

**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 142

**Hearing held at
Audience tenue à**

**Chances Prince Rupert
240 West, 1st Avenue
Prince Rupert, British Columbia**

**February 22, 2013
Le 22 février 2013**

**International Reporting Inc.
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Canada

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as represented by the Minister of the Environment
and the National Energy Board

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participant à l'audience publique.

Imprimé au Canada

HEARING /AUDIENCE

OH-4-2011

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 Rupert (British Columbia), Friday, February 22, 2013
Audience tenue à Prince Rupert (Colombie-Britannique), vendredi, le 22 février 2013

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- Ms. Carol Hales
- Ms. Rebecca Brown
- Mr. Asad Chaudhary
- Mr. Neil Patterson

ERRATA

(i)

Thursday, February 21, 2013 - Volume 141

Paragraph No.:

Should read:

12030:

“...forwarding over...”

“...porting over...”

12041:

“...population level that the 88 year class...”

“...population level and the 88 year class...”

12052:

“...the Osaka spill...”

“...the Nestucca spill...”

12064:

“...candlefish and oolichans are the most common name ...”

“...candlefish and hooligans are the most common name...”

12120:

“...return in 1990 and '91, we constituted...”

“...return in 1990 and '91 they constituted...”

12123:

“...to as high as 33,000...”

“...to as high as 33 parts per thousand...”

12160:

“...Dr. Ernie Brennan...”

“...Dr. Ernie Brannon...”

12165:

“...any kind of test material where...”

“...any kind of test material whether...”

12187:

“...organization in the Province of B.C. to...”

“...organization and the Province of B.C. to...”

12201:

“...it would be considered...”

“...it would not be considered...”

12501:

“So again, what is showing is...”

“So again, what is shown is...”

ERRATA

(ii)

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Paragraph No.:

Should read:

12275:

“MR. GREG MILNE:”

“DR. ALAN MAKI: ...”

12338:

“...a species-sensitive distribution looking at the sensitivity...”

“...a species-sensitivity distribution looking at the sensitivity...”

12364:

“...Ian Bertwell...”

“...Ian Birtwell...”

12541:

“...response planning purpose.”

“...response planning process.”

12776:

“High UV exposure was included in the testing as well as two examples.”

“High UV exposure was included in the testing as well, as two examples.”

12995:

“...order of seconds entrained to the surface.”

“...order of seconds, entrained to surface.”

13173:

“...a spectrum effect...”

“...a spectrum of effects...”

13199:

“...and under breaking wave conditions, the significant...”

“...and under breaking wave conditions, a significant...”

13222:

“...would no different.”

”...would not be different.”

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Mr. Randy Belore	
Mr. Jeffrey Green	
Dr. Alan Maki	
Mr. Owen McHugh	
Mr. Greg Milne	
Dr. Edward Owens	
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(i)

Description

Paragraph No./No. de paragraphe

UNDERTAKINGS/ENGAGEMENTS

No.	Description	Paragraph No./No. de paragraphe
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--- Upon commencing at 8:30 a.m./L'audience débute à 8h30

13350. **THE CHAIRPERSON:** Good morning, everyone.

JOHN CARRUTHERS: Resumed

RANDY BELORE: Resumed

JEFFREY GREEN: Resumed

ALAN MAKI: Resumed

OWEN McHUGH: Resumed

GREG MILNE: Resumed

EDWARD OWENS: Resumed

WALTER PEARSON: Resumed

JACK RUITENBEEK: Resumed

MALCOLM STEPHENSON: Resumed

JOHN THOMPSON: Resumed

CHRIS WOOLEY: Resumed

DENNIS YEE: Resumed

13351. **THE CHAIRPERSON:** Are there any preliminary matters this morning?

13352. Mr. Langen. We can always count on you in the morning for a preliminary matter.

13353. **MR. LANGEN:** Thank you, I think. Good morning, Madam Chair.

13354. Three preliminary matters. One relates to this witness panel. I just want to confirm that Dr. Al Maki's rejoined us. As well, to let the Panel know that Dr. Jim Stronach, who's sitting as a support person behind this panel, will be with us until the close of the hearing day tomorrow, Saturday. He will not be rejoining us next week.

13355. The second preliminary matter relates to undertaking responses. We have four to file, and to obtain exhibit numbers for.

13356. The first is undertaking response to U-59 given by Northern Gateway to the Joint Review Panel at Transcript Volume 106, paragraphs 512 and 547 through 557.

13357. **THE REGULATORY OFFICER:** And that will be Exhibit B202.

--- **EXHIBIT NO./PIÈCE No. B202:**

Enbridge Northern Gateway's Response to Undertaking U-59

13358. **MR. LANGEN:** The next is undertaking response to Undertaking U-66. That was given by Jon Moore to Mr. Patterson at Transcript Volume 137, paragraph 6813.

13359. **THE REGULATORY OFFICER:** That will be Exhibit B203.

--- **EXHIBIT NO./PIÈCE No. B203:**

Enbridge Northern Gateway's Response to Undertaking U-66

13360. **MR. LANGEN:** The next is response to Undertaking U-68. That was given by Dr. Pearson to Mr. McCormick at Transcript Volume 140, paragraph 11867.

13361. **THE REGULATORY OFFICER:** And that will be Exhibit B204.

--- **EXHIBIT NO./PIÈCE No. B204:**

Enbridge Northern Gateway's Response to Undertaking U-68

13362. **MR. LANGEN:** And the last is a response to Undertaking U-69 given by Mr. Owen McHugh to Mr. McCormick at the end of the hearing day yesterday, and that's at Transcript Volume 141, paragraph 13338.

13363. **THE REGULATORY OFFICER:** And that will be Exhibit B205.

--- **EXHIBIT NO./PIÈCE No. B205:**

Enbridge Northern Gateway's Response to Undertaking U-69

13364. **MR. LANGEN:** Madam Chair, I provided copies of undertaking response U-68 and U-69 to Mr. McCormick this morning.

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13365. And the last preliminary matter relates to Dr. Pearson. He has a clarification he would like to make to the evidence he provided yesterday on the record.

13366. **DR. WALTER PEARSON:** I'd like to clarify one small point on the record from yesterday. In paragraph 12041 of Volume 141, I misspoke the date. "Of their 1997 synthesis" should have been "their 2007 synthesis". Thank you.

13367. **MR. LANGEN:** Thank you, Madam Chair. Those are our preliminary matters.

13368. **THE CHAIRPERSON:** Thank you, Mr. Langen.

13369. Good morning, Mr. McCormick. Please continue with your questions of this panel.

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

13370. **MR. McCORMICK:** Good morning, Members of the Joint Review Panel. Good morning, witnesses.

13371. To begin, I'd like to speak briefly to what is now Exhibit B205. This is response to Undertaking U-69. I'll note from my review of the undertaking, and I'm not sure if it is yet available in the record for viewing electronically, it indicates various tables which have informed the information that is provided in Table 5-1 of Exhibit B23-15.

13372. It is my understanding from discussions with Mr. McHugh yesterday that he had informed the Joint Review Panel that the source information for Table 5-1 of Exhibit B23-15 was Table 7-11 from the DNV report.

13373. I don't see Table 7-11 referenced in the response to the undertaking, and I would appreciate it if Mr. McHugh could please provide clarification on how Table 7-11 has informed the preparation of Table 5-1 if it is not included in the undertaking.

13374. **MR. OWEN McHUGH:** Just one moment to pull it up, please.

--- (A short pause/Courte pause)

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13375. **MR. OWEN McHUGH:** I do believe in the transcript that we clarified that and did say that it was gathered from various tables throughout the DNV report. And what we've highlighted in the table that's attached to the undertaking are the specific tables. And the numbers within 7-11 and Table -- I think it's 8-4 as well, there are actual numbers that are, I believe, either repeated. But what 7-11 is showing is unmitigated, and I probably should have stated that it was from 8-4, which is mitigated.

13376. So 8-4 shows the same thing as Table 5-1 in B23-15. It's just that, as we expressed yesterday, B23-15 breaks out the information further.

13377. **MR. McCORMICK:** Thank you, Mr. McHugh.

13378. Madame Clerk, could we please see yesterday's transcript, that being Volume 141, February 21st, 2013, line number 13311? One three three one one (13311).

13379. Mr. McHugh, we see here that you indicate that the source information is from Table 7-11. Is that statement accurate?

13380. **MR. OWEN McHUGH:** The statement -- excuse me -- is accurate. But what I didn't realize is that the other table that is included, which essentially looks at the over-filling of cargo tanks, is the mitigated probability, which is Table 8-4.

13381. So the source information is the same. The mitigation was not applied in Table 7-11. Any additional questions on specific numbers I would direct to DNV.

13382. **MR. McCORMICK:** Just to clarify, so what you're telling us is that the information from Table 8-4 and the information from Table 7-11 of the DNV report both informed the preparation of Table 5-1 in Exhibit B23-15 despite Table 7-11 of the DNV report not being referenced in Undertaking U-69. Is that correct?

13383. **MR. OWEN McHUGH:** I believe if we go up in the transcript to -- we were actually directed to Table 7-11. So maybe that has caused a bit of confusion. But what I will say is that the numbers in Table 7-11 and 8-4 are very similar, but what's expressed and missing is that if you're just pulling out these

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tables is the text associated with this that DNV can speak to in detail about how these numbers could qualitatively or quantitatively change with mitigation applied, which is Table 8-4.

--- (A short pause/Courte pause)

13384. **MR. McCORMICK:** And just to confirm for my understanding of your response, it is not necessary to reference Table 7-11 in order to satisfy Undertaking U-69.

13385. **MR. OWEN McHUGH:** I think we've clearly demonstrated in the table that's attached how those numbers were calculated, which was the undertaking. And again, if you're looking for additional information, the DNV quantitative risk assessment is a process that goes through a whole bunch of tables and that was my concern with the original undertaking, is that what you ask would essentially require regenerating of all of the tables in there.

