. Is that correct?
MR. RAY DOERING: I will just seek a comment here.

--- (A short pause/Courte pause)

MR. RAY DOERING: Yeah, I just confirmed that, really, the design we initially proposed and the design we're currently proposing, each section is designed to a unique, individual maximum operating pressure. And of course, just due to the nature of the hydraulic profile and the elevation profile, you know, that -- it's not possible to exceed the maximum operating pressure in a subsequent section based on the hydraulics associated with that section.

MR. PETER: But seeing that Enbridge has suddenly moved to a single wall thickness or a dual wall thickness throughout the entire length of the oil pipeline, was -- were they influenced in any way by Keystone XL's decision to have a single wall thickness for its pipeline?

MR. RAY DOERING: Mr. Peter, I was just wondering if you could repeat that question, I just missed the tail end of that.

MR. PETER: So was Northern Gateway aware of Keystone XL going to a single pressure, single wall thickness design in response to the PHMSA's 56 special conditions? And if so, did this have any influence on Northern Gateway’s revised wall thickness for the oil pipeline?

MR. JAMES MIHELL: I’d believe we were aware that Keystone XL has a single-wall thickness design. I’m not sure if that’s in -- they may have been the design prior to the PHMSA condition; I couldn’t really speak to that.

We have moved to a two-wall thickness design, really, again, to address some of the issues that I described earlier which was generally a commitment by the project to move to heavier wall pipe, to address and mitigate some of the potential risks on pipelines, to make that pipeline safer and to address some of the concerns of citizens of the -- to reduce the potential of a rupture on that pipeline in environmentally sensitive areas.

So we’ve really moved to a two-wall thickness design pipeline for that reason, not for any reason that might have been stipulated by PHMSA.

MR. PETER: Well, in light of the fact that there is reason to speculate that, if Keystone had tried to use Category I and PHMSA said ‘No’ and
they changed to Category II pipe and Keystone also went to a single-wall thickness which Enbridge appears to be moving in the direction of doing as well based on containing the maximum operating pressure on all segments of the pipeline rather than just containing the individual segments for the maximum operating pressure for that hydraulic segment of the pipe, why would Enbridge not be willing to follow Keystone’s XL lead -- Keystone XL’s lead also and use Category II pipe for its Northern Gateway project?

7188. **MS. ESTEP:** Madam Chair, I think Mr. Doering has explained a couple of times now the difference between the two pipeline systems and why Northern Gateway has decided to do what it -- what -- you know, design its project the way it is being designed.

7189. So I don’t know that there’s anything more that’s going to be gained from asking the question again.

7190. **MR. PETER:** We’re merely alluding to the fact that it appears that there has been some influence by the PHMSA special conditions on Northern Gateway in one aspect of the pipeline design and that has been largely due to public pressure and various different other things that you alluded to that made the design coming from the reply evidence modify the pipe wall thickness.

7191. **MS. ESTEP:** And again, I think that question has been asked and answered.

--- (A short pause/Courte pause)

7193. **THE CHAIRPERSON:** We’d like to hear the answer to the last question that you asked.

7194. So that was the -- your last final statement that you asked there: Are they -- I think you said: Is Northern Gateway -- Would Northern Gateway consider using Category II pipe through all its pipeline?

7195. **MR. PETER:** Yes, that is the question that is being asked.

7196. **THE CHAIRPERSON:** So let’s have the answer to that question.
MR. PETER: And we have not heard the answer to that.

THE CHAIRPERSON: Let’s hear to the answer to that question, please, from this witness panel.

MR. RAY DOERING: So perhaps I’ll go again to Exhibit B32-2, Adobe page 51, which was the Northern Gateway response to JRP IR 3.15 (a) and (b). Again, I’ll focus on (b).

We have indicated that we will --

“…Category II pipe will be considered [...] during detailed engineering...”

Essentially where necessary. There are some examples given there.

I think we’ve heard from Jim Mihell all the reasons why Category I is appropriate for the design and he may want to add a few words to my comments here but I think we really responded to your question already in the response to this JRP IR.

MR. JAMES MIHELL: And I’ll just add to that.

And I hear your question, Mr. Peter. You’re concerned that Northern Gateway was driven to go to a thicker wall X80 design out of -- sorry, did I say “X80”? -- X70 out of some concern over what was happening on the Keystone pipeline.

And I’d like to reiterate what’s driven the movement towards the thicker wall and that is the risk-based design process and this is something, I think, that we’re all very proud of.

This is a very rigorous design process that is not normally undertaken by pipeline proponents. It seeks to be informed of the threats and the nature of those threats during an iterative design process.

It first establishes the risk profile of a base design, identifies the high points of risk, identifies the risk drivers, if you will, the things that are causing the risk to be higher.
And in this iterative process, Northern Gateway established that there was significant risk mitigation benefits to be achieved in moving to a thicker wall design. That is the motivation behind going to a thicker wall, it’s part of the risk-based design process.

MR. PETER: Thank you very much, Mr. Mihell and Mr. Doering.

I have no further questions, Madam Chair.

THE CHAIRPERSON: Thank you, Mr. Peter.

This is a good time to take a break then. We’ll come back at 20 to 11.

We learned last night that Driftpile Cree Nation will not have questions of this Panel, nor will they be participating in the Prince George hearings. So we will call the Coalition next to begin their questions of this Panel.

--- Upon recessing at 10:24 a.m./L’audience est suspendue à 10h24
--- Upon resuming at 10:42 a.m./L’audience est reprise à 10h42

THE CHAIRPERSON: Thank you very much.

Good morning, Mr. Leadem.

MR. LEADEM: Good morning, Madam Chair. Good morning, Mr. Bateman, Mr. Matthews. It’s good to be back again, appearing before you. I think you’ll see a lot more of me in the days to come until we finish in Prince Rupert. I’m very pleased to be here, to ask questions of this Panel.

RAY DOERING: Resumed
PETER ACTON: Resumed
BARRY CALLELE: Resumed
DRUMMOND CAVERS: Resumed
TOM FIDDLER: Resumed
SHANE KELLY: Resumed
CLIVE MacKAY: Resumed
JAMES MIHELL: Resumed
PETER WONG: Resumed
--- EXAMINATION BY/INTERROGATOIRE PAR MR. LEADEM:

7217. **MR. LEADEM:** Good morning, witness panel. My name is Tim Leadem. I am a lawyer with EcoJustice and I have the privilege of representing three environmental groups who have filed as intervenors in these proceedings. They are ForestEthics Advocacy, the Raincoast Foundation and Living Oceans.

7218. I find that some of my questions have already been asked of some of you, so I won’t trench upon ground that’s already been covered but, for the benefit the Joint Review Panel and for the witness panel, I will intend to canvas the following issues with you.

7219. I will, firstly, start off with water course crossings and probe some questions into what kinds of water course crossings the Proponent is proposing for this particular project.

7220. From there, I intend to cover off some ground with respect to the supervisory control and data acquisition program that has been designed for the program.

7221. And finally, with some degree of trepidation, I may decide to ask questions on the semi-quantitative risk assessment that you performed, Mr. Mihell, as well as some other members of the Panel.

7222. So with respect to water crossings -- and I think that most of my questions may, in fact, be addressed to you, Mr. Cavers, my understanding is that, after a number of assessments, that the Proponent decided that roughly 80 -- and I think exactly -- 83 water crossings of the 700 or so actual water crossings along the entire route of the project would be done by trenchless crossing methods.

7223. Is that fair to say?

7224. **MR. RAY DOERING:** And perhaps, I’ll respond, counsel.

7225. **MR. LEADEM:** Yes, certainly Mr. Doering.

7226. **MR. RAY DOERING:** And Drum Cavers will likely be the one to respond to most of the technical elements but the 83 what we called “individual review sites” ---
MR. LEADEM: Yes.

MR. RAY DOERING: --- were sites that we felt required further, more deeper analysis in terms of crossing methodology, environmental sensitivities and so on.

And actually, not all of those are proposed as trenchless crossings. I believe in our initial filing of May, 2010 we had identified 33 trenchless crossings and we’ve since added to that and perhaps my colleagues can correct me with the number now, but it’s another four or five, I believe, that we’ve added to that since the initial filing.

MR. LEADEM: All right, in order to assist, I have in my files and result of my analysis determined that there will be HDD crossing, or Horizontal Directional Drilling crossings at 10 sites; is that right?

That’s what’s being proposed at this preliminary stage?

--- (A short pause/Courte pause)

MR. RAY DOERING: Yeah, we were just confirming the number.

There were 10 HDDs proposed in the initial filing and, subsequently, we have advised the JRP of one additional directional drill that we’re proposing for Chist Creek.

So that would bring it currently to 11 sites.

MR. LEADEM: And then, as I understand it, aerial crossings are being proposed -- at least at this preliminary stage -- with respect to four crossings.

Is that right as well?

--- (A short pause/Courte pause)

MR. RAY DOERING: Mr. Cavers is just checking but, yes, I do believe four is the correct number.
MR. LEADEM: And if we’re sticking now with trenchless methods as opposed to open-cut or trench methodology, then it’s my understanding that there will be bore crossings contemplated for approximately, or exactly, 19 of the watercourse crossings.

--- (A short pause/Courte pause)

MR. LEADEM: I apologize for making you scramble and do your work so early.

--- (A short pause/Courte pause)

MR. DRUMMOND CAVERS: Yes, that corresponds with my tabulation.

MR. LEADEM: Thank you, Mr. Cavers.

So I take it then from those responses that the vast bulk of stream crossings that the Proponent intends to cross with its dual pipelines will fall outside the ambit of being trenchless crossings and will, in fact, involve open-cut or some trench methodology in order to proceed through the stream; is that correct?

--- (A short pause/Courte pause)

MR. DRUMMOND CAVERS: Yes, in terms of -- if we’re just looking at numbers, that’s correct. A large number of the crossings are relatively small as well.

MR. LEADEM: My understanding, if I can just refer back to HDD crossings -- and I’ve read your CV with much interest, Mr. Cavers, because you mentioned in your CV -- and we can go to it if you need to refer to it -- that you had participated personally in over 1,000 designs involving horizontal directional drilling.

Is that correct?

MR. DRUMMOND CAVERS: No, I think it says 1,000 crossing evaluated.
Those didn’t all necessarily proceed to full designs. In some cases, we find that the proposed directional drilling isn’t feasible and so we don’t go to a full design.

**MR. LEADEM:** Right.

And I think you also indicated in your CV that roughly 20 percent of the actual investigations that you did proceeded to a full construction.

Is that fair to say?

**MR. DRUMMOND CAVERS:** That’s fair to say, but it’s not a number that can be taken forward to any other kind of a ratio, to apply to any other suite of streams. It’s just what happened in those particular circumstances.

And I understand that each one of these must be approached on a case-by-case basis rather than derive any generalities.

Is that right?

**MR. DRUMMOND CAVERS:** Yes, the directional drilling feasibility at a crossing is very dependent on the local conditions.

**MR. LEADEM:** My understanding is that HDD drilling or Horizontal Directional Drilling crossings are usually undertaken to minimize adverse environmental effects at watercourse crossings; is that fair?

**MR. DRUMMOND CAVERS:** There’s a number of reasons why we may consider directional drilling; certainly, environmental issues are one.

Construction issues may be another one and geohazard mitigation is a major one. There’s a number of reasons why we might consider directional drilling.

**MR. LEADEM:** The mere choice that you select HDD as a methodology does not necessarily guarantee or preclude that all adverse environmental effects will be prevented; does it?
MR. DRUMMOND CAVERS: You’d have to categorize what you mean by “environmental effects”.

There is, of course, a panel that does deal with the environmental effects.

MR. LEADEM: Yes, and I’m going to certainly deal with that panel with respect to environmental effects.

But you’re familiar, are you not, Mr. Cavers, as a result of your vast experience with HDD, that sometimes there can be inadvertent returns of drilling fluids into the aquatic, terrestrial or environment?

MR. DRUMMOND CAVERS: There can be.

It’s a situation that is minimized by appropriate design, but not completely eliminated.

MR. LEADEM: And there can also be disturbance of soils, vegetation, wildlife arising from construction of drill sites, the exit areas, access roads, temporary vehicle crossings, or the HDD activity itself.

Isn’t that fair?

MR. DRUMMOND CAVERS: Any construction process by its very nature has some disturbance to the terrain and that’s a disturbance that, ultimately, we mitigate and also reclaim.

MR. LEADEM: And you would agree with me, would you not, as a result of your expertise in this area that it’s important before you actually start drilling in conjunction with an HDD that you do proper site investigation and explore the area thoroughly?

MR. DRUMMOND CAVERS: Are you meaning a geotechnical site investigation or something else?

MR. LEADEM: Meaning, since I’m speaking to your expertise, the geotechnical aspect of it.

MR. DRUMMOND CAVERS: Yes, the geotechnical investigations
prior to drilling are important.

7273. **MR. LEADEM:** As well -- and I’m going to turn to Mr. Doering now -- it’s important to also investigate what effects could happen on the terrestrial or aquatic environment as a result of HDD.

7274. Is that not fair to say?

7275. **MR. RAY DOERING:** That would be part of the assessment, yes.

7276. **MR. LEADEM:** And I’ll ask these specific questions with respect to the ESA Panel that’s coming along, I think, two panels down from this one.

7277. Now, in terms of the actual proposals for HDD, I want to stay with that for a moment and just try to see if I can drill down -- excuse the pun -- into some of the issues that might surface and you might want to refer to, actually, some of the work that’s already been done.

7278. I understand that there were two studies done with respect to all the HDD sites. One is entitled “A Preliminary HDD Feasibility Assessment”, and one is “A Preliminary Geotechnical HDD Feasibility Assessment”.

7279. And with respect to the latter one, was it your firm, Mr. Cavers, that participated in the preliminary geotechnical HDD feasibility assessment?

7280. **MR. DRUMMOND CAVERS:** Yes, we participated in the preliminary geotechnical assessments for the crossing where reports have been filed.

7281. **MR. LEADEM:** Now, with respect to the preliminary HDD feasibility assessment, Mr. Doering, was -- is there anyone on this Panel that can answer questions or will those kinds of questions have to be deferred until the ESA Panel sits?

7282. **MR. RAY DOERING:** I’m sorry, is there anybody on this Panel that can address questions with respect to?

7283. **MR. LEADEM:** The feasibility assessment itself.

7284. There were two assessments that were done with respect to each HDD
site and Mr. Cavers has indicated that his firm was responsible for the preliminary geotechnical HDD feasibility assessment.

7285. I’m familiar with the fact that preliminary HDD feasibility assessments have also been filed and so my question is: Are you competent to answer questions if I should have them with respect to the preliminary HDD feasibility assessments?

7286. **MR. RAY DOERING:** Yes, this would be the right panel for that.

7287. **MR. LEADEM:** Thank you.

7288. So I want to focus by way of example upon Hunter Creek. Hunter Creek has been proposed by Enbridge as undergoing HDD crossing and the references if you need to refer to them are B7-6 and B7-18. I think the latter one, Mr. Cavers, is your assessment.

7289. Now, when I looked at all of the information contained in that -- those preliminary assessments one of the items I examined specifically was duration -- How long would it take for these kinds of HDD’s to be actually done? -- and the estimate of time for Hunter Creek was 4.5 months for the oil pipeline and 3.5 months for the condensate pipeline.

7290. So my first question is: Is it contemplated at this stage that the two pipelines would actually be dealt with at the same time or would they follow one upon the other?

7291. I see Mr. Fiddler may have a response there.

7292. **MR. TOM FIDDLER:** Yeah, I’ll respond to that.

7293. At this point in time, we haven’t developed execution plans for each of those HDD crossings to that level of detail. Conceptually, they could be independent rigs. They certainly will have different arcs based on the size of pipe. So different lengths, if you will, of drill. And the size of equipment could conceptually be different as well.

7294. So they could be coinciding or overlapping in terms of process. Or they could be sequential.
MR. LEADEM: At this stage, we’re not sure if it’s going to take -- if we stay with the example of Hunter Creek -- eight months projected or 4.5 months to complete?

That’s what you’re telling the Panel at this stage?

MR. TOM FIDDLER: At this stage, I have to say that.

Having said that, I’m not aware of and hadn’t participated in the estimates of those timelines. So I’m not sure what the assumptions are and can’t speak to that. They certainly seem conservative, off-hand, but can’t speak to the details.

MR. LEADEM: I take it from your answer, Mr. Fiddler, that we haven’t reached the stage where you can derive a critical path towards the construction of this particular project.

Is that fair to say?

--- (A short pause/Courte pause)

MR. TOM FIDDLER: Could you just repeat the question?

I’m not sure whether you meant critical path for the project or the logistics for construction.