13386. So when you look at it, 8-4 is the final outcome within this section of the QRA of the mitigated probabilities. So to get to that, you do need to look at 7-11, but that's not a necessary calculation for the undertaking.

13387. **MR. McCORMICK:** You do need to look at 7-11, but it's not a necessary calculation for the undertaking.

13388. **THE CHAIRPERSON:** Mr. McCormick, can you help the Panel understand the relevance of this discussion to the overall application that's in front of us?

13389. **MR. McCORMICK:** Certainly, Madame Chair. Just a bit of confusion on my part.

13390. I note in the transcript that Mr. McHugh had indicated that Table 7-11 was the source. I received an undertaking relating to the same table that he indicated 7-11 was the source of, in the undertaking, provides absolutely no reference to the table he's brought us to, being 7-11.

13391. So I apologize for any misunderstanding. I was just confirming that -- what I thought might be a contradiction between the testimony and the provided undertaking, but I'm happy to leave it.

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13392. **THE CHAIRPERSON:** Thank you, Mr. McCormick. We'll look forward to your next line of questioning.

13393. **MR. McCORMICK:** Certainly, Madame Chair.

13394. Would Northern Gateway agree that any inaccuracies or errors in the DNV report itself would result in inaccuracies or errors in those sections of TERMPOL 3.15 which are reliant upon the deficient portions of the DNV report?

--- (A short pause/Courte pause)

13395. **MR. JEFFREY GREEN:** Just before I answer the question, one comment I would like to make is that the document -- the TERMPOL documents were filed as supplemental information to the Application. So the table that you were speaking to yesterday and again today and much of the information on the assessment of environmental effects is in Volume 8C.

13396. And in fact, the TERMPOL information is largely based on Volume 8C. It was developed several months after the Application had been filed. So in terms of the actual environmental assessment, Volume 8C is a more appropriate volume.

13397. What I can say in response to your question in regards to the environmental effects assessment is that the probabilities shown in that table become essentially generalized likelihoods because that's what the *Canadian Environmental Assessment Act* asked us to do.

13398. And unless there was a extremely large change that would change it from being unlikely to likely, it would not have a great effect on the environmental assessment.

13399. **MR. McCORMICK:** Thank you, Mr. Green.

13400. And just to confirm that, despite being supplemental, TERMPOL 3.15 does form part of the evidence that Northern Gateway is providing to support its Application. Is that correct?

13401. **MR. JEFFREY GREEN:** That's correct. But under requirements of the *Canadian Environmental Assessment Act*, the TERMPOL application is not the environmental assessment.

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13402. **MR. McCORMICK:** Thank you, Mr. Green.
13403. A few more questions about TERMPOL 3.15. It's my understanding that in both models, oil and condensate -- I'm referring to spills from the marine terminal -- it was presumed that the released hydrocarbons would enter into the marine environment. Is that correct?
13404. **MR. OWEN McHUGH:** Yes, that was an assumption for evaluating the risk of the product entering the environment.
13405. **MR. McCORMICK:** And in both cases, the modelled failure occurs in the loading arm during transfer operations. Is that right?
13406. **MR. OWEN McHUGH:** That's what the spills were based on, yes.
13407. **MR. McCORMICK:** And am I also correct in my understanding that these hypothetical examples are intended to model what Northern Gateway considers to be the maximum discharge of both diluted bitumen and condensate at the marine terminal based on a loading arm and containment boom failure during transfer operations?
13408. **MR. OWEN McHUGH:** Again, what that was considered was a credible worst-case discharge. And by credible, what DNV assessed within their report was a failure of one loading arm.
13409. **MR. McCORMICK:** And the spills modelled at the marine terminal in the DNV report were based on forecast loading and discharge rate for the Kitimat Terminal, not the actual specifications for the marine terminal filed initially in May 2010 or the revised design specifications filed on December 28th, 2012.
13410. Is that correct?
13411. **MR. LANGEN:** Perhaps my friend can point to the record. It might be helpful for the witnesses.
13412. **MR. McCORMICK:** Certainly, Madame Chair.
13413. It may be helpful to look at Exhibit B23-34, page 104. You'll be

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looking at the third paragraph from the top under Table 6-14. I believe it's the second sentence.

“The spill volumes are based on forecast loading and discharge rate for the Kitimat Terminal.”

13414. The question relates specifically to confirming that the spills modelled were not based on the actual specifications for the marine terminal. Is that correct?

13415. **MR. OWEN McHUGH:** I think throughout the application and the construction and volumes as well, it's clearly stated throughout that that current environmental assessment standpoint, most things are considered preliminary in terms of the engineering and design.

13416. And there will be changes in the future associated with very specific elements, but what I can say is that, based on the actual loading arm specifications, we feel that this is an accurate representation of what DNV depicted for a single loading arm failure.

13417. **MR. McCORMICK:** So just so I understand correctly your response, Mr. McHugh, that is confirmation that the numbers that we see in TERMPOL 3.15 are not based on the actual design specifications of the Kitimat marine terminal.

13418. **MR. OWEN McHUGH:** I think I just answered that question.

13419. They're based on the best available information at the time the assessment was done and they are in general alignment with what we'd expect for the operational aspects for the loading arms.

13420. **MR. McCORMICK:** And that is, in the opinion of Northern Gateway, equally true for both the original design specifications and the revised design specifications that were filed on December 28th of 2012?

13421. **MR. OWEN McHUGH:** As far as I'm aware, that's correct. But as we should point out is that the 250 cubic metres from a modelling standpoint was allowed just to enter the marine environment doesn't account for the fact that there would be drip trays and other mitigations, curbing on the docks to catch anything that landed or catch product that landed on the actual loading arms or the

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- burse or on the tanker itself. They also have curbing and associated systems to help minimize, in the event of this type of incident, oil entering the marine environment.
13422. So we made some fairly conservative assumptions and said this is a large credible worst-case discharge and it will immediately enter the marine environment.
13423. And what I'd also point out is that, again, we selected a risk based -- or committed to a project standard based on the current analysis, which is 250 cubic metres. This is way -- this is a lot more than the 50 cubic metres that's required by Transport Canada for dedicated equipment at an oil handling facility of the size that Northern Gateway's proposing.
13424. **MR. McCORMICK:** Did Northern Gateway anticipate during the preparation of TERMPOL 3.15 that the spill modelling for the marine terminal would need to be prepared to meet the revised specifications, including the increased volumes and transfer rates that were filed on December 28th, 2012?
13425. **MR. LANGEN:** Madam Chair, if my friend can direct the witnesses to the referenced increased volumes and transfer rates, that might be helpful.
13426. **MR. McCORMICK:** Certainly, Madame Chair. There are a collection of them, and I believe that I did direct the witness panel to those increases yesterday.
13427. Perhaps, Madam Clerk, if we could pull up Haisla Nation aid to cross HN PR 4. This is a document prepared by the Haisla Nation, and it provides a summary of modifications to some of the design specifications to the marine terminal.
13428. You'll note in the second row there is source information provided for both the original application of May 2010 and the updated application from December 28th, 2012. I will note that there was an errata filed subsequent to the preparation of this table, Exhibit B197, which has not been incorporated. These are the increased volume and transfer rates that I am referring to in the question.
13429. It would be possible to take the witness panel to each of the individual source locations; however, as they are dispersed through the Application, it would require flipping through a fair amount of documents so we provided this summary

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to aid in the questioning.

13430. And just for confirmation, the question was did Northern Gateway anticipate at the time that the spill modelling for the marine terminal in TERMPOL 3.15 was prepared that Northern Gateway would need to be prepared to meet the revised specifications, including increased volumes and transfer rates that we see displayed here in this table?
13431. **MR. LANGEN:** Madam Chair, I'm struggling a little bit with my friend's question.
13432. He has -- on his aid to cross he has a design injection rate and then he has an average take-away rate, yet he's using the term "transfer rate".
13433. **MR. McCORMICK:** Thank you, Mr. Langen. I'm maybe, yes, coming to my lack of knowledge of engineering.
13434. By "transfer rate" I hope to capture design injection, flow rate per tank and average take-away flow rate per tank. If that's incorrect engineering language, I apologize.
- (A short pause/Courte pause)
13435. **MR. McCORMICK:** Shall I pose the question again?
13436. **THE CHAIRPERSON:** Do the witnesses need the question posed again in order to be able to answer it?
13437. **MR. OWEN McHUGH:** Sorry, yeah, we were unclear if there was a question or not. We weren't sure.
13438. **MR. McCORMICK:** Certainly, Mr. McHugh. I'll read the question for the third time.
13439. Did Northern Gateway anticipate that the spill modelling for the marine terminal provided in TERMPOL 3.15 would need to be prepared to meet the revised specifications of the marine terminal, including increased volumes and transfer rates as filed on December 28th, 2012?
13440. **MR. LANGEN:** Madam Chair, my friend -- again, I go back to his

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aid to cross.

13441. It references design injection flow rate, it references average take-away flow rate with respect to tankage, the DNV report -- and if we go back to Exhibit B23-34, Adobe page 104 where the witnesses were put previously, and we go down to the bottom of that page, Table 6-15 demonstrates what the transfer rate across the loading arm will be. And the transfer rate, as I understand it, is different than the injection rate for tanks and the take-away rate for the tank.

13442. So my friend -- built into his question is an incorrect premise, in my submission, and I think that's causing a great deal of confusion. If he can rephrase his question in relation to the transfer rate, I think that would be helpful.

13443. **MR. McCORMICK:** Certainly, Madame Chair. And I apologize if I've misstated. If you can just bear with me for one moment to locate the appropriate reference.

--- (A short pause/Courte pause)

13444. **MR. McCORMICK:** Perhaps we can avoid the difficulties associated with my apparent misuse of the word "transfer rate".

13445. Does Northern Gateway agree that design injection flow rates per tank and average take-away flow rates per tank are relevant to transfer rates as displayed in -- if we could please go back, Madame Clerk? In Table 6-15, typical release volumes for spills caused by major loading failure, and we see at the bottom it notes transfer rate per loading arm.