MR. LEADEM: I mean the critical path for the logistics of the construction. And I thank you for the qualification.

I am familiar enough with construction cases having done a few to know that, ordinarily, construction or a contractor takes a look at the project that has to be built and then determines a pathway of timing in order to make sure that the actual project can be built within that timeframe.

Do I have you so far?

MR. TOM FIDDLER: Yes, I’m with you so far.

MR. LEADEM: And that after a while, it’s important to designate, primarily at the outset of this process, what would be the sticky points, what
would be the critical points at which construction might hang up, or might there be delays encountered, in order to address those kinds of issues first and get them off -- out of the way, so to speak.

7308. Are you familiar enough with that concept in terms of construction -- approaching construction logistics?

7309. **MR. TOM FIDDLER:** You bet.

7310. **MR. LEADEM:** All right.

7311. So if I were to suggest to you that, when I look at this project from a construction perspective, I would say that the critical path would be probably delineated by the tunnels -- the two tunnels that you are proposing -- as well as the HDD crossings.

7312. Is that fair?

7313. **MR. TOM FIDDLER:** I wouldn’t characterize the HDDs that way.

7314. And I guess, just to back up, I want to be clear that, as owner of the project, we in fact would define the critical path schedule and deliverables from the contractor community. We wouldn’t be passive and be awaiting their definition of the deliverables.

7315. And, you know, it’s always subject to field conditions and some potential negotiation as work proceeds. But the actual breakdown of the work, the contracting of the work, the logistics in that regard will be defined by ourselves.

7316. **MR. LEADEM:** Have you actually set out and mapped out a pathway for the construction of this project?

7317. **MR. RAY DOERING:** Yes, we have.

7318. We have a -- maybe I’ll define it as a preliminary schedule associated with the preliminary engineering. There are certainly a number of critical habitat windows that need to be worked around to identify the least-risk periods for some of these activities.
But we are looking at a construction phase. We’re estimating about 3.5 years and I think that’s been described in schedules that we’ve filed.

Perhaps I could say the critical path items -- and you did identify one of them -- would be the developing and preparing to undertake the boring of the tunnels from the Clore Valley over the Hoult Valley. That is certainly a critical path item: Developing the infrastructure and then undertaking the work.

The other critical path activity that we would see would be developing and preparing the terminal site, in fact. Preparing that site for construction of facilities.

We believe that the pipeline construction related activities, such as the directional drills, can certainly fall within that three and a half-year time period that we’ve defined and the critical path would be related to those other activities I mentioned.

MR. LEADEM: I want to come back now to Hunter Creek which started us off on this digression.

And the material that was filed by the Proponent said that the alternate method for the HDD crossing, which was the primary method that’s being proposed for Hunter Creek, was an isolated crossing.

And I understood you to say, Mr. Cavers, in response to some questions yesterday from I think it was Douglas Channel Watch that you are now considering micro-tunnelling.

Do I have that right?

MR. DRUMMOND CAVERS: That’s correct.

MR. LEADEM: Have you been involved in micro-tunnelling in any of your other projects?

MR. DRUMMOND CAVERS: I’ve been involved in micro-tunnel assessments.

There have not been a large number of micro-tunnels done yet in North America so I haven’t -- we haven’t -- I haven’t actually had personally a
But I’m certainly familiar with the issues as are a number of my 
colleagues here on the Panel.

MR. LEADEM: So, at this stage, is it fair to say that the preliminary 
design is that there will be an HDD at Hunter Creek but, if that fails or if that 
does not prove out, that Enbridge intends to rely upon micro-tunnelling as the alternate 
technique?

MR. DRUMMOND CAVERS: At this point, we are partway 
through the process but there is a process that needs to play out in terms of the 
geotechnical evaluation of the conditions, the feasibility of different methods. 
And this is outlined in B35-2, page 45, in our response where we discuss the 
preliminary feasibility. This is JRP IR Number 4, page 45, B35-2.

We discussed it before in the information requests, that we have a 
process here that we need to go through to determine feasibility and to determine 
the best crossing method for Hunter Creek.

MR. LEADEM: I can't help but get the sense from some of the 
answers that this panel has given that very much what's going on here is a work in 
progress that you're -- you put together a proposal and there's a lot of preliminary 
evidence and preliminary design but with respect to the actual pipeline, where it 
will go, what it will look like, how it will cross certain streams, that it's very much 
we don't really know at this stage. Is that fair?

MR. RAY DOERING: This is -- we are following a very regimented 
process. We have filed a preliminary design with the Joint Review Panel for 
review. We've supplemented that design and information on the basis of 
information requests and requests for additional information. This is a fairly 
typical approach on projects such as these.

This process, in fact, will help inform further design matters as we 
move into the detailed design phase. So we have provided the preliminary 
feasibility assessments, but we've made it very clear that there is further work and 
further process that needs to be undertaken to finalize those crossing 
methodologies, in this case.

And I think Mr. Cavers probably could add a little bit to that response.
7339. **MR. DRUMMOND CAVERS:** Yes. And I think you've alluded this -- to this earlier, that we are partway through our geotechnical investigations. We will be doing more investigations at Hunter Creek to better define the conditions, to better define the method and to assess the feasibility of the various ways of crossing Hunter Creek to provide a safe and -- a safe and properly engineered crossing that is not going to be a problem over the life of the pipeline.

7340. **MR. LEADEM:** Let me focus on another example and see if we can pursue this a little bit further. If we can take the example of the Morice River, and Mr. Cavers, I think it was your geotechnical assessment which is B7-19, your preliminary geotech assessment. Mr. Doering, the preliminary assessment per se is B7-7.

7341. And the Morice River has, as an alternate methodology being proposed, alternative trenchless methodology. I'm not sure exactly what that would be, that might be a bore, that might be aerial crossing, I'm not sure what is contemplated but if you can advise me at this stage what is exactly is being contemplated, I would be most grateful.

--- (A short pause/Courte pause)

7342. **MR. RAY DOERING:** I'm just going to bring up a reference here to some material that we've recently filed. The reference is B101, and we will go to -- I guess it's a single page, B101-4, I'm sorry.

7343. **THE CHAIRPERSON:** Was that B101, Mr. Doering?

7344. **MR. RAY DOERING:** I'm just going to bring it up here again. I'm just trying -- it's actually not B101-4, I'm just trying to find the correct map here.

7345. **MR. DRUMMOND CAVERS:** The reference would be B101-6. Mr. Doering had referenced to one of the earlier maps in the series. But the actual Morice crossing is shown on 101-6.

7346. **MR. RAY DOERING:** Correct, B101-6.

7347. And what we've described in this response is further work that's being undertaken in regard to routing in the area of the Morice River.
7348. We've identified -- based on feedback we're receiving, have received from DFO and from other consultation activities about concerns, about potentially having a pipeline immediately adjacent to the Morice River, we have proposed here a revision to the route in this area.

7349. And this is -- we have filed the information here associated with the environmental assessment of this alternative route. This actual incorporation of this modification of the route in this area, it's a fairly substantial modification, is going to be included in what we call route revision V which is -- will be filed imminently, but highlighted already here with this information.

7350. And really, just wanted to make sure we're starting from the right point, that we have identified what we believe is, in this case, an improved crossing location for an HDD of the Morice River.

7351. And I believe Mr. Cavers can add to that. And he will also then discuss the alternative crossing methodology at that location.

7352. **MR. DRUMMOND CAVERS:** I wonder if you could just restate the last part of your question -- they key part of your question, Mr. Leadem?

7353. **MR. LEADEM:** Certainly. I think what I'm driving at -- and I apologize, Madam Chair, because in my review of the material I missed this particular reference to an update. I find that there's a lot of material and I don't always catch everything, so my apologies for missing this particular piece.

7354. What I'm focused upon, Mr. Cavers, is just -- I want to drill down in terms of trying to understand this process. Because what concerns me and my clients is mainly to what extent there's continual changes to the design, continual changes to the route and at some point, I'm trying to understand what exactly will be built.

7355. And now I'm told that there's going to be a route revision V, so that means that there's a different route that will be built than the one that we've all been focused upon, which is U. Let me get that answer first before I move on to another question. So, Mr. Doering, do I have that evidence right that there is now a route revision V that's being contemplated?

7356. **MR. RAY DOERING:** Yes. I'll bring up the reference. We have identified the anticipated changes going from Route U to Route V. And I'll
provide the reference here for you in just a moment.

7357. So B101-2, Adobe page 46 is the indication?

7358. **MR. LEADEM:** Right, that concerns the Morice River specifically; is that right?

7359. **MR. RAY DOERING:** Yes, that’s correct.

7360. This one is indicating the modifications for the Morice River. I’m going to also give you a reference to some other additional modifications that are anticipated for Route V.

--- (A short pause/Courte pause)

7361. **MR. LEADEM:** While we’re doing that -- because I really don’t need the answer to that, I understand the desire of the Proponent to be as thorough and exhaustive as possible -- but I want to come back to the Morice River example.

7362. And if you are now defining that -- you’re still defining an HDD crossing at that particular site, as I understand it.

7363. Is that right?

7364. **MR. DRUMMOND CAVERS:** That’s our expectation for the primary method; that’s correct.

7365. **MR. LEADEM:** Right.

7366. And what would be the secondary method or contingent method?

--- (A short pause/Courte pause)

7367. **MR. DRUMMOND CAVERS:** The alternative method that we’ve filed for the Morice River is other trenchless.

7368. **MR. LEADEM:** Right.

7369. And do you have any projected timeframe for when that might
conducted; not in terms of duration but time of year?

7370. **MR. DRUMMOND CAVERS:** One of the advantages, in general, of other trenchless methods and trenchless methods in general -- but this depends on a variety of site factors -- is that, to a significant extent, we can be independent of the time of year.

7371. **MR. LEADEM:** Now, I understand that with respect to 11 HDD crossings that are being contemplated that we’re at the stage where we’re projecting that they occur but, in fact, not necessarily all of them will proceed as HDD crossings.

7372. Is that fair to say?

7373. **MR. DRUMMOND CAVERS:** That’s the starting point for our evaluations and we will -- as we’ve stated already, we need to do more investigations to confirm the feasibility of those crossings as HDDs.

7374. **MR. LEADEM:** So if were to fast-forward and try to discern as-built, we could actually see a pipeline that may have 11 HDD crossings, may have no HDD crossings, potentially may have more than 11.

7375. We don’t know at this stage; isn’t that right?

7376. **MR. DRUMMOND CAVERS:** I can’t speculate on what the final numbers are going to be. We’ve outlined the process by which we evaluate these things.

7377. **MR. LEADEM:** With respect to the trench crossings, I’m going to turn back to you again, Mr. Doering.

7378. It’s fair to say that, in terms of the construction, that you’re alive to the issues of making sure that those proceed on a seasonal basis as opposed to just simply going in and digging a trench across the stream and putting your pipeline?

7379. **MR. RAY DOERING:** Yes.

7380. Typically -- just as a reminder, the vast majority of the watercourses that we are going to be crossing as Northern Gateway -- and I believe the current number is 777 watercourse crossings with defined bed and banks -- the vast
majority of those are very small watercourses that may, in fact, be dry or frozen at
the time of construction -- very small watercourses.

But we have certainly identified a number where we are anticipating
using methods such as -- not trenched in wet conditions but trenched in dry
conditions, that is isolated crossing methods and we’ve identified the appropriate
season for those crossings to address the fishery sensitivity, environmental
sensitivities, associated with those crossings.

**MR. LEADEM:** Yes.

And with respect to the actual fishery values, that’s an issue that I can
take up with the ESA Panel.

**MR. RAY DOERING:** That’s right.

These seasons would have been identified in cooperation with the
Environment Panel; correct.

**MR. LEADEM:** Now, generally speaking, if I’m going to go back
now to you, Mr. Cavers, with respect to HDD, but -- and this is a generalization
so I expect you to take it with that qualification.

But, generally speaking, failures of HDD are usually encountered
when, as you’re progressing through the drilling, you get coarse-textured,
granular materials that are encountered such as gravels and boulders, things of
that nature.

They can give rise to problems; is that right?

**MR. DRUMMOND CAVERS:** Yes, but I would point out that we
do extensive investigations first so that we try and avoid drilling through
problematic granular materials and we try and avoid a failure due to granular --
encountering granular materials during drilling.

Not all granular materials are problematic. Some may be, and we try
and rule those out before we start drilling.
7392. It is as -- I would disagree with your generalization to the extent that there are a number of different things we look at in terms of the feasibility of drilling and unfavourable granular materials is one of the considerations that we would look at.

7393. **MR. LEADEM:** My understanding is that with respect to HDD that you need a water source in order to get the -- make up the water supply that you need for drilling fluid.

7394. Is that right?

7395. **MR. DRUMMOND CAVERS:** Yes, water is required in the drilling process with some exceptions of very short -- industry now calls them “directional bores” but, generally speaking, we need water, yes.

7396. **MR. LEADEM:** Right.

7397. And as an aside -- and this piques my actual curiosity more than anything else -- but I came across some reference that for some reason HDDs do generally not exceed 2,000 metres in length.

7398. Is that right?

7399. **MR. DRUMMOND CAVERS:** That’s an older reference.

7400. There are HDDs now that have exceeded 2,000 metres but, generally speaking, these are smaller diameters than what we’re considering here.

7401. But the industry is -- with a variety of technologies, is getting to the point where it can consider drilling longer than 2,000. For this project, we have generally tried to keep our directional drills less than about 1,900 metres long.

7402. **MR. LEADEM:** And can you tell me, just to satisfy my own personal curiosity, why you can’t drill past 2,000 metres?

7403. **MR. DRUMMOND CAVERS:** Well, as I say, we can and there have been crossings longer, but it relates to pipe stress, pipe friction during pull in, the capability of the rig, directional control, increased risk.

7404. There’s a number of different issues that start to get more difficult as
the length goes up, and most directional drills, it's certainly to fair to say, in the world to date, have been less than 2,000, but the record is significantly greater.

7405. **MR. LEADEM:** All right, thank you for that.

7406. I came across a term also in my review in reading of a term called "frack out", where you actually encounter a fracture in the rock and there can be then a leakage, either upwards or in some fashion, of the drilling material or the drilling fluid. Is that -- are you familiar with that term?

7407. **MR. DRUMMOND CAVERS:** Yes I am. But it doesn't actually typically mean that you have encountered a fracture. What it -- it's short for hydraulic fracture and -- but the industry uses it in a wider sense in terms of fluid leakage.

7408. What hydraulic fracture is if the fluids -- the fluid pressure in the borehole exceeds the local ground stress you can propagate a fracture to the ground surface, and that's the hydraulic fracture. It's used even in a broader sense; it can include encountering an open fracture to surface, it could include encountering gravel for a leakage.

7409. So it's -- the term has become more general in terms of a mud leakage, but originally what it meant was hydraulic fracture, and that indeed is the principal means by which these things occur.

7410. I might add that with proper planning we have very, very greatly reduced the occurrence of hydraulic fracture relative to what was occurring in the early days of directional drilling.

7411. **MR. LEADEM:** I want to move from HDDs to the actual two tunnels, and I might have to shift over to you, Mr. Mackay, if you're the one responsible for the questions on the tunnels.

7412. And I'm going pull up a -- or ask the clerk to pull up a couple of photographs, and ask you a series of questions around those photographs, Mr. Mackay.

7413. Madam Clerk, could we please have D, as in David, 66-3-14?

7414. The focus here, Mr. Mackay, will be on the Clore River, the east portal
for the Clore Tunnel. That was D66-3-14, there should be a series of photographs. Thank you. I can start with that one, that's fine. I'm not sure if that's actually the one. If we can go back maybe -- I'm sorry, I didn't realize they were under Adobe. I think -- that's it. Thank you.

7415. This is a photograph that was provided to one of my clients by the Office of the Wet'suwet'en and it purports to show the tunnel east portal at the Clore River site. Are you able, Mr. Mackay, from your knowledge of that site, to confirm that that is the approximate location of where the Clore Tunnel east portal would be located?

7416. **MR. CLIVE MACKAY:** Yes, that is the approximate location.

7417. **MR. LEADEM:** And in the foreground, do I take it that that depicts the Clore River itself?

7418. **MR. CLIVE MACKAY:** Yes.

7419. **MR. LEADEM:** All right. Could we go to the next photograph then, please, and for the record, I think that should be D66-3-15, the next one that we will be examining.

7420. Now, this is an aerial shot, once again also provided to one of my clients by the Office of the Wet'suwet'en, and on the left-hand side you will see a yellow dot depicting the approximate location of the tunnel, the Clore Tunnel, and at the bottom of the frame, waste rock dump, and there's an outline in red.