13446. Does that information correspond to design injection flow rate per tank and average take-away flow rate per tank, or have I been misusing the term "transfer rate"?

13447. **MR. OWEN McHUGH:** Again, I think what we're struggling with is some confusion around what's being implied, I guess, is from this panel's standpoint is that we have a calculation in Table 6-15 in B23 that shows the standard transfer rate per loading arm. So I don't think it's necessarily important to compare the two.

13448. And I'll say I'm a little bit out of my element on that because I'm not an engineer associated with the loading arm. So there are people that will be able

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to speak specifically to the Route B filing changes on the Kitimat panel, so it may be the more appropriate venue.

13449. But from our standpoint, what the QRA, the quantitative risk assessment, looks at is mitigating probability. So again, we talked a lot about this in Prince George where what you want to understand is what is the potential, based on the best type of probabilities and statistics that are available, what the potential probabilities or return periods are of an event and then what can you do to apply to minimize those.

13450. So again, if you go to other sections in this report, there are quantitative measures that cannot be -- or say, I guess, qualitative measures that cannot be assessed quantitatively to limit this volume that could potentially be spilled in the types of incidents that they're looking at.

13451. So I think it's a little out of context, potentially, the question, and I am a little bit out of my league in terms of the transfer rates from the upland tanks associated with the loading arms. And there are people that can speak to that on the next panel, the Kitimat panel.

13452. **MR. McCORMICK:** Thank you, Mr. McHugh.

13453. Would Northern Gateway agree that the use of actual specifications as inputs for spill modelling would provide more accurate and reliable information than reliance on forecasted specifications?

--- (A short pause/Courte pause)

13454. **MR. OWEN McHUGH:** Again, what I'd say is that, from standards in Canada, the standard for a Level 4 oil-handling facility is 50 cubic metres of a dedicated response package. What this project is committed to is 250.

13455. So again, even if we look at these preliminary numbers and we do the back calculation of approximately 92,700 cubic metres a day over four loading arms at 4,000 cubic metres per hour, that's -- it works out to the same numbers for the crude oil. And again, the condensate is dictated by the offloading from the condensate tanker. The pumps on board take it to shore and then it's lifted up to the tanks.

13456. So I -- we've overcommitted in terms of a response planning standard

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- for the project based on what we feel are credible, realistic volumes. So I don't think that changing it by a few cubic metres in either direction from what we're talking about from a response or a modelling standpoint would change.
13457. **MR. McCORMICK:** So Northern Gateway is not of the opinion that using actual specifications would be better than forecasted specifications.
13458. **MR. OWEN McHUGH:** Of course, once you do your detailed design you'd be looking at specific specifications, and what we've laid out in the Application is the realistic estimates of what this would look like after detailed design.
13459. **MR. McCORMICK:** And is there any difference in reliability for forecasted specifications versus actual specifications?
13460. **MR. OWEN McHUGH:** I believe that DNV will speak to that.
13461. **MR. JEFFREY GREEN:** I'd just like to add that one of the topics we're here to speak to is the -- obviously, the environmental effects of the condensate spill. And the scenario painted out here is the assessment basis for the environmental assessment.
13462. And I go back to the way we approached the assessment, again, as there is a discussion of the general effects of condensate on each of evaluated environmental components. We then look at the mass balance model, which takes into account the 200 cubic metres shown in this table, and we look at more site-specific types of effects that could occur on the same VECs. The 200 cubic metres was also used in the ecological and human health risk assessment.
13463. So that's the assessment basis. And changes in that volume could slightly shift, perhaps, some of the specifics, but in the end, the effects of these events are not going to change in the environmental assessment. We still predict an adverse effect, and depending on the resources it affects, there could be the potential for significant effects.
13464. **MR. McCORMICK:** Thank you, Mr. Green.
13465. Does Northern Gateway agree that loading arm failures are not the only potential source of the spill at the marine terminal?

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13466. **MR. JEFFREY GREEN:** It may not be the only source of the spill, but we thought it was the most realistic spill that could occur at the terminal given the marine terminal design. So there are a number of features built into the terminal that are intended to prevent product from ever reaching the water, and Mr. McHugh has spoken to those.
13467. **MR. McCORMICK:** Would you agree with me that a spill could occur from loading or unloading lines that connect the loading arms to the oil and condensate tanks?
13468. **MR. JEFFREY GREEN:** Could you repeat the question again, please?
13469. **MR. McCORMICK:** Certainly. Would Northern Gateway agree that a spill could occur from the loading or unloading lines that connect the loading arms to the oil and condensate tanks?
13470. **MR. OWEN McHUGH:** That's possible.
13471. **MR. McCORMICK:** And would Northern Gateway agree that if a spill of that nature were to occur, it is possible that the hydrocarbons released could enter the marine environment?
13472. **MR. OWEN McHUGH:** Again, that is a possibility, but unlikely and will be designed and mitigated for. And where you can, you'll look at containing, obviously, as much as the oil that you could onshore as possible.
13473. **MR. McCORMICK:** So I'd like to look a little bit about -- at this choice of loading arms for TERMPOL 3.15.
13474. Madame Clerk, could we please have displayed on the screen Exhibit B23-34, page 104? And if you'd scroll up to the top, please.
13475. This is Table 6-14, distribution of spills from loading/discharge incidents. Its source is DNV 2000. Has DNV 2000 been filed in these proceedings?
13476. **MR. LANGEN:** Madam Chair, we're back in the DNV report. As we've indicated throughout this panel's being up and subject to cross-examination, and as indicated well in advance of this panel going up, this document is to be

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spoken to by the shipping and navigation panel.

13477. My friend is asking a specific question related to a citation in that document, and I would submit that that question should be properly put to that witness panel where there will be an individual available to speak to this document.

13478. **MR. McCORMICK:** I think that's fair, Madame Chair.

13479. The -- perhaps the witness panel can assist me in understanding. The selection of -- or bear with me just one moment.

--- (A short pause/Courte pause)

13480. **MR. McCORMICK:** Would the witness panel agree with me that a release from loading or unloading lines could result in a spill volume as large as 1,500 cubic metres?

13481. **MR. OWEN McHUGH:** I'd need to see that on the record or be spoken to by DNV.

13482. **MR. McCORMICK:** Certainly, Mr. McHugh.

13483. I'd be happy to direct you to -- if we could see displayed on the screen, Madame Clerk, Exhibit B69-5? This is the Kitimat Terminal Quantitative Risk Analysis, and if we could see page 80, please.

13484. And just noting, I believe it is the second or third sentence up from the subheading 7.4. So if you could scroll down just a touch, Madame Clerk. It reads:

"This sump should be sized to accommodate an additional volume of 1,500 m³, the maximum spill size from any tanker loading or unloading line."

13485. **MR. LANGEN:** So Madam Chair, this document was spoken to by a previous panel. This panel is not in a position to speak to it. It relates to the operations of the marine terminal, which was the subject matter of previous panel.

13486. **MR. McCORMICK:** If I may assist, Madame Chair. We all

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appreciate the effort that Northern Gateway has put in to trying to coherently divide the evidence to prevent cross-examination. The ---

13487. **MR. LANGEN:** Madam Chair, I take issue with that statement. He indicated implicitly that we -- that Northern Gateway has divided its evidence to prevent cross-examination, and that is not at all what Northern Gateway has done.

13488. Northern Gateway has a large record that it has to manage. It has put numerous witnesses -- made numerous witnesses available with a breadth of experience and expertise, and I take issue with my friend's statement.

13489. **MR. McCORMICK:** I will offer my apologies, Madame Chair. That was not the inference I was attempting to convey.

13490. I'm simply expressing appreciation for the amount of work that must go in to dividing -- or perhaps another term -- preparing the witness panels and assigning the different documents so that they can be examined. It's not a -- I'm not taking a shot at Northern Gateway in that respect, so I apologize.

13491. The document we see before us provides -- well, for a moment, just for context, the TERMPOL 3.15 purports to characterize risks associated with accidental releases either en route or at the marine terminal. In doing so, Northern Gateway has provided information on what it considers to be credible worst-case examples. And that can be confirmed at Exhibit B23-15, page 20.

13492. In the document we see displayed on the screen, which is also prepared by Northern Gateway for this project, we see that it indicates that:

“...an additional volume of 1,500 m3, [which is] the maximum spill size from any tanker loading or unloading line.”

13493. And I see a contradiction in Northern Gateway's information in TERMPOL 3.15 that the largest credible spill volume would be 250 cubic metres when they've submitted in different evidence, although assigned to a different panel, information which indicates that the maximum spill volume could be as high as 1,500 cubic metres. And that is the reason this document has been pulled up.

13494. **THE CHAIRPERSON:** Mr. McCormick, was there a question there?

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13495. **MR. McCORMICK:** Certainly. The question as posed was, would it be fair to say that a release from the loading or unloading lines could result in a spill volume as large as 1,500 cubic metres?

13496. **MR. OWEN McHUGH:** I think if you'll look at this report, I think this is actually in very good alignment with what we've been talking about is what's the purpose of a risk assessment.

13497. In this case, this -- these BERCHA reports, which I'm not going to speak to you in detail, are typically addressing human safety factors. And one of the issues with this thing -- and we talk a bit about mitigation -- if you read where that line is:

“This sump should be sized to accommodate [...] additional volume of 1,500 m³, the maximum spill size from [the] [...] tanker loading or unloading line.”

13498. So he's talking about the loading lines. We were talking about a loading arm. There's a difference between those two. And what DNV decided was that -- or determined is that credible spill was the failure of one loading arm, which we talked about.

13499. This is talking about a loading line. And it's also talking about including a sump to contain that oil on land. So I think this is in alignment with what we've been talking about.

13500. But again, when you talk about a credible worst-case discharge, there are situations where you could have a larger event, but what's important is that for -- in the example of Kitimat, we've not only committed to having the 250 cubic metre dedicated package at the terminal site, we've also committed to having approximately a 10,000 tonne base in Kitimat as well. So now you're looking at having a massive capacity in this area.

13501. So if you had a larger event at the terminal, which is very unlikely, and what this is talking about is including a sump to limit oil getting into the water, is that you can deal with it very quickly through additional resources through the project RO.

13502. **MR. McCORMICK:** Would you agree with me, Mr. McHugh, that 1,500 cubic metres is in excess of 250 cubic metres?

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13503. **MR. OWEN McHUGH:** Yes, it's a bigger number. But what it's talking about, again, is including a sump to contain that on land.
13504. **MR. McCORMICK:** And the sump would be required because of the potential for a spill. Is that correct?
13505. **THE CHAIRPERSON:** Mr. McCormick, we seem to be back into terminal design, which was covered by a previous panel. Can you help the Panel understand your line of questioning and its relevance to this particular witness panel?
13506. **MR. McCORMICK:** Certainly, Madame Chair. Just to note again what I understand to be the purpose -- or perhaps we could pull up Exhibit B23-15, page 20, please Ms. Niro? If you could scroll down -- that's the one right there.
13507. And just below 1.1 Objective -- so this is TERMPOL 3.15. We have the objective of the document identified, *"to characterize the risks associated with accidental release events either en route or at the marine terminal site"*.
13508. And they accomplish it, in part, by, you'll note the last bullet, identifying *"credible worse case examples of hydrocarbon spills..."*
13509. The concern is we have what Northern Gateway considers to be a credible worst-case scenario of 250 cubic metres being spilled at the Kitimat terminal. We have other evidence from Northern Gateway indicating that a spill of up to 1,500 cubic metres could occur at the marine terminal. And it is unclear to me how those two things reconcile.
13510. And the purpose of the questioning is to understand how reliable Northern Gateway's assessment of the credible worst-case example is if, in their own evidence, they have cited potential spills in excess of those.
13511. **THE CHAIRPERSON:** Mr. McCormick, again I think you've identified your question. Maybe we can have the panel answer the question that I believe was posed in the end of your statement.
13512. **MR. OWEN McHUGH:** I believe that we just addressed that specific question.

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13513. **MR. McCORMICK:** I would have to disagree with Mr. McHugh. I don't feel the question has been addressed.
13514. The 1,500 cubic metre spill potential has not been included in TERMPOL 3.15 and it has been identified as being a credible spill by Northern Gateway. But the reconciliation between why that credible spill would not be included in TERMPOL 3.15 is -- remains beyond my understanding.
13515. If Mr. McHugh could kindly clarify, I would appreciate it.
13516. **MR. OWEN McHUGH:** What TERMPOL primarily deals with is the marine portions of the project. So the scope within the DNV quantitative risk assessment was essentially the loading arms or incidents associated with the vessels.
13517. What the 1,500 cubic metres is talking about is up-line infrastructure that's connecting those two pieces. So again, what we're talking about is a land-based event or design factors that can be used to mitigate that entering the marine environment.
13518. So again, we do feel that the 250 cubic metres is a very credible worst-case spill size based on the DNV analysis. And DNV will be able to talk at length about why that volume was chosen and probably how it's a fairly conservative volume in terms of the things we talked about in terms of having additional mitigation in place.
13519. **MR. McCORMICK:** Thank you, Mr. McHugh.
13520. Madame Clerk, if we could please go back to B69-5? I just want to clarify my understanding of what Mr. McHugh's told us. I think it's in -- six lines down in the paragraph we see displayed on the screen. It reads:
- “With the current configuration, the flow into the marine environment would dominate, so that most of the contents would spill into the sea.”*
13521. He's referring -- or she -- the author is referring to the spill of 1,500 cubic metres. Can you please explain how what you've just told us reconciles with this assessment?

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13522. **MR. OWEN McHUGH:** Yes. If you read down further in the exact same paragraph, what they're recommending is, that based on the current configuration, they're recommending from the land design portion of the project that a sump is installed to limit oil moving into the marine environment. So again, it's a mitigation procedure that's land based.
13523. **MR. McCORMICK:** And am I correct in my understanding that the spills modelled in TERMPOL 3.15 were unmitigated?
13524. **MR. OWEN McHUGH:** That's correct in terms of having loading booms around an oil tanker and allowing oil to flow away from the terminal site, making assumptions about all of the 250 cubic metres immediately entering the marine environment.
13525. So instead of having it contained either on the berth site or on a tanker, if you had -- depending on where the failure occurred, we allowed it all to enter the marine environment.
13526. **MR. McCORMICK:** So the reasoning that mitigation measures would prevent a spill of 1,500 cubic metres is the basis upon which you would distinguish it from a spill of 250 metres occurring in the loading arms.
13527. **MR. OWEN McHUGH:** The type of sump that's being recommended would be a permanent on-land fixture to -- to limit that oil potentially moving into the marine environment. And again, I repeat, you don't plan for one volume.
13528. What we've committed to is having a designated capacity at the terminal site to deal with approximately a 250 cubic spill. If you did have a larger event, you still have that additional resources in Kitimat, so you -- you're looking at a specific capacity that we feel is based on a credible worst case and it's over five times the Canadian standard for an oil handling facility of this size.
13529. **MR. McCORMICK:** And just so I'm clear, when you say over five times the Canadian standard, is that -- is that referencing -- is that particular to either of 250 cubic metres or 1,500 cubic metres, or is it separate and independent?
13530. **MR. OWEN McHUGH:** Again, what we've committed to is having

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- a 250 cubic metre capacity at the terminal. The oil handling facilities requirements for Canada are to have a dedicated package at the terminal of 50 cubic metres. That's the standard. That's the minimum. So if Northern Gateway was sticking with strictly regulation, we would be proposing a 50 cubic metre response capacity at the terminal.
13531. Again, this goes to the extended responsibility of taking a risk-based approach to look at what is a credible worst-case spill at the terminal and design a response around that for the specific dedicated resources at the terminal.
13532. **MR. McCORMICK:** Thank you, Mr. McHugh.
13533. Madame Clerk, could we please see displayed on the screen Exhibit B3-22, page 111, top of the page please. This is Section 9, examples for response planning from Volume 7C.
13534. I draw the attention of the witness panel to the top of the page and specifically the sentence indicating the emergency shutdown times. There's two elements to this question I'm unsure about.
13535. The first is that it -- I'll ask the Panel to note the emergency shutdown time of 47 seconds for oil. Could you please confirm that the emergency shutoff times described on the screen have not been updated and remain the current specifications for the marine terminal?
13536. **MR. OWEN McHUGH:** As far as I'm aware, again, this would have been a question that should have been addressed to the operations panel and construction design.
13537. **MR. McCORMICK:** I may be mistaken, Mr. McHugh, but I do believe Volume 7C is currently assigned to this panel.
13538. Am I correct in my understanding that the emergency shutoff for loading and unloading equipment for the Kitimat terminal requires manual initiation by personnel?
- (A short pause/Courte pause)
13539. **MR. OWEN McHUGH:** The panel to speak to that would have been the operations panel, and we are unaware at this standpoint. I do believe that it --

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I'll stop there.

13540. **MR. McCORMICK:** Was there something you wanted to add, Mr. McHugh?

13541. **MR. OWEN McHUGH:** No, thank you.

13542. **MR. McCORMICK:** Madame Clerk, could we please go to Exhibit B23-34, page 104, and to the bottom of the page, please.

13543. And could you please confirm for me that there is a seven-second distinction between the emergency shutdown time that we see displayed here in the DNV report and the emergency shutdown time that we see in Volume 7C? Is that correct?

--- (A short pause/Courte pause)

13544. **MR. OWEN McHUGH:** Again, the assumptions are laid out in this table and DNV will be able to speak to those specific assumptions.

13545. **MR. McCORMICK:** And you're not prepared at this time to acknowledge the seven-second distinction between Volume 7C and the DNV report.

13546. **MR. OWEN McHUGH:** I will acknowledge that there is a difference in the seven seconds between the two reports. But again, I'm not sure the reasoning behind it and I think it would be appropriate for -- for DNV to address the assumptions behind the 40 seconds, or the shipping and operations panel.

13547. **MR. JEFFREY GREEN:** Actually, I'll just add that -- and this actually corrects something I said earlier.

13548. If we go back to -- B23-15 is where I found this, but essentially what they assumed in the assessment was a 250 cubic metre spill of both diluted bitumen and a 200 cubic metre spill of condensate. And they do refer to the 47 seconds and 60 seconds. But if you go back to your table that you were comparing to in B23-34, you'll see that the total spill volume for condensate is 250. So there is a difference. I don't know why there is that difference, but there is.

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13549. **MR. McCORMICK:** Prior to filing with the Joint Review Panel, when was TERMPOL 3.15 finalized?
13550. **THE CHAIRPERSON:** Mr. McCormick, am I understanding that you're seeking to understand if it's a different date than what's on the report?
13551. **MR. McCORMICK:** That may be a fair -- relevant point, Madame Chair.
13552. What I seek to understand is, in comparing TERMPOL 3.15 with the design specifications that were filed in May, whether those design specifications were available to Northern Gateway at the time that TERMPOL 3.15 was prepared. So perhaps I'll restate my question as that.
13553. **MR. OWEN McHUGH:** The dates on the TERMPOL 3.15 report are April 2010 and the dates on Volume 8C are May 2010.
13554. **MR. McCORMICK:** And understanding that a fair amount of work goes into the preparation of these documents, it'd certainly exceed a month I would expect.
13555. Were the design specifications for the marine terminal available prior to the finalization of TERMPOL 3.15?
13556. **MR. OWEN McHUGH:** Again, I think it's included throughout the record that the engineering or design was completed at a preliminary level and it would be looked at in the future for updates and changes.
13557. So the preliminary design -- and as Mr. Green has noted, in terms of the conclusions within the environmental assessments, the design was completed at the appropriate scale to make the effects predictions.
13558. **MR. McCORMICK:** Thank you, Mr. McHugh.
13559. I may have misheard you. I was asking for dates specifically but I don't believe I received any dates in response. Could you please inform us of when the -- perhaps -- when the folks who prepared TERMPOL 3.15 sat down and looked at the numbers did they have available to them the design specifications for the marine terminal?