7421. To your knowledge, Mr. Mackay, is that the approximate location of waste rock that will come from the tunnel, where it will be deposited?

7422. **MR. CLIVE MACKAY:** It is not.

7423. **MR. LEADEM:** And where would that waste rock be deposited?

7424. **MR. CLIVE MACKAY:** It is -- the depiction, if I could call for…

--- (A short pause/Courte pause)

7425. **MR. CLIVE MACKAY:** I apologize for the delay. We're just referencing a figure that's been filed.
7426. So if we could bring up Adobe document -- or Document B1-2, Adobe page 27. Now, if you scroll to the very right-hand side of that figure.

7427. And I apologize that this is not at the same scale as shown on the photograph, but if you were to superimpose the waste -- proposed waste area, the working area, and the camp area on that photograph, you would see that the area that's occupied is considerably smaller than what's shown on the photograph. You would also see that it is a considerable distance away from both the Bernie and the Clore Rivers.

7428. **MR. LEADEM:** So if I have your evidence correct, what we're looking at here in this diagram shows the Clore Tunnel depicted as a series of red dots, and I see Tunnel Portal on the right-hand side. I see an area in grey and I'm going to ask you in a moment, because I can't see the legend -- if we can go to the left, please, Madam Clerk, we can see the legend, I think.

7429. My eyes aren't as good as they used to be. I can't make out what it says. Could you inform me what that says, Mr. Mackay, as to the grey area? "Excess Cut Disposal Area"?

7430. **MR. CLIVE MACKAY:** That's correct.

7431. **MR. LEADEM:** All right, so that's where the waste rock would go, is that fair to say?

7432. **MR. CLIVE MACKAY:** That is.

7433. **MR. LEADEM:** And so what you're telling me is that when you superimpose that diagram that you've now pulled up on the screen, onto the photograph that I showed you, that they're not coincidental.

7434. **MR. CLIVE MACKAY:** No, they're not and, if it would help the Panel, we can certainly provide a better quality map that would show that and I think you would see that it occupies a considerably smaller area and also is a significant distance away from the rivers, respecting the riparian habitat areas.

7435. **MR. LEADEM:** Now, my understanding from some of the information request answers that we've received -- and the reference would be B47-4 response to, I believe, it's 2.9 request from the Coalition.
My understanding is that, at that particular site of the east portal of the Clore Tunnel entrance, that there will be a bridge crossing.

Is that right?

MR. CLIVE MacKAY: The -- there will be a temporary bridge required for construction.

It’s not exactly at that -- it’s not exactly on the proposed pipeline alignment. The bridge crossing is actually several hundred metres as we’ve considered it upstream at a narrower crossing of the Clore.

MR. LEADEM: How would that tunnel actually be constructed? Is it by a tunnel boring machine?

What’s the methodology that is being contemplated by the Proponent at this stage?

MR. CLIVE MacKAY: The -- at this stage, we are keeping two construction options open and that’s because we have not done the detailed engineering and it’s common at this stage for large tunnels to keep your options open until you are at that level of engineering.

So, the tunnels would either be bored or constructed with drill and blast techniques.

MR. LEADEM: Now, I’m aware that there have been some testing done of the actual rock in the area of the tunnels for potential acid generating rock and acid rock drainage.

And I think it was your firm, Mr. Cavers, that did that testing. I think it was AMEC who did the testing.

MR. DRUMMOND CAVERS: That’s correct.

MR. LEADEM: And that was -- 119 samples were done. I’ll just let you consult with Mr. Doering first before I ask.

MR. DRUMMOND CAVERS: You go ahead.
MR. LEADEM: That was a testing sample that was done of 119 samples and the reference was B47-5, I think, if you want to refer the actual document.

And when that sampling was done and analyzed by a laboratory, it came back at less than 5 percent potential for acid generating; is that right?

MR. DRUMMOND CAVERS: Yes, just to clarify, those were samples that were taken from the boreholes that were drilled for investigation and I’ll just check the numbers.

It was -- there was 119 samples tested and less than 5 percent of the samples were indicative of possible acid generating conditions.

This is the attachment to EcoJustice IR 2.9 B47-5. Adobe page 12 summarizes the test results in the conclusion of that report.

MR. LEADEM: Right, and that’s -- that’s what I referring to.

And are you able to tell me of those 119 samples, the bore samples, where -- were they taken over a wide area of the potential tunnels?

Was it both Clore and Hoult tunnels?

And if so, where, generally speaking, were those field samples taken -- the bore field samples taken?

MR. DRUMMOND CAVERS: The samples were taken during the logging of the different core holes and the samples were specifically selected as ones that had visible pyrite in them because we have found that during the acid rock drainage studies, the ARD studies that we’ve undertaken, that -- which are summarized in the two reports that have been filed, that the -- that pyrite was an indicator of potential ARD.

So, those weren’t samples that were selected on the basis of location, they were selected on the basis of being the most likely samples to exhibit ARD behaviour.

And those samples, in the report that you’re referring to, are from the
boreholes. There were additional samples from the surface that are discussed in the other filed reports.

MR. LEADEM: In terms of what we may expect to encounter, I guess what you’re saying to me is that you suspect that, based upon the samples so far, the evidence that you have is convincing you, at least at this stage, that you will not encounter PAG or potentially acid generating rock.

Is that what you’re telling me?

MR. DRUMMOND CAVERS: That’s correct.

ARD generating rock looks to be -- if it is present in generally small quantities, it’s not pervasive and I think the other thing to remember is that the samples that were tested were fist sized samples.

They were the most likely samples that we could find to generate ARD. If fact, when one is mixing this very small volume of rock with these hairline little veinlets of pyrite into a large rock mass, it may well be during the actual excavation of the rock that there is -- that the mixing of these very small volumes means that these potentially generating areas don’t have any effect.

MR. LEADEM: All right.

Supposing we’re wrong on that -- and I don’t know how far I can take you in terms of speculation but I think we should look ahead -- and that we do encounter potentially acid generating rock as we're drilling and -- or boring this tunnel, Mr. McKay, have anyone -- have you given some thought as to what you would do with that ARD, where you will deposit it and how it will be dealt with?

--- (A short pause/Courte pause)

MR. MacKAY: So I could refer to document B1-15, Adobe page 125.

So the process for identification of potentially acid generating rock, metal leaching rock, during construction has been laid out in this document.

I think for -- and just to outline in simple terms, during the construction of the tunnels, the rock that is removed from the tunnels will be
visually assessed for visible pyrite and then there will be an on-site lab for testing so that can be undertaken and progressed without delay and, certainly, any material that’s identified as having visible pyrites will be segregated until such time that that material is known whether or not it has the potential to generate -- it’s potentially acid generating.

7471. In terms of the -- now, could you repeat your second part of your question, please?

7472. **MR. LEADEM:** Oh, I think you’re answering it.

7473. You’re telling me how you’re going to deal with it which is the second part of my question and so I’ve gotten the answer that I was looking for so I thank you for that.

7474. **MR. CLIVE MacKAY:** Okay. Thank you.

7475. **MR. LEADEM:** Could I pull up one more photograph? Let’s see if we can get some evidence on this one. It’s D66-3-16. I think it was the first photograph that you -- right.

7476. So this also appears to be a photograph depicting the general area of the east portal for the Clore Tunnel. We may have some quarrel with respect to the extent of the waste rock area. There’s also a depiction there of camp and staging area.

7477. Is that roughly where that will be located, Mr. MacKay?

7478. **MR. CLIVE MacKAY:** I have the same comment for the camp and staging area.

7479. What we proposed are rectangular areas -- and go back to my previous comment -- they’re considerably smaller than the area that is shown on here and we can certainly provide a better drawing than the drawing that we had -- or map that we had previously referred to but there actually -- given the distance that’s covered -- and in both of those areas that are -- it is -- so I guess I would say that I don’t agree with the depiction of either the camp and staging area or the waste area.

7480. **MR. LEADEM:** And your quarrel with the depiction is the size but
not the relative location.

7481. Is that fair to say?

7482. **MR. CLIVE MacKAY:** Really both because the -- this shows the areas going right down to the river and, certainly, the -- perhaps I would go back to two things -- and we could go back to the ---

7483. **MR. LEADEM:** Well, let me see if I can help you out, Mr. MacKay, because several times you indicated that you would be happy to provide a better diagram or a better location and, if it would be helpful to the Panel to receive this evidence, then I’m prepared to ask the witness to go ahead and prepare that better diagram depicting the area of the waste rock, where it will be deposited, as well as the area of the camp and staging area for the construction at the east portal of the Clore Tunnel.

7484. **MR. CLIVE MacKAY:** Yes, I can undertake to provide that.

7485. Perhaps I would just add, the areas that we have assessed for the waste area and for the camp and staging are -- they’re certainly, at this stage, preliminary. They’re not the final layouts that would be developed during detailed engineering.

7486. So those are -- you know, those will be forthcoming during detailed engineering stage so what I would present in the updated map really is just to provide a correction of what was filed with the details showing the areas that we filed.

7487. **MR. LEADEM:** All right. I understand.

7488. And I understand that it’s preliminary as is most of the geotech work at this stage. It’s subjected to detailed engineering as I think many of the witnesses have attested to.

7489. I have that right?

7490. **MR. CLIVE MacKAY:** That’s correct.

7491. **THE CHAIRPERSON:** So, Ms. Niro, could we get an undertaking number for that, please?
THE REGULATORY OFFICER: That will be U-31.

--- UNDERTAKING No./ENGAGEMENT No. U-31:

For Mr. MacKay to prepare a better diagram depicting the area of the waste rock, where it will be deposited, as well as the area of the camp and staging area for the construction at the east portal of the Clore Tunnel.

MR. LEADEM: Madam Chair, I’m going to be considerably less than I anticipated which, hopefully, is music to your ears.

And I was wondering -- in order for me to examine the rest of my questions -- which I can probably compress considerably -- that we could take the luncheon break at this stage and that we come back perhaps a little bit earlier?

THE CHAIRPERSON: Thank you, Mr. Leadem.

So let’s break now and we’ll come back at 1:25 p.m. Thank you, everyone.

--- Upon recessing at 11:52 a.m./L’audience est suspendue à 11h52
--- Upon resuming at 1:25 p.m./L’audience est reprise à 13h25

THE CHAIRPERSON: Now, we’re good to go.

Thank you very much, Mr. Leadem.
MR. LEADEM: Thank you Madam Chair.

Mr. MacKay, I’m afraid I’ll have to come back to you for a few more questions that occurred to me over the lunch break concerning the tunnels and one of the questions relates to how you intend to construct the actual pipeline.

Is it going to be done welding in place within the tunnel or will it be dragged into place?

Do you know?

Counsel, I think your question is: How are we going to construct the tunnel -- pipeline once the tunnel has been completed?

Yes.

Right. I could help with that.

The preliminary plan is to construct or weld the pipeline outside of the tunnel and, basically, bring it into the tunnel through a roller-type process. Bringing in sections and then doing tie-end welds within the tunnel itself.

But, generally, the bulk of construction work, welding the pipe would occur outside of the tunnel.

And, similarly, with the respect to the HDD that we discussed earlier, Mr. Doering, the plan is to weld outside, obviously, and then to pull the pipe through?

That’s correct.

The pipe is welded up into a string and then pulled into the HDD hole.

Okay.

Now, with respect to the actual -- what the tunnel will look like when it’s finished, is the pipeline going to sit on the actual surface of the floor? Is it
going to be raised in some fashion, off the floor?

7513. **MR. CLIVE MacKAY:** So the -- there are a couple of ways that the pipes can be installed in the tunnel and the final selection has not been made.

7514. The two methods that are commonly used for supporting pipes and tunnels are to put them on sleepers which rest on the tunnel floor -- and there are a number of examples of those -- or to put them on pipe racks.

7515. **MR. LEADEM:** And in terms of the drainage of water from the tunnel, assuming that you encounter some groundwater seepage and groundwater that comes into the tunnel, do you have some methodology for determining how you go about collecting that?

7516. **MR. CLIVE MacKAY:** So in terms of collecting the water in the tunnels, the tunnels will be constructed with positive drainage so they drain to the portals.

7517. So there will be a collection system to collect water that seeps into the tunnels and that collection system will be directed to a facility at the portals that will -- there’s a water --certainly -- potential for a treatment facility and I can -- pardon me one sec.

--- (A short pause/Courte pause)

7518. **MR. CLIVE MacKAY:** I’m just going to get a reference number for a document that responded to that question in terms of the collection and potential for treatment of water coming from the tunnels if you just give me a minute.

--- (A short pause/Courte pause)

7519. **MR. CLIVE MacKAY:** So I’ll just refer you to B35-2, Adobe page 21, and this just provides some details in terms of the construction and layout of the tunnels.

7520. So perhaps you could just -- would you mind repeating the last part of your question?

7521. **MR. LEADEM:** Well, my concern was around the drainage of water.
I realize that with respect to potential spills of oil or condensate in the -- from the pipelines that you have a sump at either portal entrance.

Is there a mechanism for keeping track of the oil and keeping that out of the sump or is that simply going to drained all into the same sump?

MR. CLIVE MacKAY: I think the -- I’ll also just refer you to another document. Pardon me, a second.

--- (A short pause/Courte pause)

MR. CLIVE MacKAY: So if you refer to document B63-2 and Adobe page 22.

So this just shows schematically the -- what the final configuration of the tunnel may look like with the pipeline sleepers, a -- this is for a bored tunnel and it shows an invert section with a drain pipe.

This is part of a document that was prepared in response to a request for information on feasibility of spill collection containment in the tunnels.

So to answer you specific question about the -- if you want to call it, how does -- how would normal seepage water be captured and separated from what would be the flow of oil to the sumps in the event of a mishap?

And I can’t give you the specific details on the plumbing of that at this point in time but the control systems will be required to identify the -- you know, a normal operation would be to address the transit of seepage water.

The emergency operations would have the requirement to -- for the water to go through a sump or, pardon me, the oil would go to a sump in the event of a mishap.

MR. LEADEM: Thank you.

And finally, one more question on the -- on tunnels and I might have to turn to you, Mr. Cavers.

Are we at the stage where we can predict with any degree of precision with respect to whether we have to worry about tunnel collapsing in either the
Clore or the Hoult tunnels?

7534. **MR. CLIVE MacKAY:** I’ll answer that question for you.

7535. So the -- I think in just in a -- as a design approach, the tunnels will be supported as permanent structures.

7536. They will be supported to carry a range of ground loads and, for their full operating life, just as there will be an ongoing integrity program for the pipelines, there will be an ongoing integrity inspection program for the tunnels so as is consistent with any kind of major structure.

7537. **MR. LEADEM:** Thank you, Mr. MacKay.

7538. I’m going to switch topics now and start onto the supervisory control and data acquisition system and I think, Mr. Callele, most of my questions will probably be directed your way.

7539. Can we agree we can refer to that by its acronym, SCADA, and not have to say the words all the time?

7540. **MR. BARRY CALLELE:** Sure, SCADA or SCADA.

7541. **MR. LEADEM:** Okay.

7542. My understanding from reviewing the material -- and I’m just going to ask you a few background questions and then we’ll go into the detailed questions -- is that the LDS or the leak detection system will actually be integrated into SCADA.

7543. Is that right?

7544. **MR. BARRY CALLELE:** The leak detection is an independent system that is fed its data as it comes through our systems to allow it to do the computational modeling.

7545. So it’s integrated but it’s not solely in the auspices of the SCADA system itself.

7546. **MR. LEADEM:** Now, my understanding of how it will work in
theory is that you’ll have a number of remote terminal units, or TUs, spread throughout the different areas of the pipelines and that that will then feed into a central collecting agency or collecting department or a computer, actually.

7547. Is that -- generally, do I have that right?

7548. **MR. BARRY CALLELE:** Yes, counsel.

7549. The definition of SCADA is that it’s a controlled system for a distributed, a geographically distributed system, like a pipeline, for example.

7550. That does not preclude though -- sorry, I have a cold -- that does not preclude that same collection mechanism to come into local station control systems as well.

7551. **MR. LEADEM:** And is it contemplated at this stage for this particular system that the information will be fed into the Edmonton main base or main control centre?

7552. **MR. BARRY CALLELE:** Yeah, Enbridge Liquid -- Liquids Pipelines has the vast majority of its pipeline network controlled out of the Edmonton control centre.

7553. Basically, there are two control centres: both a primary and a redundant, fully configured to be back up to each other. Sorry. Within the primary control centre there is full redundancy for every environment or for every system that we control. So there’s local redundancy as well as an off-site redundancy that’s fully capable of controlling all of the facilities.