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13560. **MR. OWEN McHUGH:** The assumptions are built into the report and we had those and the design will be finalized in the future.
13561. **MR. McCORMICK:** We may be miscommunicating, Mr. McHugh. I think you indicated earlier that April 2010 they finished up TERMPOL 3.15; May 2010 they finished up Volume 7C.
13562. Were the information that went into 7C concerning design specifications available prior to April 2010?
- (A short pause/Courte pause)
13563. **MR. OWEN McHUGH:** I think “design specifications” is quite specific and what I’ve said is that we have assumptions that are used. And whether it’s TERMPOL Volume 3.15 or Volume 8C you have typically a set of assumptions that can be used in terms of design that is incorporated into that and the design standards or design -- the detailed design will be to come. So we had certain aspects that are included in these reports.
13564. **MR. McCORMICK:** Is there any direct relationship between the model inputs applied in the DNV report and the actual design specifications for the marine terminal that Northern Gateway proposes to build outside Kitimat?
13565. **MR. LANGEN:** Madam Chair, I think that question is best directed to the Shipping and Navigation Panel and the author of the DNV report.
13566. **MR. McCORMICK:** Madame Chair, I think we may have come full circle to a concern that was expressed yesterday. That being that, in the preparation of TERMPOL 3.15, Northern Gateway has relied heavily on the DNV report.
13567. In the current ordering of cross-examination we will have the opportunity to examine the DNV report. However, because TERMPOL 3.15 is being examined today we won’t have the opportunity to examine how any deficiencies in the DNV report might influence the conclusions reached in TERMPOL 3.15.
13568. As noted, we did ask to have a member of DNV seated on this panel. That request was declined. However I would now request that someone from TERMPOL 3.15 be seated on the DNV panel in order to facilitate the questioning

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- that we're currently not able to pursue.
13569. **MR. LANGEN:** Madam Chair, my friend has asked the question -- two points; he's already asked the question whether or not the extent that the DNV report is proven incorrect or is flawed, will that impact the evidence that this witness panel is speaking to and he's received an answer, I think, on at least two occasions.
13570. If that in fact turns out the case after he's cross-examined or that is his view after he has cross-examined the individual speaking to the DNV report then he's free to make that point in argument.
13571. Northern Gateway has made it very clear that this evidence that this panel is speaking to is informed by the DNV report. He does not need to cross-examine the individual who's responsible for the DNV report in order to test the evidence of this panel.
13572. He can cross-examine the Shipping and Navigation Panel and he can make argument. Those would be our submissions.
13573. **THE CHAIRPERSON:** Mr. McCormick, any further comments to Mr. Langen's?
13574. **MR. McCORMICK:** I think the concern stands, Madame Chair. I don't have anything further to add.
13575. **THE CHAIRPERSON:** So we'll move on to your next line of questioning. Is that what I understand?
13576. **MR. McCORMICK:** Perhaps I've misstated. I have asked my friend whether he -- Northern Gateway would be willing to seat someone to speak to TERMPOL 3.15 on the Shipping and Navigation Panel. My understanding from his response is that request has been declined.
13577. I would like to bring a motion requesting that the Joint Review Panel request Northern Gateway to seat someone from TERMPOL 3.15 on the Shipping and Navigation Panel to ensure that TERMPOL 3.15 can be fully evaluated in light of its reliance on DNV.
13578. **THE CHAIRPERSON:** Now that there's a motion, Mr. Langen, any

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comments to that motion? Are you prepared to speak to it at this point?

13579. **MR. McCORMICK:** Madame Chair, if I may add one point. I have not prepared a summary of it but I will note that various intervenors which preceded us in the questioning did attempt to address the DNV report in the context of TERMPOL 3.15 and were not permitted to continue with their questioning.

13580. **MR. LANGEN:** Madam Chair, if we can respond to my friend's motion after the break we'd be -- that would be our preference.

13581. **THE CHAIRPERSON:** Absolutely. Given the fact that there was no notice of the motion and that we want to make sure that we get the best information in front of the Panel as it considers the motion that would be helpful.

13582. Mr. McCormick, are you in a position to continue with your questioning of this panel without having the ruling of the Panel on this motion?

13583. **MR. McCORMICK:** Madame Chair, what I can do is I will leave those materials relating to TERMPOL 3.15 and the DNV report for potential -- for further discussion after we've had the opportunity to address the submissions of my friend.

13584. **THE CHAIRPERSON:** Again, I would encourage to ask all the relevant questions of this panel that you have to make sure that you can fully address the -- and test the information that you're seeking to test.

13585. So I'm not trying to limit you in any which way, just make sure that your questions are direct and relevant please.

13586. **MR. McCORMICK:** Certainly, Madame Chair.

13587. And by delay I refer not to put off to another panel; I mean to a later time in today's questioning following the submissions of Mr. Langen.

13588. So, I will heed your direction and continue with the questioning.
Thank you.

--- (A short pause/ Courte pause)

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13589. **MR. McCORMICK:** Dr. Stephenson, I'll take a few moments and just clarify a few points in relation to the Northern Gateway reliance on the Di Toro model.
13590. Would you agree that many important scientific findings have been published in the past decades on the mechanisms of exposure, the modes of toxic action, and the effects of oil contaminants on aquatic species that were not included as references in Volume 7C or the related TDRs?
13591. **DR. MALCOLM STEPHENSON:** I will agree that many important findings in hydrocarbon toxicology have been published in the past decade. I won't comment as to whether or not specific references were included in our documents. The references are what they are.
13592. **MR. McCORMICK:** Thank you, Dr. Stephenson.
13593. Is it the opinion of Northern Gateway that the Di Toro model is relied upon in Volume 7C and the related TDRs as the sole basis for evaluating risk concerning the extent and degree of chronic effects of exposure of oil on fish and to fish?
13594. **DR. MALCOLM STEPHENSON:** I believe that is correct.
13595. **MR. McCORMICK:** Would you agree that in later work Di Toro and colleagues acknowledged that the target lipid model does not account for the toxic effects of oil contaminants on early life stages of fish?
13596. **DR. MALCOLM STEPHENSON:** I did indeed discuss this yesterday, acknowledging that very point, but also making the point that the benchmarks developed using the narcosis model have been tested by Di Toro and coworkers and found to be also protective of the blue sac disease endpoint?
13597. **MR. McCORMICK:** And would you agree that in later work Di Toro and colleagues acknowledged that the target lipid model does not account for the unique nature of PAHs to be metabolized when taken up by fish?
13598. **THE CHAIRPERSON:** Mr. McCormick, can you help the Panel understand how this line of questioning is different than the conversation you had with Dr. Stephenson yesterday?

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13599. **MR. McCORMICK:** Certainly, Madame Chair. Yesterday we did touch on some of the Di Toro -- for context, the Di Toro model has been used by Northern Gateway to assess the toxic effects on fish. It goes from -- it uses a system of looking at acute chronic toxic effects and rolls that forward into -- or acute to chronic.
13600. These questions dig just a little bit deeper into the information that has already been provided just to clarify our understanding of how exactly Northern Gateway has applied that Di Toro model. And they are responsive to the questions that were provided yesterday and that information has helped to inform these questions.
13601. **THE CHAIRPERSON:** Let's continue at this point. However, the Panel will be seeking to understand the probative value of the line of questioning that you're pursuing following the line of questioning from yesterday.
13602. **MR. McCORMICK:** Certainly, Madame Chair.
13603. Does Northern Gateway consider the use of the Di Toro model to be precautionary science?
13604. **DR. MALCOLM STEPHENSON:** We consider the benchmarks provided by the Di Toro model to be the best available benchmarks for evaluating the chronic effects of oil on fish.
13605. **MR. McCORMICK:** Thank you, Dr. Stephenson.
13606. Madame Clerk, could we please turn to Haisla Nation aid to cross-examination HN P4 -- or HN PR 24?
13607. This is the validation of the target lipid model for toxicity assessment of residual petroleum constituent's monocyclic and polycyclic aromatic hydrocarbons prepared by Joy McGrath and Dominic Di Toro.
13608. Dr. Stephenson, can you please confirm that this document or this article was relied upon by Northern Gateway in preparation of the materials before this Panel?
13609. **DR. MALCOLM STEPHENSON:** Bear with me while I locate my copy.

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--- (A short pause/Courte pause)

13610. **DR. MALCOLM STEPHENSON:** From memory, I do not recall whether this specific paper was referenced in the ecological and human health risk assessment but certainly earlier works by Di Toro and coworkers were. So if we can proceed on that basis.
13611. **MR. McCORMICK:** Could I ask you to please note -- Madame Clerk, if we could roll down the screen on the first page.
13612. The first highlighted portion in the main bottom of the text indicating recent literature suggests that exposure to PAHs during organism's early life stage results in various sub-lethal effects, following which it lists various sub-lethal effects.
13613. If we could please turn to page 8, Madame Clerk.
13614. There is a few points in this document which will contextual the question. So if the Panel will bear with us. Oh, my apologies, Madame Clerk, page 7. That will contextual the questions for Dr. Stephenson. I just want to make sure he's had the opportunity to have them fresh in his mind. At the bottom of page 7.
13615. **THE CHAIRPERSON:** I would suggest you proceed directly with your questions and if Dr. Stephenson needs time he'll advise us of that.
13616. **MR. McCORMICK:** Would you agree, Dr. Stephenson, that the acute chronic ratio in this study is based on studies of only 11 different species and 13 different chemicals?
13617. **DR. MALCOLM STEPHENSON:** I'm sorry; I don't recall seeing that information in your highlighted sections so I can't immediately respond.
13618. **MR. McCORMICK:** Assuming it is true for a moment, Dr. Stephenson, would you agree that that -- that the model it's generated from does not cover all of the toxic chemical constituents of petroleum products, let alone all of the PAHs that could be toxic to fish?
13619. **DR. MALCOLM STEPHENSON:** One moment please.