7554. However, in this design, as has been indicated in the filing, there is a Kitimat Terminal as well.

7555. One would think at this point in time -- it’s fairly early to talk about exactly how that’s going to be implemented but, certainly, we can project out that it would be a system specific for the Kitimat Terminal.

7556. In the terminology that we use in our industry, it would be a distributed control system, something that is localized to that area, where the control system in Edmonton could still be able to monitor and communicate via that, in the event of an emergency.
MR. LEADEM: Are we at the stage where you can tell me with any degree of accuracy roughly the amount of RTU’s that will necessarily be employed for a pipeline of this length?

MR. BARRY CALLELE: Just to give everybody a bit of context, RTU is a remote terminalling unit.

It’s kind of -- it’s one of those data concentrator type functions that exist at a local station level as an interface point between the SCADA system itself and the multitude of PLCs or programmable logic controllers that could be present at the station.

The RTU or a master PLC are kind of used synonymously within our industry. Basically, it’s a communication point to a station. So each of the pumping stations themselves -- to answer your question -- would have at least one RTU, in fact very rarely would we implement a single RTU at a pumping station. We would have a backup as well to ensure full redundancy of communications to the PLCs.

MR. LEADEM: Will there be additional RTUs located at strategic locations throughout the rest of the pipeline other than the pumping stations?

MR. BARRY CALLELE: It’s a little early to tell, counsel, although typically what happens is the valve sites, if you want to call those, the critical locations, will have to have communications to them, obviously, if we want to do remote control of them. The addition of those pressure transmitters that I alluded to in previous testimony indicates that either we would need a high speed data acquisition communication network or we would need localized data acquisition units, also referred to almost like an RTU or a PLC. So there may be a localized data acquisition unit there.

Not to get too technical, but the reason that is there is that you want to store the time of the sample, as well as the value that is being sampled by the instrument, and the data quality itself to ensure full integrity of the data path back to SCADA.

MR. LEADEM: Is it also too early for us to conjecture how the actual testing of the system will be operated? Whether you intend to, for example, do parameter manipulation, fluid withdraw, simulated leaks, things of
that nature?

7565. **MR. BARRY CALLELE:** Testing as per the -- both OPR99 and also the CRM rule in the U.S. indicates that a full point to point -- what they call point to point -- commissioning must occur not only on new facilities but on an annual -- let me make sure I got the regs right here. One second, I’ll check. Sorry.

7566. Both on the initial facility and any expansion of the facilities, that would include new data points, and so part of a testing program would be obviously that -- it’s called field commissioning during the construction phase.

7567. You also had a question though, you had two. I think you also alluded to leak detection testing, was that ---

7568. **MR. LEADEM:** Yes.

7569. **MR. BARRY CALLELE:** --- correct?

7570. Sorry, I apologize for the cold.

7571. I alluded to this a bit in previous testimony, I think I -- we also have various filings, but at a very high level for everybody in the room; we start with the predicted capabilities of a system, which is the API 1149 methodologies. We move beyond that into a regiment of testing. The first step is continuous are on every one of our pipeline systems to do the methodologies described in API 1130, to do segment by segment forced manipulation of each one of those segments’ metre values to ensure that you’ve got adequate leak detection or detection limits as per what you had indicated previously.

7572. We’re taking it beyond that with the regulations. As I’ve indicated, we get into the simulated leak test, hydraulically accurate models are being used to produce simulated scenarios for leak testing. We have at this moment simulators developed for -- let me just check the number based upon our total facilities.

7573. We have 28 pipeline facilities today. The simulators are required to do the next level of testing, in our opinion anyway. We have 10 of the hydraulically accurate simulators built to date. We expect all 28 of them to be complete either by the end of this year or into the first quarter of next year.

7574. The next level of testing on our systems is -- just to complete the
picture counsel -- is the performance of fluid withdrawal tests.

7575. We’re undergoing a major improvement program across all -- well, I wouldn’t say all -- the vast majority of our Enbridge pipeline systems, both in Canada and the U.S., identifying areas for equipment improvement, predominantly the older metering technologies and places where we can add pressure transmitters and temperature transmitters.

7576. Part of that is a comprehensive plan associated with those construction activities to do fluid withdrawal tests. The reason we want to do those fluid withdrawal tests at that time is to prove out the value of that investment strategy.

7577. So we’re trying to get to the point of ensuring that we are, at all points in time, able to detect the leaks that we have predicted, and that API 1130 also says we should be able to detect.

7578. Beyond that, of course, if we don’t have any changes to our pipeline systems on a five-year program, we will be getting back to each one of those pipelines to ensure that they get a fluid withdrawal test again.

7579. **MR. LEADEM:** So as -- what you seem to be describing, Mr. Callele, is that Enbridge is actively engaged in testing all aspects of SCADA and its LDS throughout all of its pipelines and that’s an ongoing project, if I can call it that; is that right?

7580. **MR. BARRY CALLELE:** Yes. In fact we have been doing this for many, many years, this is not just as a result of the Marshall incident.

7581. Certainly there’s been, obviously, an increased focus on this and a redoubling of efforts to ensure that we are protecting those that live along our right-of-way, and those -- and the environments that we pass through.

7582. **MR. LEADEM:** And presumably the results of those testing will be shared with regulators is that -- do I have that right?

7583. **MR. BARRY CALLELE:** We haven’t been asked to share the results of the tests with the regulators to this date. We have had NEB, the National Energy Board for example, and PHMSA or NTSB, I should say, come and visit us and we’ve held presentations, we’ve talked about the future plans that we have in place, and so I suspect that the regulators will want to see transparency.
in that, yes. And there may come a time in this industry where independent
certification is also out there so --or independent testing, so somebody else
monitoring and ensuring.

7584. **MR. LEADEM:** That’s where I was leading to, whether it was going
to -- whether Enbridge could foresee that it would make its systems available for
independent testing by non-regulators, but skilled and interested parties to come
and make sure that the system was functioning to their satisfaction. Can you
foresee that happening?

--- (A short pause/Courte pause)

7585. **MR. BARRY CALLELE:** Sorry, some interesting perspectives
coming from the back row. Just -- could you repeat the question, please? I just
want to make sure I’m going to answer you ---

7586. **MR. LEADEM:** Yes.

7587. **MR. BARRY CALLELE:** --- as best I can.

7588. **MR. LEADEM:** It relates to whether or not Enbridge would be
willing to have your system, your SCADA system, your LDS system, be open for
inspection and review by independent non-regulatory bodies, who have a skillset
that is commensurate with the system, that could go about doing the testing and
verification of Enbridge’s system.

7589. **MR. BARRY CALLELE:** You know, certainly I don’t see yet the
regulations going that way, to become prescriptive in that nature. You know, if
that obviously occurred in the future we would be complying with any regulatory
bodies that indicated that that had to occur.

7590. I don’t really want to be setting a precedent today by saying that
Enbridge will do this. It tends to ripple throughout the industry one way or the
other on that. I’m certainly not -- I don’t have any trepidation whatsoever of
having anybody observe the testing of our systems. In fact, we’ve had numerous
instances where -- as we unfortunately have had some practice in this, had a
regulator come in and ask to see what occurred at the time, and how did the
systems perform, and what did you see, et cetera, et cetera. And that forms the
basis for corrective action orders or other sorts of related activities.
MR. LEADEM: With respect to the actual standard that may apply to both the SCADA systems and LDS systems, and with the focus primarily being on the LDS, my understanding is that CSA Z662-11, Annex E, is the actual standard that would be applicable to your system; is that right?

MR. BARRY CALLELE: We actually have that as well as the associated regulations in the U.S. And also we have Alberta related regulations that we have to be compliant with as well.

MR. LEADEM: Right. And there would be presumably British Columbia regulations that you would need to be compliant with?

MR. BARRY CALLELE: If there were I’d have to check. It’s our first foray into the province. Subject to check obviously you know that’s something that we’d be compliant with. And there’s also Saskatchewan related regulatory concerns too because we have gathering systems there.

MR. LEADEM: I think you will find when you start looking into the British Columbia regulations that there’s some comity with the Alberta regulations with respect to the reliance upon CSA Z662-11.

MR. BARRY CALLELE: Actually it’s correct. You know, I don’t see that as being anything more than just a statement. That’s correct.

MR. LEADEM: Now, I want to turn to the construction aspects, and I think Mr. Mihell, I’m going to defer my questions. I understand that Haisla is going to be asking you some questions about SQRA, and I’m much relieved in that regard. It’s something I try to wrap my head around, probability analysis. And the reason I left science and got into law was because I couldn’t handle the math. And I make that public admission quite freely.

So I’m grateful to them for doing that.

So let’s turn to construction because I have a series of questions I want to ask you, Mr. Doering, and perhaps Mr. Fiddler, about the actual construction of it. And essentially I want to focus, initially, on what happens in terms of the actual work that you’re contemplating getting done.
7601. Now, I’m imagining that what you will probably end up doing is contracting and having a general contractor be responsible for all or portions of the pipeline. Do I have that right; have you gone that far in terms of your thinking on how the actual work would be conducted?

7602. **MR. RAY DOERING:** Yes. I think you’re asking about construction planning and construction strategy.

7603. **MR. LEADEM:** Yes.

7604. **MR. RAY DOERING:** And actually, Mr. Fiddler might be a little bit better equipped to answer that question.

7605. **MR. LEADEM:** Okay.

7606. **MR. TOM FIDDLER:** So certainly a project of this magnitude is going to take a large volume of resources over extended period of schedule and time, as Mr. Doering talked about earlier.

7607. The work will be packaged in such a way as to create some continuity and some efficiency to the marketplace of contractors; draw on their skills and attract them to the work, along with the resources that they need to bring to bear.

7608. I don’t know if that answers your question or not specifically.

7609. **MR. LEADEM:** I think I wanted to get a more specific answer to whether or not you intend to rely upon subcontractors, general contractors, whether you thought it through in the context of who’s actually going to be responsible for performing the work.

7610. **MR. TOM FIDDLER:** The detailed contracting strategies may remain a work in progress. But generally our practice is to hire general contractors; prequalify subcontractors with the prequalified generals, and then invite them for proposals with defined deliverables, scopes of work. So it could be X number of tanks within a certain timeframe at the terminal or it could be pump stations packaged.

7611. We certainly have commitments to local small business opportunities through the subcontracting scopes of the project, as well as supplies of goods and services. We have other objectives that we want to meld together with the general
contracting.

7612.  **MR. LEADEM:** So is it fair to say then -- though we’re still at the early stages and you haven’t really identified identities and put together any proposals for the work going out for tender or anything like that; we’re too early on in the process?

7613.  **MR. TOM FIDDLER:** We are at this stage. One of the steps in the process will be to overlay all of the regulatory commitments, as well as any conditions, inclusive of all the environmental conditions, and we’ll have an in-service date, as Mr. Doering introduced to the hearing the other day, of late 2018.

7614.  So basically we’ve got to package the work, as I indicated earlier, to complete the work prior to that date and allow for time for commissioning and some of the detailed activities at the tail end.

7615.  So it’s kind of -- it’ll be a continual work in progress as we overlay all of the restrictions and commitments. And then, as I say, look at the marketplace. Definitely competition for resources will come into play in terms of the strategies. So it’s got many dimensions to that discussion and that development of that detailed contracting and execution strategy.

7616.  **MR. LEADEM:** We had a general discussion earlier about critical paths and just trying to map out how you would tackle something this size, this enormity.

7617.  And at the time I think there was pointing out -- well you’ve got obviously some critical junctures to work through in terms of your schedule, predominantly with respect to the tunnels. And -- are you confident that you’ll be able to find the crews and the actual personnel to carry out that work here in Canada?

7618.  **MR. TOM FIDDLER:** Certainly our discussions currently with -- and we’re out ahead of this in discussions, preliminarily with larger general contractors for all of the different aspects of the project.

7619.  And we’ve also been in discussions -- again very preliminary -- with organized labour. And our very -- continue to be optimistic that if the resources are not available in Canada, that in a strategic way we will work with organized labour as well as the contractor community to manage foreign labour if necessary.
7620. **MR. LEADEM:** But we’re just too early on in that process to gaze into that crystal ball and come up with actual projections?

7621. **MR. TOM FIDDLER:** We are -- I would say intuitively, my personal opinion is we’re at least a year ahead of being able to make commitments and roll out detailed strategies. Those will always be a work in progress with, again, the contractor community and organized labour.

7622. **MR. LEADEM:** Now, I know that you’ve got a quality assurance program and somewhat of an internal inspection program to make sure that the work that’s being done is carried out to your standards and to your satisfaction.

7623. And I want to see if I can understand how that would work in practice, if I can just look at something that’s bound to be a source of potential problems. And that’s the welding that has to occur on the pipeline -- on the pipelines, and whether or not you’ve given some thought to actually how you would ensure that all of those hundreds, if not thousands, of welds that will have to be done on the pipeline are done in such a fashion that they’re safe and they’re not going to necessarily cause leakage and pull apart and fracture and things of that nature. What are you going to do?

7624. **MR. TOM FIDDLER:** So that’s a significant -- and I’ve got to say -- strength of our organization and we’ve expended significant effort, in particular, in the last number of years, involving our welding inspection, both in practical practice by visual welding inspectors as well as NDT technologies.

7625. All of our welds are subjected to a 100 percent NDT inspection, which is either ultrasonic or radiography.

7626. In fact very recently in this regard, and if you want to get into the details, we’ve submitted an extensive IR response to the JRP that gets into our detailed practices, including those that exceed code minimums.

7627. **MR. LEADEM:** Is it contemplated that most of those practices would be things such as x-rays that would not be degrading of the actual weld in order to have the inspection be conducted?

7628. **MR. TOM FIDDLER:** There’s no impact on a weld by x-ray.
7629. **MR. LEadem**: Right.

7630. **MR. TOM FIDDLER**: A vast majority of our current practices are done with ultrasonics which has a -- a tendency to be able to find -- finer flaws, not necessarily those that have to be removed but to identify them.

7631. **MR. LEadem**: Now, would that quality assurance and inspection apply to the work done by contractors as well?

7632. In other words, would there be some oversight that Enbridge would bring to bear to make sure that the contractors are doing their job properly and sub-contractors are doing their job properly?

7633. **MR. TOM FIDDLER**: Absolutely.

7634. We take a hands-on approach to managing the quality, the safety, the environmental compliance, regulatory compliance in general of all the contractors.

7635. **MR. LEadem**: And, in terms of the actual quality assurance program, I may have missed it in the material but I could not find any actual reference to it.

7636. Was it contained in -- in some document that was submitted?

7637. **MR. TOM FIDDLER**: There’s some high-level submissions that relate to quality management systems and -- and programs and, certainly, there’s an expectation under OPR 99 in those regards both relative to inspection and relative to audits and specific to the welding which you seem to be focused on.

7638. As I said, we’ve -- we’ve submitted a tangible response to the Panel in regard to IR JRP11.5. If you want to look at it, it’s B101-2.

7639. And in this regard, what we did is we -- we focused on some very legitimate questions, obviously, from the Panel regarding our welding integrity management program during construction. So it goes in, to some extent, extensive detail regarding welding procedures, welding inspection, both visual and NDT.

7640. Sorry, did we get to the wrong one? Oh sorry, it’s multi --- Adobe
So under the regulations and we’ve -- we’ve had extensive experience with this with the NEB projects, we are compelled -- and, certainly, actually very supportive and do it for all of our projects -- to create adjoining preparedness plan and, within that adjoining preparedness plan, we define our welding procedures that are going to be used for each of the materials, weld thicknesses, grades and the like as well as our inspection procedures and protocols inclusive of our pre-qualification requirements for inspectors and NDT operators.

MR. LEADEM: Getting back to the question of contractors and oversight of contractors, obviously, something went wrong with respect to Wisconsin and we heard some evidence from you yesterday about the pipeline in Wisconsin which resulted in various violations under the Wisconsin Civil Code and Statutes relating to construction such as deposition of fill and wetlands, putting equipment -- running equipment right through wetlands and so forth and it resulted eventually in a judgment of $1.1 million that was assessed against Enbridge.

Is that not right?

MR. TOM FIDDLER: That’s correct.

Again, I would highlight that many of the initial findings or observations by regulatory inspectors as well as some that were self-reported were of a nature that they were immediately remedied.

There were also some requirements that, if you went through the long list and I think you -- you have that -- were judgment calls, if you will, such as untimely collection and disposal of construction debris such as pipe ropes, cutbacks on quoting; those types of things.

There was also a very unique requirement and -- and not to make excuses in these regards because it was a permit condition that we not rut sub-soil more than six inches which is -- is really an unheard of expectation but, certainly, an expectation nonetheless and it caused some controversy as you -- as you might expect living in Northern B.C. and observing what happens in wet conditions with equipment.