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--- (A short pause/Courte pause)

13620. **THE CHAIRPERSON:** Again, Mr. McCormick, can you help the Panel understand the relevance and probative value of this line of questioning, given the discussions that have already taken place on this topic?
13621. **MR. McCORMICK:** Certainly, Madame Chair. As noted earlier, this document is -- the science prepared by Mr. Di Toro has informed the preparation of Northern Gateway's assessment of the effects on fish if hydrocarbons be released into the marine environment.
13622. It is our concern that the sole reliance on the model that has been prepared by Mr. Di Toro will exclude elements of the extent and degree of effects that should be considered in assessing the potential impacts of a hydrocarbon spill on the fish species.
13623. **THE CHAIRPERSON:** Mr. McCormick, I would suggest that you frame a question again directly based on what you just told us and let's get right to the point please.
13624. **MR. McCORMICK:** Certainly, Madame Chair.
13625. Mr. Stephenson, would you agree that the prediction model developed by Di Toro can underestimate the potential for effects on fish should a spill occur in the marine environment?
13626. **DR. MALCOLM STEPHENSON:** No, I don't agree with that.
13627. **MR. McCORMICK:** Is it your opinion that it does not exclude or limit any potential degree or effects which might be encountered in the event of a spill into the marine environment?
13628. **DR. MALCOLM STEPHENSON:** I think you have my earlier statement that I believe that the Di Toro model is the best available model predicting chronic effects on fish in the marine environment.
13629. **DR. ALAN MAKI:** If I could add to Dr. Stephenson's remarks here, the paragraphs in the sections you've chosen to highlight in the article reflect the rhetorical questions that the authors are asking, acknowledging that these may be

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problems. If I could direct you back to the abstract, which summarizes the results of their investigations wherein they answer those very questions. And three quarters of the way down, the statement is made:

“The target lipid model correctly predicted where sub-lethal effects of oedemas, haemorrhaging and other anomalies were observed to occur in the early life stages of exposure to PAHs.” (As read)

13630. So as you read through the balance of the paper, you see the authors address those rhetorical questions that you’ve highlighted and they do reach the conclusion, based on the best available data, that the target lipid model does indeed address those.
13631. Now as we said yesterday, this is very much a state-of-the-art model. The target lipid model was used -- is used by the U.S. EPA, U.S. Environmental Protection Agency develop sediment quality criteria. It’s the fundamental basis behind the water quality criteria, and was used to define the regulatory and safety limits most recently in the Deepwater Horizon oil spill.
13632. So it continues to be very much the state-of-the-art but like any state-of-the-art, it is always subject to further refinement. As I indicated yesterday, we are working jointly with Dominic and Joy to further refine this model, to get it even more predictive. But as they say in the abstract, within the given uncertainty bounds, this correctly does predict the endpoints you’re asking about.
13633. **MR. McCORMICK:** Thank you, Dr. Maki. Good to have you back.
13634. Would you agree that the statistical confidence limits for the results in this study show that the prediction of the model can underestimate the potential for effects by more than an order of magnitude?
13635. **DR. ALAN MAKI:** I can’t agree to that basically because the statement I just read from the abstract reflects that within the uncertainty bounds that are available, it does correctly indeed predict those endpoints.
- (A short pause/Courte pause)
13636. **MR. McCORMICK:** Would you agree, Dr. Maki, that the information you’ve just provided to the Panel represents the opinions of the

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authors in that they are also -- the opinions of the authors in justifying their own study?

13637. **DR. ALAN MAKI:** It represents accurately the opinion of the authors based on the balance of the empirical data that they've applied and developed and refined in the target lipid model. So it's a -- it's not only their opinion but it is their opinion based on the best available science.
13638. **MR. McCORMICK:** Thank you, Dr. Maki.
13639. Turning to a new topic, I understand from Northern Gateway's response to JRP I.R Number 10 that one of the proposed measures that Northern Gateway intends to institute would be an industry-wide scientific advisory committee.
13640. Are Aboriginal representatives on the Advisory Committee going to be sought from all of the groups whose traditional lands or waters may be impacted by transportation of hydrocarbons?
13641. **MR. OWEN McHUGH:** I'd just like to pull up a figure. I'm just looking up the B number. If we could please go to B3 -- that's not right. B164-13, page 13, please.
13642. So in this figure, what we've laid out is a preliminary proposal for the Scientific Advisory Committee and the facilitation team structure, and again, this is up for discussion with Environment Canada and meetings in the near future.
13643. So where the role with -- in terms of local input and export, what you'll see is under the advisory panels, so that would represent people from local communities, Aboriginal groups and other government or stakeholders. And the role of these advisory panels is that this would be a two-way information exchange so that information can be incorporated into these studies and they can also receive information.
13644. So there are systems already set up on the project in terms of the community advisory boards as one example of the types of systems where invitations have been put out. This would probably be a more formal organization and the details are yet to be sorted in terms of exact participation but what we would imagine is that it would entail having representatives from various groups.

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13645. **MR. McCORMICK:** Are advisory panel members going to be included by invitation only?
13646. **MR. OWEN McHUGH:** Pardon me, can you please repeat that?
13647. **MR. McCORMICK:** Yes. Are advisory panel members going to be included by invitation only?

--- (A short pause/Courte pause)

13648. **MR. JEFFREY GREEN:** I'll respond from the point of view of all types of committees that would participate in this project, should the project go forward, is one of the fundamental principles that has been observed in the community advisory boards is that to keep the group functional, is that participating groups are asked to nominate a representative for them. So the expectation would be that Aboriginal First Nations would nominate representatives to sit on this advisory panel.
13649. What has been the case in the community advisory boards is that the boards themselves determine that they will open their meetings to observers. So anyone can come in and observe and quite often at the ends of the community advisory board meetings they open the meeting to those observers so that they can speak but the actual functioning of the advisory committee is restricted to the representatives.
13650. The -- at the risk of going to another panel, the community and Aboriginal panel that will be up following the Kitimat Valley, can speak more specifically to the community advisory boards but that's been a fundamental principle put forward for a number of the different advisory groups spoken to by Northern Gateway.
13651. **MR. OWEN McHUGH:** And again, if we maybe just go up one page. Sorry one more page.
13652. So at -- in section 2 on -- it's page 11, and near the bottom of the page.
13653. And quite clearly here we identify:

"The specific membership, scope [and] terms of reference of the Committee will be [developed] [...] through [the]

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committee development meetings.”

13654. And that's again where we'd probably ask for some sort of nomination. But what we do need to point out with this is that if you look at the management team in the figure what we've outlined is -- is government participants which could include federal, provincial, potentially municipal in certain areas if they are very specific issues, Northern Gateway and other industry partners.

13655. So this is what we've talked about is that this isn't just a Northern Gateway initiative, what we're looking at is a wider initiative. And if there are specific elements that we need to undertake to meet our commitments that we've made as a project, those are elements that would be dealt with separately than the scientific advisory committee.

13656. So this is an additional technical group that can look at issues at -- in a more industry-wide arena.

13657. **MR. McCORMICK:** Thank you, Mr. McHugh.

13658. Will all Aboriginal groups potentially affected by the project be guaranteed a spot on the Aboriginal Advisory Committee?

13659. **MR. JEFFREY GREEN:** The details of this committee haven't been worked out. But I -- I can say the principle that has been used in the community advisory boards and some of the other committees that have spoken to for this project, the intent is that each Aboriginal group would have one representative that also could include for example the Métis Association of British Columbia because they -- they do have coastal representatives as well. So -- or coastal members.

13660. And so they would have a representative. So I think the intent is yes, one -- one representative per First -- First Nation group.

13661. **MR. McCORMICK:** Will the research conducted by the scientific advisory committee be shared with --

13662. **MR. OWEN McHUGH:** Could we just have one moment please?

--- (A short pause/Courte pause)

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13663. **MR. OWEN McHUGH:** I just want to go back to Mr. -- Mr. Green's comment. And what he started off with talking about was that to keep these groups functional and manageable you do need to limit potential membership. And again what we're looking at here is something that would span the pipeline and the marine. So to have that many representatives on a -- that's a very specific technical panel like this might not be the most efficient or effective way of having representations.
13664. So again through some initial development meetings what we'd look to is to determine what is the most appropriate representation for various groups and how groups would like to be represented. But I don't think it would be fair to commit to having one representative from every community on this piece. Because what I'm -- this is one specific piece in an overall strategy for the project.
13665. What doesn't -- if you looked at say the community advisory boards those are area-specific committees. So you're looking at a different type of representation for specific areas. Because this has such a broad range, it would not be the most effective mechanism.
13666. But again, there's also the public awareness programs that would be used to help disseminate the information from the scientific advisory committee.
13667. **MR. McCORMICK:** And will the results of all of the research conducted by the scientific advisory committee be shared with the advisory boards and the public?
13668. **MR. OWEN McHUGH:** The intent with the scientific advisory committee is that it was formulated through a government, Northern Gateway and industry partnership. So again I would anticipate that the results of any of the studies would be public. And I think page 14 does identify that.
13669. **MR. McCORMICK:** Is that a guarantee from Northern Gateway that the documents developed by this committee will be available for -- for the public and potentially affected Aboriginal groups?
13670. **MR. JOHN CARRUTHERS:** Generally I don't see any reason why reports would not be made public and probably through a website. I think there'll be elements that that group will have to determine themselves, how they want to communicate more broadly with the public in terms of -- Northern Gateway is not

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- the only entity. But that group would have to create a -- a methodology for the information to be made more -- more public, and quite often it might be through a website.
13671. But I won't say everything in a guarantee. I'm just saying they need to develop that. But that's the intent is to make those observations more public.
13672. **MR. McCORMICK:** Thank you, Mr. Carruthers.
13673. So just to summarize; Northern Gateway is not prepared to make a guarantee that all of the affected Aboriginal groups will have representation on the committee and Northern Gateway is not prepared to provide a guarantee that all of the committee's product in terms of research will be public?
13674. **MR. JOHN CARRUTHERS:** They can be represented on the committee through what Mr. McHugh has talked about. So there's certainly representation that way.
13675. You do need -- you do need to develop something that's effective and value-added for all members. So certainly they'll be -- have to be developed a process for determining the proper representation. And again they'd be -- not to limit anything from a public perspective, the reports would be as they are relevant made public. And again, I would think the website could be a very effective means to do that.
13676. **MR. McCORMICK:** Thank you, Mr. Carruthers.
13677. And just so I -- I don't walk away with any ambiguity. When you use the word "they" you're referring to all of the Aboriginal groups that might be affected by the project.
13678. **MR. JOHN CARRUTHERS:** Again you'd need to look at who is affected and -- and I'm not sure when you say "they", you'll have to point me to where the specific.
13679. You're looking at trying to get a representative committee that for affected stakeholders from wherever part they are. So again it -- it doesn't go to guarantee of everyone. It does go to looking at what's a practical application and who is affected.

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13680. **MR. McCORMICK:** Thank you, Mr. Carruthers.
13681. Madame Clerk, could we please go to Haisla Nation aid to cross-examination HN PR 15. Thank you Madame Clerk.
13682. This is the approved report of findings for submerged oil temperature effects study dated May 18, 2012, submitted by Enbridge to federal onsite coordinator and incident commander U.S. Environmental Protection Agency in relation to the big spill in Kalamazoo.
13683. Enbridge conducted research into the effects of temperature on submerged oil in this document. Was this research provided to the Joint Review Panel by Northern Gateway?
13684. **MR. GREG MILNE:** No, to my knowledge this was not filed with the JRP. This is documentation relating to the Marshall, Michigan incident as you've noted, and is a letter between Enbridge U.S. and the Environmental Protection Agency.
13685. I'll also note I guess that it is with regards to a -- a fresh spill into a freshwater system as opposed to a marine -- a marine incident.
13686. **MR. McCORMICK:** Thank you, Mr. Milne.
13687. Would you agree that this research is pertinent to the potential fate, behaviour and clean-up of spilled diluted bitumen in the event of an oil spill?
13688. **MR. LANGEN:** Madam Chair, Mr. Milne's just indicated that this relates to a spill into freshwater. It relates to the Marshall incident. And the Marshall incident was subject to extensive cross-examination and this document was in existence at the time that cross-examination occurred by the Haisla Nation as well as other parties to this proceeding.
13689. **MR. McCORMICK:** Certainly, Madame Chair. We do note that it is relevant to the big spill in Kalamazoo; however, that's not the purpose of our use of this document in this questioning.
13690. Northern Gateway has prepared the meso-scale laboratory testing to assess the likelihood of oil to submerge and, in that testing, they've used freshwater oils -- fresh water to complete the test.

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13691. While this does refer to freshwater, it is still relevant to potential fate behaviour and clean-up, and that is the focus of the questioning here. I seek to find a little bit more information about -- from Northern Gateway about what information might have been available to them but not provided to the Joint Review Panel as part of these proceedings.
13692. **MR. LANGEN:** Mr. Milne's responded to the question my friend just presented. If he wants to frame his questions generally, off we go.
13693. We'll see where this goes. But again, this document was in existence at the time that the freshwater spills were addressed by the terrestrial panel and there was extensive cross-examination on the Marshall incident.
13694. And if I may, Madam Chair, this panel does not have all of the individuals that were present and available to speak to the Marshall incident.
13695. **THE CHAIRPERSON:** Mr. McCormick, again, the Panel would expect you to focus your questions to the expertise that's on this panel and to the subject that is being spoken to on this panel.
13696. **MR. McCORMICK:** Certainly, Madame Chair. We will do so.
13697. Mr. Belore, would you agree with me that the information contained in this document is relevant to potential fate behaviour and clean-up of spilled oil?
13698. **MR. LANGEN:** Madam Chair, in the marine environment I would suggest is the proper frame of reference. My friend is continuing to use spilled oil and we're here to talk about marine spills.
13699. **MR. McCORMICK:** Mr. Belore was kind enough to provide us with a great deal of information yesterday about testing of spilled oil in laboratories using fresh water. The information in this document may be relevant to that.
13700. We have not yet received a response from Mr. Belore. It may be the case that it's completely extraneous. We would just seek to confirm whether this document does have any relevance to spilled oil in terms of its behaviour and potential fate.
13701. **MR. RANDY BELORE:** If you could point to specific areas in the

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document and maybe we could answer them specifically, rather than a generalized statement.

13702. **MR. McCORMICK:** Bear with me for just one second.

13703. Given that the question is solely to relevance, I would ask you to look at page -- sorry. I'm looking at a hard copy, but I'm hoping to provide an Adobe page number. Page 8. If we could scroll down just a touch? Thank you.

13704. I'll ask you to note the last sentence above the sub-heading "Objective". It reads:

"The purpose of this report is to present the results of this study of temperature effects on submerged oil to enhance the understanding of the effects that water and sediment temperatures have on submerged oil liberation and the implications for subsequent effectiveness of recovery methods." (As read)

13705. Mr. Belore, do you agree with me that this information is relevant to understanding both fate and behaviour of oil, as well the potential recovery mechanisms?

13706. **MR. GREG MILNE:** Perhaps before Mr. Belore provides his response, I will note that the context of this report is very specific to work done in and to inform future work to be done as part of the Marshall incident.

13707. So although that last -- the sentence that you wrote -- that you just read is perhaps -- can be considered fairly broadly, it needs to be understood in the very focused context that is the premise behind this work.

13708. **MR. McCORMICK:** Thank you Mr. Milne. And I'm noting that specificity does not necessarily determine relevance. I'd still appreciate if Mr. Belore could weigh in.

13709. **MR. RANDY BELORE:** I think I'll only add that this statement says, "...submerged oil liberation and implications for recovery methods." And I believe they refer specifically to the Marshall situation, and that goes to what Mr. Milne had indicated.

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13710. So I again just ask for other specific questions related to potential fate behaviour that I may be able to answer based on my understanding of the marine environment.

13711. **THE CHAIRPERSON:** Mr. McCormick, does this seem like an appropriate time to take a break?

13712. **MR. McCORMICK:** I would think that would be an excellent idea, Madam Chair.

13713. **THE CHAIRPERSON:** Can you give us an update as to where you're at on your questioning, please?

13714. **MR. McCORMICK:** In part, it will be dependent on this -- results of the motion that were provided earlier. I would expect to -- we'd certainly be finished before the lunch break.

13715. **THE CHAIRPERSON:** Certainly, Mr. McCormick.

13716. Just before we go on a break, I would just note that -- for everybody's information that in B188-11, which was revised 23rd of January, Northern Gateway Witness Panels and Area of Responsibility, that the document B23-15, Section 3.15 is referred to in both this witness panel as well as the witness panel dealing with shipping and navigation. So I just note that at this point for bringing it to everybody's attention.

13717. Thank you. So let's come back at 10:30, please. Thank you.

--- Upon recessing at 10:17 a.m./L'audience est suspendue à 10h17

--- Upon resuming at 10:36 p.m./L'audience est reprise à 10h36

JOHN CARRUTHERS: Resumed

RANDY BELORE: Resumed

JEFFREY GREEN: Resumed

ALAN MAKI: Resumed

OWEN McHUGH: Resumed

GREG MILNE: Resumed

EDWARD OWENS: Resumed

WALTER PEARSON: Resumed

JACK RUITENBEEK: Resumed

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MALCOLM STEPHENSON: Resumed

JOHN THOMPSON: Resumed

CHRIS WOOLEY: Resumed

DENNIS YEE: Resumed

13718. **THE CHAIRPERSON:** We're ready to get under way again.
13719. Mr. Langen, did you have comments on the motion?
13720. **MR. LANGEN:** I do, Madam Chair, thank you.
13721. B23-15, the TERMPOL study number 3.15 is, as you correctly pointed out, identified on our witness response -- witness panel's responsibility document being assigned to both this panel and the shipping and navigation panel.
13722. On review of that document and the reason why it was placed on both panels is because the expertise needed to speak to that document crosses between environmental and shipping and navigation. And so the reason we put it on the -- on -- or identified it being assigned to both panels was because of the split of specialty.
13723. So this panel here is intended to speak to the environmental portions of that document, and the shipping and navigation panel is intended to speak to the shipping and navigation portions of that document.
13724. Now, I've spoken with Mr. McCormick off the record with respect to his line of questioning and his motion and we've agreed that, in context with the information I've just provided you and understanding the identification of the document on both panels, our intention would be that questions relating to Sections 3, 4 and 5 of that document which relate to shipping and navigation would be properly put to the shipping and navigation panel. Obviously, questions relating to environmental matters would properly be directed to this panel. And I believe that satisfies my friend, Mr. McCormick.
13725. **MR. McCORMICK:** That does satisfy our request, Madame.
13726. **THE CHAIRPERSON:** Thank you.
13727. So Mr. McCormick, please continue with your questions of this panel.

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

13728. **MR. McCORMICK:** Thank you, Madame Chair.

13729. Does Northern Gateway agree that the possibility that diluted bitumen spilled in water may submerge or sink is a legitimate concern for the Haisla Nation?

13730. **MR. RANDY BELORE:** With regard to the potential sinking of diluted bitumen, I think we've discussed that at length in terms of the conditions where we feel that that may or may not happen. In terms of the concerns, I can't speak to that.

13731. **MR. McCORMICK:** Will Northern Gateway ensure that its spill response and recovery plans account for the possibility that spilt oil may sink or submerge?

--- (A short pause/Courte pause)

13732. **MR. OWEN McHUGH:** Yes, in the context of the risks that we've talked about during this session, which is in near-shore habitats associated with submergence through sediment interactions. But again, plans are designed to be very flexible and mobile to address all types of situations.

13733. **MR. McCORMICK:** And am I correct in my understanding that, following the big spill in Kalamazoo, Enbridge identified submerged oil locations using poling crews who traversed the river assessing the presence or absence of submerged oil in the sediments?

13734. **MR. GREG MILNE:** This issue was canvassed extensively on the terrestrial spill panel, but yes, we did use poling as one of the techniques for identifying locations of submerged oil for that incident.