That’s not to say that there was any permanent effect. All of the
wetlands that I mentioned -- and there was somewhere over 1,400 wetlands in that 321 kilometres -- were all restored to the satisfaction of the regulator in final acceptance.

7649. Nonetheless, some of the learnings were contingency management and planning related to significant storm events and I think that’s where you were going with your question regarding sediment loading and erosion.

7650. **MR. LEADEM:** Right.

7651. Obviously, the route of this pipeline that’s being proposed by you will cross significant streams some of which are salmon-bearing and -- and some of which have high ecological values.

7652. You’re quite aware of that; are you not?

7653. **MR. TOM FIDDLER:** Absolutely.

7654. And I got to highlight that our learnings weren’t drawn out. They were immediate. There were two significant projects done immediately after -- (sound problems) -- non-compliances in those natures and we strived for that with far greater contingency planning and expectation of -- of our --- sorry, about that -- far greater focus and emphasis on our contingency management planning with our contractors to mitigate environmental risks and impacts.

7655. **MR. LEADEM:** Looks like I was cut off.

7656. With respect to the -- what happened in Wisconsin, my understanding is that, essentially, there were violations over a period of time from January 2007 until October 2008; a period of almost 22 months.

7657. Why did it take Enbridge so long before it got involved and did something about all these violations that were accruing in Wisconsin?

7658. **MR. TOM FIDDLER:** Personally, I can’t speak to all of the details depending where you want to go with this discussion.

7659. I know some folks that are involved in the next panel were directly involved more extensively. I had some cursory involvement at the front end so, certainly, can acknowledge that efforts were made immediately to take corrective
measures with the contractors and -- and our inspection teams.

7660. And again, not to make excuses because the magnitude is very similar to any large project, we had over 2,500 personnel at times on the contractor side of the equation. So, certainly, one of the commitments going forward -- and we did immediately and ongoing -- is that we do extensive orientations of an environmental nature to all staff, all workers of the permit commitments and conditions as well as our minimum best practices.

7661. **MR. LEADEM:** You mentioned that the next Panel may have some people that could speak to that specifically.

7662. Who would they be?

7663. **MR. TOM FIDDLER:** I believe Mr. Underhill who is the Vice-President -- his title escapes me right off hand but ---

7664. **MR. LEADEM:** The name is sufficient.

7665. **MR. TOM FIDDLER:** Yes.

7666. **MR. LEADEM:** So I guess it comes down to this, Mr. Doering and Mr. Fiddler, that you're obviously proposing something to the people of Canada that’s going to be built and may have the potential not just -- not focusing now on the spill aspect so much as I am on the construction aspect -- but may carry with it the potential during the construction phase to actually significantly affect ecosystems and -- and habitat of wild species that Canadians tend to value.

7667. And, on the record, when we look around, we see incidents such as what happened in construction at Wisconsin.

7668. Can you really assure the people of Canada that you’re to be trusted, your company can be trusted to do this job?

--- (A short pause/Courte pause)

7669. **MR. DOERING:** Yes, thanks, counsellor. There’s probably a few things I can say. You asked earlier about routing changes, for example. You indicated that perhaps, you know, we’re making changing late in the process but really, this is a natural progression of the design.
We are incorporating feedback from the regulatory process, from ongoing consultation, discussions with Aboriginal communities. So this is a really a natural evolution of the design. So we can’t suggest that we will have a final design because this process really is meant to continue to include that feedback and inform the design.

And so what we’ve provided to the Panel is a detailed design that we think is at the appropriate level to determine whether there are any potential significant adverse effects that would be associated with the design and construction and operation of this project.

And again, we’ll maintain that we’ve been at this for about 10 years now to get to this point so, it’s not something that just happened in the last few months. We’ve been continuing to inform the design and add to our fieldwork.

You know, large volumes of material have been filed, unlike any project I’ve ever seen, that are really supporting some of the decisions and work that we’ve done. And really, this is all meant for the JRP to evaluate the proposal, and really, for them to come to the conclusion whether there are any significant adverse environmental effects that could be associated with this project.

And we believe we’ve got a very full record here to help them make that decision. So -- and I think perhaps my colleague Tom would like to add a little bit more on the construction related side.

MR. TOM FIDDLER: What I would add to that and I think it’s -- the evidence is clear, the number of thousands of kilometres of large bore pipeline that we’ve built in Northern Alberta and certainly east from our terminal in Edmonton, including the Canadian Clipper Project was a project of 12 pipeline spreads similar size to this, 36-inch pipe.

Albeit a different a geography with lesser stream crossings, all private land predominantly with individual landowner concerns for their agricultural land, and in some cases, prairie lands.

So different concerns, different risks, hazards to manage, if you will, consequences, but certainly, nonetheless very legitimate concerns, far more stakeholders, if you will, in terms of individual interest in what we were doing and doing it in compliance and similarly, with many other projects of recent.
MR. LEADEM: Well, I appreciate your answer Mr. Fiddler and Mr. Doering, but I suppose the good people of Wisconsin were told more or less the same thing before construction debris was placed in their wetlands. I don’t imagine they were told in advance, you know, you’re going to -- we’re going to build you a pipeline and we’re going to foul your wetlands in the process.

So I think that when I speak to trust -- and I’m not going to be argumentative Madam Chair, I’m going to come to a question. When I speak of trust, I speak of the trust that you’re trying to engender in the Canadian public, that your company is trying to engender in the Canadian public. And if I look at the track record and I’ve just focused on the construction, I’m not going to focus on the spill record, that’s coming later, then I’m not left with a great degree of trust.

And with all respect, how can you assure the people of British Columbia, the people of Alberta, the people of Canada, that this pipeline is going to be built, that you’re not going to foul wetlands; that you’re going to treat everything carefully, that you’ve got endangered species that will be encountered?

I’ve yet to hear that you can actually do something about ensuring that those kinds of things will not occur, will not happen.

MR. TOM FIDDLER: So I’ve got a -- I definitely do take exception to your suggestion that we fouled the wetlands. My comment was that there was untimely collection and disposal of construction debris and that was in fact the circumstance at times.

And it wasn’t that that debris was being left and covered, it was debris such as the pipe ropes that I mentioned, that wasn’t necessarily being picked up the same day that it was being removed a pipe before it was lined up and put in the welding sequence.

So there is certainly situations like that where it’s subjective whether it was efficient and the right thing to pick it up one piece at a time as you’re doing the work or you do it before you clean up, as a process of cleanup of the right-of-way and before you restore topsoil in the wetland.

In any case, that aside, certainly as part of this project and our projects of recent that I can recall, we’ve got an environmental protection and
management plan for construction and within that we detail -- and we’ll get into that in a future panel -- all of the risk mitigation and work processes that we employ, progressively as a process and a methodology of management of construction that mitigates risks that were unfortunately incurred in Wisconsin.

7686. **MR. LEADEM:** Madam Chair, I have no further questions of this panel.

7687. **THE CHAIRPERSON:** Thank you, Mr. Leadem.

7688. Call the Haisla Nation next; represented by Mr. McCormick and Mr. Donovan.

7689. And we’ll just take a five-minute break while we’re making the transition between the two parties.

--- Upon recessing at 2:15 p.m./L’audience est suspendue à 14h15
--- Upon resuming at 2:23 p.m./L’audience est reprise à 14h23

7690. **THE CHAIRPERSON:** We’re ready to get underway again.

7691. Welcome to the Haisla Nation for being here to ask your questions of this panel.

7692. Mr. McCormick, is it you who’s going to be asking the questions this afternoon?

7693. **MR. MCCORMICK:** Yes it will, subject to any interventions Mr. Donovan may have.

7694. **THE CHAIRPERSON:** Please proceed with your questions of this panel when you’re ready.

**RAY DOERING:** Resumed
**PETER ACTON:** Resumed
**BARRY CALLELE:** Resumed
**DRUMMOND CAVERS:** Resumed
**TOM FIDDLER:** Resumed
**SHANE KELLY:** Resumed
CLIVE MACKAY: Resumed
JAMES MIHELL: Resumed
PETER WONG: Resumed

--- EXAMINATION BY/INTERROGATOIRE PAR MR. McCORMICK:

7695. Mr. McCormick: Thank you very much.

7696. Good afternoon, Members of the Joint Review Panel, Joint Review Panel supporting staff, witnesses and staff from Northern Gateway, as well as all the fellow participants here and anyone who’s had the opportunity to participate and attended these proceedings.

7697. The Chairperson: Excuse me, Mr. Donovan, I’m not trying to interrupt your train of thinking but can you pull your microphone closer, we’re having trouble hearing you.

7698. Mr. McCormick: Of course. And I’ll do my best to speak up for everyone’s benefit.

7699. The Chairperson: Thank you.

7700. Mr. McCormick: I’m joined -- my name is Jesse McCormick and I’m joined here by Allan Donovan, and we are both legal counsel to Haisla Nation. We are also joined by Michael Gordon and Jillian Backer who are consultants with the Haisla Nation.

7701. I’d like to start by thanking the Joint Review Panel support staff for their assistance in helping us to approach these proceedings and for the efficiency that they have brought to these proceedings.

7702. We are currently scheduled for 12 hours of questioning, and I can confirm that time limit or time estimation and if there are any anticipated changes we’ll be sure to let you know.

7703. And we’ve been asked by the Haisla to attend today’s proceedings to test the evidence before the Joint Review Panel and we look forward to clear, responsive answers from the witness panel.

7704. And before I begin with the questioning, I am just hoping to confirm,
we are planning on sitting until 5:00 p.m.?

7705. **THE CHAIRPERSON:** Four-thirty (4:30).

7706. **MR. MCCORMICK:** Four-thirty (4:30). Thank you.

7707. The first topic of questioning will be on risk. I’d like to begin by confirming a few points. It’s my understanding that Northern Gateway is employing risk-based design to minimize risk; is that correct?

7708. **MR. RAY DOERING:** Yes, that’s correct. I think it’s been described through several filing documents, initially described as part of a request for additional information by the JRP.

7709. And perhaps I can get a reference number -- as a risk-based design approach and it’s really an iterative process and the sophistication and the tools that we are utilizing for that risk-based approach continue to evolve and Mr. Mihell, here, certainly will be able to speak to the reliability approach that we’re using now.

7710. **MR. MCCORMICK:** Thank you. And as part of the iterative process that you’re describing, it’s my understanding that risk associated with preliminary design is reviewed and an assessment is made as to whether risk objectives are met at all locations along the pipeline; is that correct?

7711. **MR. JAMES MIHELL:** That’s correct, Mr. McCormick.

7712. **MR. MCCORMICK:** Thank you.

7713. And you will agree with me that risk-based design is especially critical for those areas identified as higher risk?

7714. **MR. JAMES MIHELL:** Well, risk-based design is a process and it helps identify those areas of higher risk, helps identify the things that are driving risk in those areas of higher risk and, furthermore, helps to identify the potential risk mitigation measures that might be undertaken to reduce the risk and manage it in those locations.

7715. **MR. MCCORMICK:** So I understand that your answer is: Yes, risk-based design is especially critical for those areas identified as high risk; is that
7716. **MR. JAMES MIHELL:** I prefer my response actually because I think it’s a process.

7717. It’s not especially critical for one or two areas along the pipeline, it’s a process that’s undertaken along the entire process to help identify those areas of higher risk and help to identify the potential mitigation measures based on the drivers of risk at those locations.

7718. **MR. McCORMICK:** Thank you.

7719. Madame Clerk, if I could, please, ask you to put on the board Exhibit B75-2? This is the Semi-Quantitative Risk Assessment, filing document A2T9B7 and we’d be looking at page 8 of 172.

7720. If you could just scroll down to the third paragraph, please?

7721. I’d just like to note the second sentence of the third paragraph which reads:

   “Risk-based design is especially critical for those areas identified as higher risk.”

7722. I believe that was the content of the question I put forward and I’d just like to confirm that what I’m seeing here in the SQRA is, in fact, correct?

7723. **MR. JAMES MIHELL:** That’s what you’re reading.

7724. I think it’s -- what you’re reading here is a précis perhaps, without trying to be overly wordy, as I was trying to be perhaps more helpful in providing the overall context of risk-based design and establishing it as a process. This is perhaps a précis of that.

7725. **MR. McCORMICK:** Okay. Thank you for that.

7726. And you will also agree with me that risk-based design is a process that focusses on identifying and pre-empting risk?

7727. **MR. JAMES MIHELL:** Yes, that’s correct.
MR. McCORMICK: Thank you.

If we could turn to page 56 of this document, please, Madame Clerk, and just scroll down to Figure 1, the figure entitled: “Risk Based Design”.

It appears to me that the first step identified in this figure is: “Preliminary Design”, followed by “Develop Risk Assessment” and the third step is to determine whether there is an acceptable risk in all segments.

You will agree with me that the “yes” located to the right of the diamond, in the middle of the table indicates, that prior to proceeding to “Finalize Design” and “Operating Procedures”, Northern Gateway will need to determine whether acceptable risk has been achieved in all segments; is that correct?

MR. JAMES MIHELL: That’s correct.

MR. McCORMICK: And in order to determine if acceptable risk has been achieved in all segments, it will be necessary for Northern Gateway to determine what the acceptable risk levels are.

Is that correct?

MR. JAMES MIHELL: Yes.

In risk assessment, there is a principle called the ALARP principle, A-L-A-R-P, “As Low As Reasonably Practicable” and, put in simple terms, “as low as reasonably practicable” really implies that there is a point of diminishing returns. It acknowledges that all engineered structures have associated with them inherent risk levels and that there is no engineered structure that has zero risk.

You can undertake various mitigation strategies, to a certain point you can lower risk but you can -- the general principle is you can never achieve zero risk.

But at some point, once you start to include a variety of mitigative practices, you start to achieve a point where the undertaking of additional risk mitigation measures is disproportionately resource-intensive compared to the amount of risk mitigation benefits that you might be able to accrue and, on that basis, you are then starting to reach this point of diminishing returns.
7739. That essentially describes the ALARP principle and it applies to a variety of threats.

7740. For instance, I think we’re probably there in terms of resistance to third-party damage with respect to the wall thicknesses that we’re undertaking on the -- for instance, the dilbit pipeline has got a link average to wall thickness of approximately 20 millimetres.

7741. At that point, when you start to try to investigate what is the benefit, the incremental benefit, behind going to even further increases in wall thickness, there are a couple of issues. One is that’s an extremely heavy wall thickness and the existing models that are available, I would be concerned about extrapolating results beyond where we’re currently at because practical experience doesn’t usually deal with wall thicknesses of this level.

7742. Also operating experience. Even in Europe where pipelines are constructed in very high dense areas and third-party damage is a significant threat. Even in Europe, according to the EGIG, the European Gas Pipeline Incident Data Group, has not indicated incidents, loss of containment incidents, beyond wall thicknesses of say 16 or 17 millimetres.

7743. So I think on the basis of the empirical evidence alone would suggest that, as far as third-party damage resistance is concerned, I think we’ve achieved a certain level of diminishing returns with respect to that potential threat.

7744. There are other threats that you’ve heard the geotechnical engineers on this Panel talk to today at great length and there’s been a number of questions about: Geez, you know, you’ve been at this for years, why are you still at it?

7745. And I think, with respect to the risk mitigation strategy, they’re really looking at ways of mitigating risks. So they’re looking at collecting more information to fully understand the circumstance, understand the threat and find out the best ways of mitigating that risk and that’s an ongoing basis. We’re here in 2012 for a pipeline that has an in-service date of 2018 and they still feel that they have lots of work to do ahead of them and they acknowledge that.

7746. So it’s a very protracted ongoing process, requires a lot of work.

7747. **MR. McCormick:** Thank you for that.
7748. So just to confirm, you’re agreeing with me in that Northern Gateway will need to determine if acceptable risk has been achieved in all segments before it proceeds on to “Finalize Design” and “Operating Procedures”?

7749. **MR. JAMES MIHHELL:** Yes, and I think I tried to establish the basis upon which that’s done.

7750. **MR. McCORMICK:** I appreciate that. Thank you very much.

7751. I’d like to touch -- dig a little further into this concept that you put forward: ALARP, “As Low As Reasonably Practicable”.

7752. And, first, I’d be curious to know -- and I’m hoping you can help me -- is part of the practicable portion of ALARP measuring the weighted risk against the monetary costs?

7753. **MR. JAMES MIHHELL:** Well, it’s -- I think I tried to illustrate it, for instance, using the third-party damage example.

7754. Certainly, there is a cost whenever you undertake risk mitigations but, in terms of its applicability to this ALARP principle, really, there is a diminishing point of return. As you go beyond certain wall thicknesses, you really can’t be assured that you’re going to accrue significant levels of risk reduction.

7755. So, yes, cost is a factor but other resources are a factor as well and you have to -- in terms of establishing where you’re going with this, you have to understand that every undertaking has limited resources and, in optimizing those resources, you are always looking to see whether those resources might be best dedicated in other areas of risk mitigation.

7756. **MR. McCORMICK:** Thank you.

7757. To touch on another portion of ALARP, it includes reference to reasonably -- as low as reasonably practicable.

7758. Who makes the ultimate determination as to what is reasonable in terms of the risk level that will be acceptable in all segments of the project?

7759. **MR. JAMES MIHHELL:** There is no standard that I can point to that
says this is the definition of “reasonably” and this is the definition of “practicable”. It's a principle that establishes a point of diminishing returns.

7760. And, ultimately -- I guess the reason why I threw out the example initially of third-party damage is that it did a good job of illustrating the concept that, as we -- if we were to contemplate further increases in wall thickness, neither the models nor the empirical evidence would suggest that you would accrue great benefit in terms of risk reduction from the perspective of third-party damage.

7761. So it requires some subjectivity, some engineering judgment and some evaluation and I can't provide you with a hard and fast rule of what the definition of “reasonably” is or “practicable” is.

7762. **MR. McCORMICK:** Thank you.

7763. And just for clarification, at no point in my question did I raise third-party damage, wall thickness or did I request a definition of the word “reasonable”.

7764. The first word in the question was “who”.

7765. And what I'm asking is: Who will ultimately make the determination as to what is reasonable in terms of acceptable risk in all segments of this project?

--- (A short pause/Courte pause)

7766. **MR. RAY DOERING:** This -- the question about who, it is the responsibility of the Proponent to determine levels of risk and to identify opportunities for risk mitigation.

7767. But it's not done solely by the Proponent, this is a process and I -- that involves engagement with stakeholders. And I think a good example of that is the process that we're using in the Kitimat Valley Design Construction and Operations Report.

7768. And I know we're going to defer discussion of that to Prince Rupert but, really, that is an example of an engaged process where we do want to receive feedback from key stakeholders in areas where there are identified environmental sensitivities that we are trying to mitigate and reduce potential risk associated with those through that process.
MR. McCORMICK: Thank you, Mr. Doering.

Madam Clerk, if we could please look to Exhibit B132-2, exhibit -- excuse me, document A3A6J5, page 121 of 166.

This document is Northern Gateway's response to Haisla Nation Information Request No. 4. If you could please actually scroll up to the top of the page?

Actually, I'll draw your attention, witnesses, to the portion of the box which reads: “Request”. The request being:

"Please identify the geohazard risk level which, in the view of Northern Gateway, is considered an acceptable risk level."

If we could please see the response:

"Acceptable risk is context relevant, and there is neither a single number nor a single method for determining what is acceptable in any given context. During design and subsequent construction and operation, Northern Gateway will continue to reduce all identified risks to as low as reasonably practicable levels given available technologies and procedures."

The question I have is: Has Northern Gateway determined context-relevant acceptable risk level targets for the overall project?

--- (A short pause/Courte pause)

MR. RAY DOERING: I think I can respond to your question about how we determine what we mean by risk in any given context.

And, really, we are looking to reduce the risk to -- at any point along the pipeline to what we deem as low or as low as reasonably practicable levels. There's a number of means by which we can do that.

I think perhaps my colleague, Mr. Cavers, can add to some of the methods that we use to bring risk levels at -- really, along all segments of the
pipeline to that comparable level.

7778. **MR. DRUMMOND CAVERS:** Well, first of all, from a geohazard risk level -- and just to define what we mean by risk level -- in a crude sense -- and there's a much more detailed definition in the SQRA -- but, in a crude sense, it's the probability of a hazard times the consequence of that hazard if that hazard occurs.

7779. And so from a geohazard point of view, a lot of our focus is on reducing the hazard so that the consequence does not happen.

7780. If we take a river crossing, for example, we want to install the pipeline below the depth of scour and beyond the extent of lateral erosion. So that in the event that there's lateral erosion and scour occurs -- which is, as you know, widespread in the environment in which we find ourselves, particularly on the West Coast where there's heavy precipitation -- we want to install the pipeline in a way that the hazard itself is mitigated and we never need to look at the other side of the equation, which is the consequence side.

7781. And this extends with all the geohazards. We want to, first of all, mitigate those risks so that the hazard -- the geotechnical hazard or the geohazard -- is effectively removed from the equation as far as we can remove it. We don't want to trigger that geohazard in a way that's going to affect the pipeline.

7782. So that, really, what we're doing from the geohazard point of view is reducing the risk by controlling the hazard.

7783. **MR. McCORMICK:** Thank you.

7784. To begin, I'd like to assist Mr. Doering, I think I may have heard some misunderstanding of the question. Mr. Doering paraphrased the question as: How we determine what we mean by risk in any given context?

7785. The question actually was: Has Northern Gateway determined context-relevant acceptable risk targets for the overall project?

7786. Not how is it done, has it been done?

--- (A short pause/Courte pause)
MR. DRUMMOND CAVERS: Just to amplify my previous response, the kinds of geotechnical susceptibility ranges that we are looking at are in the order of 10 in the minus five, 10 in the minus six per year and lower.

MR. McCORMICK: Thank you. I’m not sure that that’s actually answered my question.

Perhaps I can touch on some of what Mr. Cavers had raised previously. He had noted that there’s an intention on the part of Northern Gateway to identify the risk so that we can avoid its consequence. He’s also noted that there are occurrence levels which may be remote, that they’re also targets. He’s noted that within geotech there are ranges of those we see indicated in the information response. However, it did not answer the question of whether or not Northern Gateway has determined context, relevant acceptable risk targets for the overall project.

Have, cumulatively, all the segments of the projects been allocated in appropriate risk level so that Northern Gateway will be able to determine whether it has met its own risk objectives?

MR. RAY DOERING: Well, this IR response was specifically in reference to geohazards and we look at the risk associated with each of those individual hazards. So it’s not -- this isn’t looking at it from a cumulative perspective but from each unique potential hazard perspective.

Perhaps Mr. Cavers could add a little bit to my description there if I’ve missed out.

MR. DRUMMOND CAVERS: No, I think from the geohazard point of view you’ve -- you’ve described it well, Mr. Doering. The -- the as I say, the -- we look at it from a hazard point of view. We don’t want to trigger the hazards so
that we have a problem with the pipeline.

7796. **MR. MCCORMICK:** Thank you. So am I understanding from Mr. Cavers that Northern Gateway has determined a context-relevant acceptable risk level for geohazard associated risks for this project?

7797. **MR. RAY DOERING:** What we have described here -- the risk levels that we have determined, the unmitigated and ultimately the mitigated risk levels for each of the unique geohazard risks that have been identified for the project.

7798. **MR. MCCORMICK:** Thank you. And as you confirmed earlier, risk-based design is an iterative process whereby the risk associated with preliminary designs is reviewed and an assessment is made as to whether risk objectives are met at all locations along the pipeline.

7799. Is my understanding correct that determining acceptable risk levels is important for the overall risk-based design process being employed by Northern Gateway?

--- (A short pause/Courte pause)

7800. **MR. RAY DOERING:** We have identified here and -- and through the work that we’ve done, the risk levels associated with unique geohazard -- geohazard risks along the pipeline, but that’s only one part of the overall risk assessment process. I think Mr. Mihell can add how we assess risks from other threats as well, which might be helpful here in kind of looking at it from the overall perspective.

7801. **MR. JAMES MIHELL:** Thank you. And -- and I apologize if we seem to be struggling with your question. We’re really, I think, trying to understand what you’re asking perhaps, but as I perceive it, I think you’re asking if there is an overall risk threshold that is integrated across the entire pipeline. Is that -- is that what you’re asking?

7802. **MR. MCCORMICK:** That was the focus of the question, yes.

7803. **MR. JAMES MIHELL:** Okay, thanks, that helps.

7804. So -- So I guess there’s a different perception about how we do this
and why we do this. The intent is not to have an overall integrated risk threshold for the pipeline as a whole. What -- what happens if you do that is that ultimately shorter infrastructures can get away with more, if you will, because risk is somewhat a function of length of the infrastructure.

7805. So you would have different effective risk targets for shorter infrastructures than you would for longer infrastructures -- longer infrastructures and -- and so what we’re doing really is we’re looking at specific -- I guess site-specific threats as they occur along the pipeline and dealing with them on an individual basis.

7806. And those threats will vary in terms of their -- the nature of those threats, the mechanism, the location along the pipeline, the things that might drive the risk to be greater. In some cases risk is not driven by failure of likelihood but by consequence. And so one of the risk mitigation measures that we’ve undertaken has -- has been with respect to addressing consequences by increasing the density of valves along the pipelines to limit volume-out potential.

7807. Other potential consequence, mitigation measures are -- are related to the technologies that Mr. Callele has been talking about earlier today, about trying to identify the best approach for leak detection. So these are all consequence mitigation measures.

7808. Other potential risk mitigation measures are -- are threat-specific and -- and so we talked about an example related to third-party damage which incidentally also benefited all other threats of failure by virtue of -- of increased wall thickness.

7809. It benefited potential for failure to corrosion for instance and there was a -- an IR response in that regard. I can provide a reference here if you’re interested.

7810. But I guess the -- the bottom line here is perhaps in response to your question, there is no overall risk target that we’re trying to manage to. We’re really implementing the principle of -- of as low as reasonably practicable on a threat-specific, site-specific basis.

7811. **MR. McCORMICK:** Thank you. With as low as reasonably practicable, how do you determine when you’ve achieved that goal?
MR. JAMES MIHELL: So -- so we attempted to answer that a few minutes ago, I think, and obviously perhaps to your satisfaction we’ve -- we’ve left something undone. But what I tried to convey when I was responding to that question earlier on is -- is that it’s -- it’s very sensitive to the type of threat that you’re experiencing, the type of risk driver, what the mitigation measures are that might be available to address the -- the risk.

And I tried to use some examples of -- of, for instance, third-party damage and where you would decide and how you would decide whether you’re at that point, using the example of third-party damage. With geotechnical threats there are other means of determining where you’ve -- you’ve done as much as you can practically do.

And I don’t know if, Mr. Cavers, you’d like to elaborate on that.

MR. DRUMMOND CAVERS: Well, our -- our approach to the geotechnical hazards is, as I indicated previously, is for the -- for the hazards in particular that can lead to full bore rupture, also for hazards that lead to significant siltation erosion events, those kinds of hazards that we are still working on. Our intention is to take those to the point where the potential for occurrence is driven so low that there’s only a remote chance that they could occur.

And so I gave the example of a stream rockfall; we don’t want to be in a position of guessing whether it’s not -- it’s going to put a hole in the pipe, we want to mitigate it so that it -- any reasonable chance of it occurring is effectively gone.

And this has all been well outlined already on the record in terms of our approach.

MR. McCORMICK: And just to build on what Mr. Cavers has shared, has the current routing of the Northern Gateway Project successfully eliminated any reasonable chance of a geotechnical hazard occurring?

--- (A short pause/Courte pause)

MR. DRUMMOND CAVERS: Could you pull up Haisla -- we’re just looking for a reference to where this question has been answered on the record.
--- (A short pause/Courte pause)

7820. **THE CHAIRPERSON**: I note that it’s just a little after 3 o’clock, and so Mr. McCormick, if it wouldn’t disrupt your questioning -- I understand that you have a question posed now and you’re waiting for that answer, it appears that the witnesses are looking for a reference to be able to provide that answer to you. Would this be a convenient time for you to take a 15-minute break for the afternoon?

7821. **MR. McCORMICK**: If it pleases the Panel we’d be happy to oblige.

7822. **THE CHAIRPERSON**: Thank you very much.

7823. So let’s come back for 3:15, please.

--- Upon recessing at 3:00 p.m./L’audience est suspendue à 15h00
--- Upon resuming at 3:16 p.m./L’audience est reprise à 15h16

7824. **THE CHAIRPERSON**: I believe we’re ready to get underway again.

7825. Thanks everyone.

7826. Mr. McCormick, please continue your questions of this witness panel. In fact, you are waiting for an answer, aren’t you?

7827. **MR. McCORMICK**: Thank you, Madam Chair.

**RAY DOERING**: Resumed
**PETER ACTON**: Resumed
**BARRY CALLELE**: Resumed
**DRUMMOND CAVERS**: Resumed
**TOM FIDDLER**: Resumed
**SHANE KELLY**: Resumed
**CLIVE MACKAY**: Resumed
**JAMES MIHILL**: Resumed
**PETER WONG**: Resumed

--- **EXAMINATION BY/INTERROGATOIRE PAR MR. McCORMICK**: (Continued/Suite)
THE CHAIRPERSON: Do we -- do we need the question again for clarification for the panel?

MR. RAY DOERING: That might be best. Why don’t we start -- restate the question?

MR. McCormick: We did go into an area that I hadn’t actually drafted into. I believe that the question that the Panel was seeking to address was relating to accumulative risk over the entire project. And I understand that there was an information response that addressed that concern and it was to be located during the break.

MR. RAY DOERING: And if I understood your question from the beginning of the break, it was -- you had asked, have we identified or considered or mitigated geohazard risks along the route; was that the essence of the question?

MR. McCormick: I think what I’d like to do is given that neither the panel nor myself is entirely sure where the question went after some discussion, perhaps we can leave it to the side and proceed to the next question.

The next question would be, the semi-quantitative risk assessment provides a risk assessment but it does not identify whether or not those risks are acceptable to Northern Gateway. Are the risks, as identified in the semi-quantitative risk assessment acceptable to Northern Gateway?

MR. RAY DOERING: I would like to just describe, again, a bit of the process associated with risk assessment because it is a process and it will last a long time and we’re partway into that process. The -- and really we’re trying to make it a transparent process.

You know, as an example with the Kitimat Valley design construction and operations process, we’re trying to engage stakeholders, First Nation communities, trying to understand that we have properly addressed geohazards, for example, that perhaps we haven’t missed any. And that’s really intended to be a very transparent process and we’re only partway into that process certainly.

Geohazards were very clearly described in the geohazard report attached to the SQRA. So there’s an extensive body of work that’s gone into describing where potential geohazards exist and the mitigation methods used to reduce the frequency or potential risk associated with those geohazards.
And it really -- it fits in with why the project is looking for -- has assessed what we call a 1-kilometre corridor, which allows us as we continue with the work, as we continue with the design work to modify the route, to address, for example, geohazard conditions and avoid those by routing modifications.

Certainly -- and I think I’ve described it before -- as we move forward with the detailed engineering, there is a substantial amount of additional geotechnical work that’s been described that needs to be undertaken to further inform the risk analysis and the geohazard risk analysis specifically.

So these processes are described in our geohazard report and I think perhaps Mr. Cavers, who’s really one of the primary authors of that report can add some details to that.

MR. DRUMMOND CAVERS: Well we’ve -- and as Mr. Doering has said, we view the -- we view the risk assessment as a very important process to identify, in particular, the outliers which may have a higher risk.

As engineers, certainly as geotechnical engineers, we tend to concentrate on the hazard or the frequency of occurrence side. So if we go to the SQRA and -- have we got the B number?

The B number is B75-2, and we go to -- it will be a couple of pages on -- I’m sorry I don’t have it up in the -- B, section six. I’m looking for just the risk matrix page, just section six of that report. I’ll have it here. Page 38, bottom of this page.

So as engineers we tend to work on the frequency side there. The consequence scoring side in this report is -- was principally driven by the next panel.

But you can see on there that there are lower, moderate and higher consequent scorings and our general aim is to be down towards the left-hand side of the matrix. We’d like to be in the dark green side with most of our risks and maybe, depending on the risk, some might go into the light green. We’d certainly like to avoid the higher -- the higher risk which is the higher consequence, higher frequency, which is in red.

So having said that, in the geotechnical report -- in the quantitative
hazard geotechnical report, we’ve outlined for each location along the pipeline, on a kilometre-by-kilometre basis, the kilometre segments, the proposed mitigations and what that does for the frequency of those occurrences.

7846. And so we -- as I say, we’ve been operating mainly on the left-hand axis as engineers to get that frequency down to very low rates of occurrence. You can see in the bottom -- in the bottom left-hand corner, it’s 1 to 10 to the minus 6, which is one in a million.

7847. So those are the kinds of numbers we would like to see from the geotechnical point of view, in the 10 to the minus 5, 10 to the minus 6, typically as a frequency of occurrence.

7848. MR. RAY DOERING: And I will just maybe finish up on the discussion because I think the question was: Are these risk levels identified acceptable to Northern Gateway?

7849. And I really wanted to point out that these -- these are described in here as unmitigated risk. So there is the -- mitigation has not yet been applied to the assessment here. So are they acceptable? No. We still have to apply the mitigations to the design and to the risks that are calculated through this work.

7850. MR. MCCORMICK: Thank you both for your responses.

7851. So my understanding from that response is that Northern Gateway does not consider the risks as identified in the SQRA as acceptable at this point?

7852. MR. RAY DOERING: I think I’ve indicated that there is additional work we need to do to further reduce risk potential associated with some of these hazards, yes.

7853. MR. MCCORMICK: Thank you, Mr. Doering.

7854. Madame Clerk, if we could briefly return to Exhibit B75-2 page 56? That was the table we had examined earlier.

7855. THE CHAIRPERSON: Mr. McCormick, just while we’re going there, would you mind again pulling your microphone a little closer? Thank you.

7856. MR. MCCORMICK: My apologies, Madame Chair. Thank you for
alerting me to that.

7857. So I think the concern that is driving some of these questions is that Northern Gateway has identified ALARP, “As Low As Reasonably Practicable”, as the driving objective of its risk assessment. Whereas, to many, I believe it would sound more like ALAWTIOK, which would be, “As Low As We Think Is Okay.”

7858. I’d like to know whether the Panel shares my understanding that there is a distinction between a quantifiable risk objective or an acceptable -- quantifiable acceptable risk level that can be accessed -- that can be assessed by my client, the Joint Review Panel and the Canadian public and a nebulous subjective risk target without quantifiable numbers.

7859. **MR. JAMES MIHELL:** So, Mr. McCormick, I think I tried to explain the process to you earlier.

7860. I think you’re asking if there is an overall risk target that we manage too on an integrated basis that says that, for the entire pipeline, this pipeline needs to meet or be better than a certain reliability. You’re asking us, I think, if that’s how the process works. And I think I’ve tried to say a couple of times that’s not how this process works nor is it the intent or is it the purpose of this process.

7861. The -- there’s a couple of options in designing a pipeline. One is: you can take out your Z662 Code and build to the minimum requirements of that code -- and it is fully compliant with regulation and law -- and bury the pipeline, put it into service and there is nothing in terms of regulation or law that says that there is anything wrong with that.

7862. The process that is being adopted here is one that is far more rigorous and I don’t think that any of us should feel apologetic about the fact that it’s a very protracted process. It takes time, it takes a lot of study.

7863. And, you know, I was listening to a lot of the discourse yesterday and today about: Why don’t you have final design yet? Why isn’t it done yet? Why haven’t you figured everything out yet?

7864. Because these guys have been working on it for years. The geotechnical engineers are constantly re-evaluating, collecting more information and striving to see whether there are -- whether or not there are hazards that can
be avoided. It’s a long protracted process.

7865. The point of the process is not to establish a reliability metric for the pipeline as a whole and I think as I mentioned before, to do so would really -- I suppose if that was the strategy that you wished to adopt then I wouldn’t want to be living near the short pipeline, because the societal risk that’s associated with a short pipeline would be quite high.

7866. You know, if I was -- if I happened to be close to that short pipeline that had an integrated risk value that was considered acceptable, then the risk on a per kilometre basis would be high enough that I think I would look to see if I can move somewhere else. Conversely, longer pipelines would be unnecessarily penalized.

7867. So that’s not the way we do things. It’s -- it doesn’t make sense to do things that way. What makes sense is to use this process to guide design so that the most risk-optimized designs can be selected and implemented and it takes time. It’s a very arduous, time-consuming process.

7868. So, Mr. McCormick, in response to your question, “Why don’t we have a risk target, a reliability target for the pipeline as a whole?”, I think I’ve answered that question.

7869. **MR. McCORMICK:** Thank you kindly.

7870. Just to clarify, my question wasn’t necessarily in relation to the entire length of the pipeline.

7871. But perhaps to leave this topic, I will just return us to Figure 1 which we currently see on the screen of the SQRA, at page 56 of 172 and we’ll note again that, in the diamond at the centre of this figure, it notes that “Acceptable risk in all segments” must be determined in order to proceed to “Finalize Design” and “Operating Procedures”.

7872. Before Northern Gateway proceeds from the acceptable risk in all segments assessment to finalize design and operating procedures, will they be -- will Northern Gateway quantify its acceptable risk levels?

--- (A short pause/Courte pause)
MR. JAMES MIHELL: You know, it would be wonderful if we could say that the science of risk analysis was exact enough that it would enable us to be completely confident that the numbers that we generate are going to be absolute and representative of what to expect and so on.

In actual fact, I think that if we were to say that a -- you know, a return period on failure of 340 years -- I think if we were to make an estimate of that, I think I would be very surprised if the return period on a failure turned out to be exactly 340 years.

The important thing in all of this is to ensure that, when developing a risk tool and a risk process that is used for the purposes of risk-based design, is that the risk process be sensitive to the design parameters, and that’s the point. So it’s not -- what we’re really not -- we’re really not trying to establish social licence, you know? Social licence would be imputed by some sort of number that we say that we’re going to manage our risk to.

What we’re really trying to do is establish a process that estimates risk using methods that are sensitive to design variables, such as wall thickness and pressure and stress levels and depth of burial, and things like that. And look and see where we start to reach a point of diminishing returns and comparing relative risk using the same methods that are sensitive to these design and operations variables.

So the goal here is to modify the design or mitigations measures such that you start to see these diminishing points of return. These -- you start to see in a relative sense that you’re getting there. You’ve addressed the significant risks and you’re at a point of diminishing returns.

It’s not to try to claim social license, it’s to inform design. And so given that that’s the case, you know, the goals will be met by following this figure. The iterative approach that’s shown in this figure comparing unmitigated risk values to mitigated risk values using the same approach, the same analysis approach that is sensitive to design variables that enables you to see where you get to a point of diminishing returns.

That’s the process. That’s why we do this. It’s not to try to claim social license. To try to generate a number that society’s going to say “I can live with that”, that’s not what we’re trying to do here. We’re trying to develop the most robust, rigorous design possible that is risk optimized.
7880. **MR. RAY DOERING:** And just to conclude on that matter again. I think the question started with “are we going to achieve acceptable risk in all segments”, and I think, again, we have described a process here. We have engaged the experts in the appropriate fields to assess those risks. And we believe that, certainly, we’re confident that we can apply the mitigation to achieve that statement that we will obtain acceptable risk in all segments of the pipeline. Yes, we’re confident that we will get there.

7881. **MR. MCCORMICK:** I thank the panel for its in-depth answers.

7882. I will note that the question didn’t seek discussion of social license. And I can appreciate that the panel may consider that to be relevant.

7883. I trust that Northern Gateway will achieve its goals in setting its own goals. I believe the concern is that those goals will not be available for evaluation by the Joint Review Panel, the public, or my client but I am happy to leave the subject, I believe we’ve discussed it.

7884. And I will now turn to a new Exhibit. If I could ask Madam Clerk to please display Exhibit B124-4, it should be Map A.118. If you’d kindly slide a bit to the right of what we see on the screen. That’s perfect.

7885. This map displays the Clore Tunnel and it informs -- it is part of the mapping that has been provided by Northern Gateway to identify pipeline route geohazards.

7886. And I’ll draw to your attention the small white caption box above the yellow line indicating the Clore Tunnel which reads: “Hazards not mapped in tunnel area”.

7887. Madam Clerk, if I could also ask you to now switch to Exhibit B124-5, which should be Map A.119. Thank you.

7888. Similarly, this is a map provided by Northern Gateway to identify route geohazards. And if we could please slide to the right of what we see on the screen. That’s perfect. Thank you very much.

7889. We see a yellow line displaying the proposed Hoult Tunnel. And similar to the last graphic we observed, it includes a caption box indicating that
hazards have not been mapped for the tunnel area.

7890. Am I correct in my understanding from the caption boxes in these two maps that the geohazards for the Clore and Hoult Tunnels have not yet been mapped?

7891. **MR. DRUMMOND CAVERS:** No. In contrast what these captions indicate is that the tunnel alignments are far below the geohazards that we see on the surface and so that those geohazards were not considered worthwhile to be mapped in the tunnel area because we had missed them all by being well below them.

7892. **MR. McCORMICK:** So my understanding from that response is that there’s not been an assessment of the geohazards associated with either the Clore or Hoult Tunnel because they are buried below the ground?

7893. **MR. CLIVE MACKAY:** If I could -- if I could answer that. So the purpose of the geohazard mapping was to display the surface geohazards. There will be -- so there has been an assessment of what the anticipated tunnelling conditions will be based on the geological model, based on the anticipated performance with construction of the tunnel and that will be further refined during detailed engineering. It will also be verified during construction.

7894. So the notion of what hazards are present in the tunnel will be part and parcel of the design, construction and lining support phase of the tunnels. Perhaps that answers your question.

7895. **MR. DRUMMOND CAVERS:** Further to my colleagues remarks I’d just like to point out that there has been very extensive work on geologic mapping, drilling, and assessing the geological conditions which go into the assessment of the tunnels. And that material which can’t readily be presented on a geohazard map such as this is contained in reporting that has been filed.

7896. **MR. McCORMICK:** Thank you.

7897. Touch briefly on a subject that was raised by Mr. Leadem in earlier cross-examination, which relates to the tunnel construction and the potential for acid-generating rock to be discovered there.

7898. Has Northern Gateway -- or excuse me. The Northern Gateway
information request responses on this issue all indicate that the decisions regarding what to do with acid-generating rock from the tunnels have not yet been finalized; is that correct?

7899. **MR. DRUMMOND CAVERS:** There is a report, first of all, which outlines in a preliminary basis the proposed approach to dealing with acid-generating rock from a point of view of detection and dealing with it. It has been stated in that report that that report is subject to additional review from -- on the regulatory -- and input from regulatory point of view. It’s been filed.

7900. There has been -- my colleague has provided answers on the -- on the way that we are going to approach, in general, the identification of materials and the treatment of those materials.

7901. And so we -- I think we have a pretty good handle on how we’re going to deal with the potential and the occurrence of possibly acid-generating materials from the tunnel in those two sources.

7902. **MR. McCORMICK:** Thank you for your response.

7903. I’d like to talk briefly about the Pacific Trails Pipeline. Am I correct in my understanding that the British Columbia Oil and Gas Commission imposes a number of stipulations for the placement of new pipelines along corridors containing existing pipelines?

--- (A short pause/Courte pause)

7904. **MR. RAY DOERING:** Yeah, I think perhaps if you were a little bit more specific in your question, I can imagine there are a number of expectations of the B.C. Oil and Gas Commission regarding pipelines.

7905. **MR. McCORMICK:** Certainly, Mr. Doering. Perhaps through the questioning, it’ll become more apparent what we’re hoping to address. You’ll agree with me that the proposed route of the Northern Gateway pipeline overlaps, in some areas, with the propose corridor for the Pacific Trails pipeline?

7906. **MR. RAY DOERING:** Well ultimately, if the PTP pipeline is constructed prior to the Northern Gateway pipeline there -- I expect there will be a number of areas where the Northern Gateway pipeline will be constructed parallel and adjacent to the PTP pipeline, so, yes.
7907. MR. McCORMICK: And based on the information that Mr. Doering provided on the first day of the sessions in Prince George, the anticipated in-service date for the Northern Gateway Project would be 2018; is that right?

7908. MR. RAY DOERING: Yes, that's our -- that was information we provided.

7909. MR. McCORMICK: Thank you. And it's anticipated based upon the current state of the Pacific Trails Pipeline development that it will go into construction prior to the Northern Gateway Project; is that correct?

7910. MR. RAY DOERING: Well, we certainly see that they have cleared a right-of-way and workspace in certain areas. There hasn't been any indication that the pipeline -- with regards to the start of construction for the pipeline.

7911. MR. McCORMICK: Mr. Doering, at any point does the proposed Northern Gateway pipeline route overlap within 30 metres of the proposed Pacific Trails pipeline route?

7912. MR. RAY DOERING: The -- there would be no intention to overlap the Northern Gateway right-of-way with the PTP right-of-way. We -- again, we've assessed and we're assessing a corridor which allows certain flexibility with -- of locating the pipeline centre line within that corridor. And certainly, if based on currently provided centre line information for Northern Gateway, if that happened to be immediately over top of the currently proposed PTP pipeline, there would need to be a small adjustment made to address that.

7913. MR. McCORMICK: Has Northern Gateway received written assurance from Pacific Trails Pipeline developers that permission will be granted to permit Northern Gateway to construct the Northern Gateway pipeline within the Pacific Trails pipeline corridor?

7914. MR. RAY DOERING: Well, Northern Gateway would not construct the pipeline within the Pacific Trails Pipeline right-of-way, if that's really what you meant.

7915. MR. McCORMICK: So I'm correct in my understanding that Northern Gateway is confirming that it will not go into the same right-of-way with the Pacific Trails Pipeline?
MR. RAY DOERING: No, we would not go into the same right-of-way. There would be a certain separation between the pipelines, certain safe separation distance, certainly. We expect that for optimum use of the land, we would want to have the pipeline right-of-way immediately adjacent to the PTP pipeline where that's feasible.

There could be some sharing of temporary workspace during the construction phase where there may be an overlap in use of portion of, perhaps, the PTP right-of-way for construction purposes. But that would have to be negotiated directly with PTP.

MR. McCORMICK: And as of today's date, that information regarding whether that overlap may occur is not yet available?

MR. RAY DOERING: Yeah. Again, it would not be overlap of the right-of-way. It may be, for efficient use of the land, it could be temporary use of portions of the PTP right-of-way for workspace, just to minimize clearing and grating activities, potentially, in some areas.

MR. McCORMICK: Thank you.

Is Northern Gateway aware that it must perform new geotechnical work following the construction activities of the Pacific Trails pipeline due to alterations in terrain and terrain stability that may be caused by the construction of the Pacific Trails pipeline?

MR. DRUMMOND CAVERS: Well, certainly we anticipate that we would need to look at what PTP had done in terms of construction in order to preserve safe operating conditions and construction conditions for the Northern Gateway pipeline, and also to avoid creating a problem on the PTP pipeline.

So if, for example, they had some big cuts and so on, we would certainly have to factor that in to our geotechnical planning relative to the new right-of-way.

MR. McCORMICK: And will this new required geotechnical work come at a substantial cost to Northern Gateway?

MR. DRUMMOND CAVERS: Well, you seem to be implying that
we're going to stop geotechnical work at some point. This is an ongoing process and this is the evaluation of the resulting terrain conditions from the PTP pipeline is just one factor that we'd be looking at. There will be undoubtedly new roads constructed, clearings, other works at various locations along the route that we will need to evaluate.

And so as I've stated before, the geotechnical process is an ongoing process that started about 10 years ago and it will keep on going through the design, through the construction and through the operation of the pipeline.

And this is not a unique situation that arises from paralleling a pipeline that's proposed for construction, this is actually very common in the oil and gas industry across Western Canada. We see it all the time and it's not an unknown occurrence that we have a preliminary plan and that somebody else has similar plans, and so we need to adjust our planning. The second pipeline needs to adjust its planning to accommodate the conditions as they actually exist at the time of construction.

MR. McCORMICK: So does Northern Gateway have a contingency plan for routing if the corridor becomes unable to sustain further pipelines by the time Northern Gateway begins construction, due to other possible pipeline projects?

MR. DRUMMOND CAVERS: We don't see why the corridor would become unable to sustain construction of another pipeline.

We discussed this in detail yesterday and I would refer you to the testimony from yesterday on that subject.

MR. McCORMICK: I'd like to discuss landslide risk during construction and operations. Northern Gateway acknowledges that there is at least the risk of landslides during construction or engineering; is that correct?

MR. DRUMMOND CAVERS: No, I would rephrase that to use the word hazard; the potential for a landslide to occur during construction.

MR. McCORMICK: I'm slightly confused. You requested that we rephrase the question using the word hazard, but in restating it you haven't used the word hazard. If I can trouble you to just clarify.
MR. DRUMMOND CAVERS: We are -- we're defining risk from the point of view of risk in the engineering sense, risk is equal to hazard times consequences. And so you're using the word in -- you're using risk to, I think, imply hazard, and so we do agree that there is a potential for landslides during construction if proper planning isn't undertaken.

MR. McCORMICK: Thank you, I appreciate that clarification.

--- (A short pause/Courte pause)

MR. McCORMICK: And has construction been timed seasonally to minimize risk of a landslide interfering with construction work when building in the Kitimat Valley and across the Coast Mountain Range?

MR. DRUMMOND CAVERS: I didn’t -- I didn’t understand the start of your question, could you say it again please?

MR. McCORMICK: Certainly. Has construction been timed seasonally in accordance with the seasons to minimize risk of a landslide interfering with construction work when building in the Kitimat Valley and across the Coast Mountain Range?

MR. DRUMMOND CAVERS: I think -- I think in general that the -- the timing of construction and the methodology of construction will certainly consider prevailing weather and climate conditions throughout the entire pipeline length. And so we are -- we are going to -- we are going to execute the construction in a safe, efficient manner which is not going to create problems. We want to run a -- we want to run a safe and -- safe construction operation from the point of view of weather conditions, climate conditions and geological conditions.

MR. McCORMICK: And does Northern Gateway agree that potential impacts on fish and wildlife could alter construction schedules or limit the times available for construction?

MR. DRUMMOND CAVERS: Yeah, we’re maybe verging on -- on questions for the other panel but certainly we recognize that particularly on the west -- towards the west that there will be out of sequence construction in order to best handle weather conditions, local conditions on a -- on an individual basis depending on -- depending on prevailing conditions.
7942. **MR. McCORMICK:** Thank you, Mr. Cavers.

7943. During construction of the proposed pipeline portions of the pipeline that would otherwise be buried will be exposed; is that correct?

7944. **MR. TOM FIDDLER:** As a natural course of construction of a pipeline, the pipeline is strung along the right-of-way, skidded up and welded. Then following that will be ditching and/or blasting activities which may actually precede the pipe, depending on the situation in the blast management plan, but ultimately then backfilled. So yes, pipe strings will be above grade during the construction process.

7945. **MR. McCORMICK:** Thank you. And you’ll agree that a landslide during construction could impact the integrity of any exposed pipeline?

7946. **MR. DRUMMOND CAVERS:** Yes, it could certainly impact the integrity of an exposed pipeline. I’m not -- I’m not sure where you’re going with this. The -- as I stated earlier, the mitigation of landslides does not only apply to post-construction, it applies to maintaining safe construction conditions, not only with respect to the pipeline but with respect to the construction crews, and with respect to the environment through the construction process.

7947. **MR. McCORMICK:** Thank you. And does Northern Gateway have a monitoring inspection and testing policy during construction while pipeline is exposed to address risks to -- to exposed pipelines from landslides or other potential hazards?

7948. **MR. TOM FIDDLER:** Yes, we do.

--- (A short pause/Courte pause)

7949. **MR. McCORMICK:** And does Northern Gateway plan to install landslide detection mechanisms in all areas where there is a risk of a landslide impacting the proposed pipeline?

7950. **MR. DRUMMOND CAVERS:** No. In general, we don’t see a need to install landslide detection mechanisms. I’m -- I presume by that you mean are we going to install instrumentation for monitoring of -- of temporary slopes. No, the aim is to engineer and construct the slopes, supplemented by visual
monitoring, in order to provide safe working conditions. Instrumentation is not typically used in this -- in this kind of a situation and -- and nor is it -- nor is it required.

--- (A short pause/Courte pause)

7951. **MR. McCormick:** Would you agree -- we’ll return to the SQRA for a moment, would you agree that the SQRA essentially writes off forest fires as a negligible risk to the pipeline?

7952. **MR. James Mihell:** In -- in terms of their potential for initiating a loss of containment event, yes, the pipeline is maintained in a cleared right-of-way in a buried condition and the -- the reality is that in its buried condition within a cleared right-of-way, yes, a forest fire is not expected to initiate a loss of containment event.

7953. There’s been several precedents set, certainly on other operator’s pipelines, Northwestern Ontario where forest fires have gone right over pipeline right-of-ways and have not caused integrity issues with the pipe.

7954. **MR. McCormick:** So what I’m understanding is that the SQRA relies on the assumption that the locations where the pipeline will be buried will all be cleared right-of-ways; is that correct?

7955. **MR. James Mihell:** Yes, we will -- we will clear the 25 permanent -- 25-metre right-of-way. That right-of-way will not be reforested; it’ll be re-vegetated but not reforested, if that helps.

7956. **MR. McCormick:** So it will -- it will be cleared at the time of construction but over a period of time it will not be re-cleared as vegetation develops on top.

7957. **MR. Ray Doering:** Yes, there -- there will be vegetation management as time goes on to -- to allow observation of the -- of the right-of-way itself. So there will be a vegetation management program periodically over years.

7958. **MR. McCormick:** And will herbicides be used as part of the vegetation management program that you’ve just described?
MR. RAY DOERING: No, we undertake vegetation management through mechanical means.

MR. McCORMICK: Do you agree that there is potential for forest fires to affect pipeline operations?

MR. RAY DOERING: There -- there were a series of information requests responses that we did provide -- I don’t have quick reference to it -- that addressed that question and there -- there could be circumstances where power may be disrupted to facilities, you know, that could be a scenario where operations would be interrupted.

But really, this is probably a question best directed to our Operations Panel and they can fill you in on a lot more detail in that regard.

MR. McCORMICK: Has Northern Gateway accounted for the potential impact of a forest fire in the vicinity of the pipeline in its design plans?

--- (A short pause/Courte pause)

MR. RAY DOERING: I’m wondering if perhaps you could restate that question and maybe just give a little more detail around your inquiry.

MR. McCORMICK: Certainly.

You’ve mentioned that there will be a buried pipeline. The buried pipeline will be under a 25-metre cleared right-of-way. The right-of-way may be subject to some vegetation occurring but a vegetation management plan that will not use herbicides will be put into place.

That does not discount the possibility that there will be a forest fire in the area of the pipeline or is that the understanding of Northern Gateway, that the clearing of the right of way will prevent a forest fire from occurring entirely?

MR. RAY DOERING: No, certainly not.

The Northern Gateway will maintain a 25-metre permanent right-of-way for operation -- safe operation of the two pipelines. During construction, the construction footprint is somewhat wider than that and it is, in fact, as much as 50 metres in total, including the permanent right-of-way.
7970. That area is cleared to allow safe construction of the pipeline. That area though, is reforested and allowed to regrow fully. So we expect to have full regrowth of trees, you know, immediately adjacent to the 25-metre right-of-way.

7971. So, certainly, there could be a situation where you have a forest fire in the vicinity of the pipeline.

7972. **MR. McCormick:** And has Northern Gateway, in its assessment of the risk of forest fires, determined what temperature increases might be experienced by the pipeline due to a forest fire?

--- (A short pause/Courte pause)

7973. **MR. James Mihell:** I think if precedent dictated that this is a viable failure mechanism, certainly, there’d be a lot of work in addressing this potential threat.

7974. As I indicated earlier, however, precedent suggests that, in a buried pipeline within a cleared right-of-way, there is more than sufficient insulation with the ground cover to not cause any concern with respect to pipeline integrity.

7975. **MR. Ray Doering:** And I will take you to an IR response and I think it is B41, response to IR 5B in this case and see if we can bring up that particular reference.

7976. B41-3 I’m told, Adobe 11.

7977. In this case, the question was:

“What is the likelihood that a forest fire would damage or disrupt pipes and, pump stations, or surpass the recommended maximum design temperature for infrastructure?”

7978. And the response was -- and, again, following up on Mr. Mihell’s comments:

“For forest fires do not present a threat to buried pipelines. Above ground facilities will be built with buffer areas to protect against forest fire damage,...”
And I won’t go on but that’s essentially the response.

MR. McCORMICK: That’s a very assertive response. It indicates:

“Forest fires do not present a threat to buried pipelines…”

Which, to me, states a conclusion.

The question I asked was: In assessing the risk of forest fires, did Northern Gateway assess what temperature increases might be experienced by a pipeline due to a forest fire?

MS. ESTEP: Madam Chair, that question has been asked and the witness has provided a response a couple of times now.

So, they haven’t responded to that specific question about a temperature but they have tried to explain, a couple of different ways now, that forest fires do not present a threat to buried pipelines.

So they’ve explained that verbally, they’ve directed the witness to an IR response that speaks to this issue directly on point and so I object to further questioning on this.

THE CHAIRPERSON: Mr. McCormick, the Panel at this point would note that some of the questions you’re asking have already been covered on the record and so we would encourage you to review your questions and eliminate those for which there are already answers on the record.

And, in doing so, this is an example of that. We would suggest that you move on to your next line of questioning.

MR. McCORMICK: Thank you, Madam Chair. We will certainly review our questions to confirm that they have not already been asked.

I will, however, state my disagreement with my friend from Northern Gateway in her assessment of whether a response has been provided to my question.

My question was addressed specifically to the assessments undertaken
to determine whether forests fires prevent or forest fires present a risk in terms of temperature.

7991. The response, which the Haisla Nation is aware of and has reviewed prior to developing these questions, indicates that Northern Gateway has determined that forests fires do not present a threat to buried pipelines.

7992. The purpose of the questioning was to test that evidence but I will move along after making that point.

7993. **THE CHAIRPERSON:** Mr. McCormick, the Panel is listening closely and believes that it has received the information that it needs in response to the questions that you’ve been posing so we would ask you to move along.

7994. **MR. McCORMICK:** Thank you, Madam Chair.

--- (A short pause/Courte pause)

7995. **MR. McCORMICK:** Stepping from the hot to the cold, I’d like to draw -- I’d like to raise some questions in relation to the potential impacts of freeze thaw cycles on the pipeline -- pipeline integrity.

7996. Madam Clerk, if I could please ask you to display Exhibit B1-5 which is Volume 3 of the application, “Engineering, Construction and Operations”, document A1S9X8, at page 46, please?

7997. Table 5-5 displayed at the top of the page provides the minimum installation depth of cover from construction grade for the pipelines.

7998. You’ll note that the general minimum depth of cover for the pipelines is identified to be 0.9 metres; that would be the upper left hand box in the chart.

7999. Does that refer to the minimum depth of cover at construction?

8000. **MR. TOM FIDDLER:** No, that is actually a reference -- I apologize for that -- a reference to a measurement from subgrade.

8001. So, organic stuff, that type of material whether it’s topsoil area or whatever removed and that would be the absolute minimum to not only top a pipe but any appurtenance.
8002. So an example might be an anchor or a weight or something like that on -- when we’re in a buoyancy control situation on pipe.

8003. Mr. McCormick: Okay, well, I’ll ask for a little clarification to help me understand that. You’ll appreciate that it’s a very technical answer.

8004. What you’re telling me is that the 0.9 I see in the chart under “Minimum Depth of Cover (Construction Grade)” is a depth of cover that is applied at the time of construction or is a depth of cover we would see at a later point in time?

8005. Mr. Tom Fiddler: It’s at a later point in time.

8006. What I was referencing to is -- the (Construction Grade) ---

8007. Mr. McCormick: M’hm.

8008. Mr. Tom Fiddler: --- is we are committed to salvaging all organics and duff for replacement on the right-of-way.

8009. Mr. McCormick: Thank you for that clarification.

8010. And am I correct in my understanding that the pipeline diameter for diluted bitumen will be 914 millimetres?

8011. Mr. Ray Doering: The oil pipeline would have an outside diameter of 914 millimetres; correct.

8012. Mr. McCormick: M’hm.

8013. And the condensate pipeline will be 508 millimetres?

8014. Mr. Ray Doering: Correct.

8015. Mr. McCormick: Thank you.

8016. Madam Clerk, if I could please ask you to turn to an aid to cross-examination entitled: “Seasonal Pipe Movement in Permafrost Terrain, K2P Study Site, Norman Wells Pipeline”.

Transcript

Hearing Order OH-4-2011
Thank you, Madam Clerk. I’ve provided earlier a list of the tab numbers that we would use to refer to but I’ve left the binder on the table, Mr. Donovan is gathering it for me. Thank you.

**THE CHAIRPERSON:** While we’re doing that, perhaps we could get an AQ number assigned for Haisla Nations AQs.

**THE REGULATORY OFFICER:** That will be AQ25.

**MR. MCCORMICK:** Madam Clerk, that would be Tab 14, please, the document HN-14, that’s correct. Thank you kindly.

I’d like to begin by noting that this is a document entitled “Seasonal Pipe Movement in Permafrost Terrain, KP2 Study Site assessing the Normal Wells Pipeline” and was prepared by Burgess et al. I’d begin by asking the panel if they’re familiar with this document.

**MR. RAY DOERING:** I see the title here but I don’t believe anybody on this panel has actually read this document.

**MR. MCCORMICK:** Was this document provided to you in advance of the hearings? There may have been some difficulties associated with the cross-examination aids.

**MS. ESTEP:** I can speak to that, Madam Chair.

We did have some difficulty with that. Counsel, Mr. McCormick, sent an email on October 5th which was sent to Mr. Neufeld. That email, for whatever reason, I’m sure it was a glitch in email land, was never received by Mr. Neufeld.

So we received the cross aids, I believe it was yesterday, if I’m keeping my days straight. So we’ve done our best to get those distributed to the witnesses. There were some issues with the electronic website links, which we’ve dealt with directly with Mr. McCormick. So we’ve straightened those issues around and we believe we have the full set. But I would say that I’m doubtful that the witnesses are fully conversant with the package of materials that’s been provided but we’ll do our best.

**MR. MCCORMICK:** I’m happy to postpone that questioning until
tomorrow’s questioning.

8028. **THE CHAIRPERSON:** Mr. McCormick, have you noted the passages in each aid that you intend to refer to so that the witnesses will be able to just hone in exactly on the passage that you want them to address?

8029. **MR. McCORMICK:** Of course.

8030. **THE CHAIRPERSON:** Has that been done on the -- I don’t see it on the documents in front of us, that’s why I was wondering.

8031. **MR. McCORMICK:** Oh, I’m sorry, we have not indicated physically on the documents themselves, however, in the Table of Contents we have provided references.

8032. **THE CHAIRPERSON:** So you’ve provided the reference on a page number in some of them and those would be the, for example, in the Index Tab 2, you want them to be able to speak to page 6 of 28; is that correct?

8033. **MR. McCORMICK:** Yes.

8034. **THE CHAIRPERSON:** So in cases where there isn’t a page number, you’re expecting them to be conversant with the entire document?

--- (A short pause/Courte pause)

8035. **THE CHAIRPERSON:** It looks to me like in the case of Tab 14, which I believe is the one that we’re on now, it’s been marked paper page numbers 95 to 99, and that appears to be the entire document; am I correct?

8036. I haven’t had a chance to look at these either but I just want to make sure that we have the witnesses concentrating on the specific pieces of the documents that you wish to use as your aid to cross-examine.

8037. **MR. McCORMICK:** Certainly. I appreciate that will help the efficiency of the process. And perhaps if I can just take a moment, I’ll identify those portions now so the witnesses are aware and then we can postpone it.

8038. **THE CHAIRPERSON:** We’re going to identify them tab by tab, document by document?
MR. McCORMICK: No, just this particular document if that pleases the Panel, or if not, we can provide it by email.

THE CHAIRPERSON: And perhaps what would be most helpful in making sure that the witnesses are prepared to proceed is if you could identify the documents that you plan to be referring to tomorrow, and the specific passages and then just keep doing that on a going forward basis during your questioning of this panel. And of course, the Panel would also like to know what those portions are that you will be referring to.

MR. McCORMICK: Certainly, Madam Chair, I’d be happy to do that.

If I may, I would prefer to do that over email as it would take up some time this afternoon.

THE CHAIRPERSON: Exactly. That’s what I’m thinking is that why don’t we -- as opposed to you taking time to do it now, why don’t you compile that list and send it as soon as feasible so that the witness panel will have the opportunity to use some time this evening to prepare for the specific passages that you want to refer to.

MR. McCORMICK: Certainly, Madam Chair. I will also note that in my discussions with my friend from Northern Gateway, we have identified the problem in their email distribution chain and the relevant people have been added to the distribution list for Donovan and company. So there shouldn’t be any further problems in providing the documents to the witnesses in advance.

THE CHAIRPERSON: Thank you for that.

So is it my understanding then that you won’t be referring to any aids to cross-examine, you know, for the next 10 minutes, until we finish for today; is that correct?

MR. McCORMICK: That is correct.

I’ll ask you to just bear with me for a moment to just confirm the next portion of questioning will not require any aids to cross. Thank you.
8049. **MR. MCCORMICK:** Madam Chair, from your last comments I understand that we’re looking at a period of 10 minutes before the anticipated closing time today. May I make a recommendation that we save further questioning for tomorrow, as 10 minutes will certainly not cover any of the proposed chapters of cross-examination that I’d like to delve into?

8050. **THE CHAIRPERSON:** Thank you, Mr. McCormick. That would also provide you the time to review your questions and make sure that we’re not covering ground that’s already been covered.

8051. So let’s close for today. And I don’t believe there are any other issues that we need to deal with tonight before we close, so we will sit again at 9:00 tomorrow morning.

8052. Thank you, everyone. Good evening.

--- Upon adjourning at 4:21 p.m./L’audience est adjournée à 16h21