13735. **MR. McCORMICK:** Thank you, Mr. Milne.

13736. Would it be fair to say that poling was the primary method used following the big spill in Kalamazoo to identify the location of submerged oil?

13737. **MR. GREG MILNE:** I think that would be a fair characterization.

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13738. **MR. McCORMICK:** Thank you.
13739. Could you please provide a brief explanation of how poling works?
13740. **MR. LANGEN:** Madam Chair, I have to object. We're well into the Marshall spill or the Marshall incident and how Enbridge responded and dealt with recovery. That was squarely within the scope of the operations panel that my friend and his colleague cross-examined on as well as other parties cross-examined on.
13741. The question is not properly put to this panel and if my friend had questions on that, he should have directed them to that panel.
13742. **MR. McCORMICK:** Madame Chair, the question is in relation to poling generally. I would like to know the process of poling separate and apart from any particular spill, but using poling to identify where submerged oil may be located, how does that work
13743. **MR. LANGEN:** Madam Chair, again, the poling was used in Marshall. That was the root of his initial inquiry.
13744. I object to the question. If he wants to talk about recovery from the marine environment, that's clearly within the scope of this panel, but again, anything relating to Marshall has been canvassed and the opportunity has passed.
13745. **THE CHAIRPERSON:** Mr. McCormick, the Panel is having a difficult time understanding the relevance of your current line of questioning with respect to this particular panel and what it's here to deal with.
13746. I also mention again, as I have before, that the Panel, we believe, is very patient in terms of allowing questions so that everybody can gain better understanding, but the purpose of this is not to -- for individuals to gain specific understanding on particular areas, especially when the relevance of it is not clear to the Panel.
13747. So if you can help us understand the context of your questions with respect to this particular panel. Otherwise, I would suggest you move to your next line of questions.

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13748. **MR. McCORMICK:** Certainly, Madame Chair.
13749. The Kalamazoo is the only real world example we have of a dilbit spill, but the focus of the questioning is specific to oil spill response, the behaviour of the oils, the potential that it might submerge and when that happens, how do you find it.
13750. Poling is a method that was used in Kalamazoo. It may be a method that Northern Gateway would use here in the event of a marine spill; it may not. We haven't yet canvassed that. But we're interested in knowing whether poling would be an effective method for identifying submerged oil in the marine context and how that might be affected by temperature.
13751. **THE CHAIRPERSON:** and again, Mr. McCormick, every time you and I have this conversation, you identify what your question is. I would really encourage you to identify your questions on your own and for us not to have to have this conversation on an ongoing basis. So you might want to look at your notes and just get to the question.
13752. And you -- at this point you may want to -- I don't know if the witnesses need that question repeated or not and let's move forward with getting the answer to that. You may need to repeat the question.
13753. **MR. McCORMICK:** Shall I repeat the question? Certainly.
13754. Will Northern Gateway consider poling as one of the potential spill response options for the marine environment in the event of a spill?
13755. **DR. EDWARD OWENS:** Poling is -- was used on this relatively limited spill in a river situation as a technique to detect oil. We would be using a range of techniques. I personally, in the past, have used a number that include using sorbent materials on the end of poles.
- 13756.
13757. In Lake Wabamun we used visual scoping over the side of boats to look into the water. On the Selendang Ayu at one point, we actually used a remote operating vehicle. There are a range of techniques that are available, poling is one. And as with all of these different techniques, each of them has their own particular near shore applicability with respect to that unique spill situation.
13758. **MR. McCORMICK:** Excuse us for that distraction.

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13759. Thank you, Dr. Owens. So we understand now that poling may be used in the marine environment in the event of a spill resulting from this project.
13760. Madame Clerk, could we please see displayed exhibit -- or I'm sorry, Haisla Nation aid to cross-examination HN PR 15? We looked at this earlier before the break.
13761. Would you agree, Dr. Owens, that the study completed here would provide relevant information to effective spill response, particularly where poling might be used in relation to how poling would work in different temperatures?
13762. **MR. RANDY BELORE:** I believe we answered that question already and put it in context of this particular spill and on what this particular document was addressing which was the liberation of oil for identifying whether or not response would be appropriate -- or what appropriate response would be in this particular spill.
13763. **MR. McCORMICK:** Has the information in the scientific study that is included in this report informed Northern Gateway's assessment of whether -- of the effectiveness of the recovery operations that have been proposed for the marine environment?
13764. **MR. RANDY BELORE:** Again, I'll restate that this study had a very specific focus, as Mr. Milne indicated, and so it informed the operation at the Marshall spill in terms of what they could specifically do in their situation.
13765. **DR. EDWARD OWENS:** I think rather than look at this one very focused study from one very specific event -- I mean, typically what we do on an oil spill as part of our shoreline assessment surveys, we do systematic surveys. And the tools that we use for those on land are obviously different than those if we suspect there's any oil that might have been transferred into the adjacent near shore subtidals. In those areas, I mean, we -- just in Deepwater Horizon, we've been doing what we call snorkel scan which is involved visual observation -- it's systematic.
13766. Poling is sort of like spot sampling. I would only use it on a very, very limited basis. If I was to do poling, I would actually add sorbent materials onto the end so that we cannot be temperature or otherwise dependent, which is one of the focal points of this study.

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13767. But I think, you know, we have methods upon which we would rely which are very systematic which have been proven on many spills in the marine environment and I think that that's probably more germane to this.
13768. **MR. McCORMICK:** Nonetheless, as poling remains one of the options proposed for spill response in the marine environment, you would agree with me that it's important that poling would need to be effective; is that correct?
13769. **DR. EDWARD OWENS:** I'd -- poling may or may not be effective. We would choose those tools which would be effective in a specific situation. It is a tool. I personally have not used it on spills. I have other things that I prefer to use. But again, it's going to be very specific to the response in time and space.
13770. **MR. McCORMICK:** Is water temperature a factor in the effectiveness of using poling as a means of locating submerged oil?
13771. **DR. EDWARD OWENS:** I don't know, quite frankly. We basically would use -- we prefer to use visual techniques or sorbent materials and those are not temperature dependent.
13772. **MR. McCORMICK:** And would you agree that part of the process of poling may include liberating oil and allowing it to move up from the water to the surface so that a sheen is created?
13773. **DR. EDWARD OWENS:** I mentioned in previous testimony some of the techniques that we've used for recovery or liberation of oil, particularly during the Anger Anchorage incident in Port Angeles. The agitation techniques that we've used in rivers and in near shore environments are typically more mechanical than a use of a single pointed object.
13774. **MR. McCORMICK:** Would you agree that techniques to detect sunken oil rely primarily on visual identification of sheen?
13775. **DR. EDWARD OWENS:** No.
13776. **MR. McCORMICK:** Would you agree that liberation -- the effectiveness of mechanical methods to liberate oils is, in part, dependent upon water temperature?

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13777. **DR. EDWARD OWENS:** No.
13778. **MR. McCORMICK:** Madame Clerk, could we please see displayed Haisla Nation aid to cross-examination HN PR 17?
13779. On the screen we see displayed a letter providing a response from the United States Environmental Protection Agency to Enbridge dated April 25, 2012 concerning submerged oil assessment via poling or other methods which relied on the liberation of oil from sediment.
13780. The information in this letter that is relevant to our current discussion is that it notes that Enbridge had proposed a minimum temperature of 55 degrees Fahrenheit for its assessment. United States EPA then directed Enbridge to incorporate a minimum temperature of 60 degrees Fahrenheit for future assessments.
13781. Would you agree with me that this is an accurate reflection of the text we see displayed on the first page of the document?
13782. **MR. LANGEN:** Madam Chair, again I object. This document is specific to the Marshall spill. It is -- predates the witness panel that was here to speak to the Marshall incident. The witnesses have been clear that -- on two occasions -- that the temperature is not a factor in marine recovery as they've responded.
13783. I don't understand why my friend is going here. The witnesses have been very clear that the subject matter that he's cross-examining on is specific to the Marshall incident. He's had his opportunity to cross in the Marshall incident, these documents should have been put to that panel. He's missed his opportunity and he should be asked to move along.
13784. **MR. McCORMICK:** Madame Chair, we face a challenging circumstance in that one of the few examples of a spill of diluted bitumen occurred in Kalamazoo. And I do acknowledge that that material was examined in a previous panel.
13785. However, many of the scientific studies and information relating to the behaviour of diluted bitumen naturally flow from one of the single incidents where it occurred.

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13786. We are here today to talk about response to potential spills into the marine environment, including fate and effects, and the information -- the scientific information that has been developed in relation to past spills, whether Kalamazoo or not, is relevant to that particular topic.
13787. We don't seek to rely on this in relation to the fact that it is from Kalamazoo. We could black line that information and it wouldn't change the question at all.
13788. What we see here is the United States Environmental Protection Agency disagreed with Enbridge about its assessment of what temperatures needed to be included in order for effectively studying liberation of submerged oil, and that is what we seek to rely on it for.
13789. **MR. LANGEN:** And Madam Chair, the document speaks for itself in that it indicates quite clearly it relates to assessment -- reassessment activities of the Marshall incident.
13790. There are four footnotes that all specifically refer to the Marshall incident. It's unfair to suggest that the temperature effects that are identified in this document are generic in application, and the witnesses have already spoken to that with respect to the previous aid to cross.
13791. And additionally, he's attempting to again question the witnesses with respect to the effect of temperature on recovery of submerged oil. And Dr. Owens has indicated, I believe, on two occasions that he does not believe that that has an effect. So he's retracing old ground and he's again misrepresenting the aid to cross.
- (A short pause/Courte pause)
13792. **THE CHAIRPERSON:** Mr. McCormick, the Panel is interested in as broad a range of information as possible about the fate and transport of hydrocarbons that are being considered for this project in a marine environment. Dr. Owens has indicated that he believes temperature is not a factor.
13793. Rather than debate and continue to have you put forward your perspective, you're free to discuss that and to bring that up in final argument. You may want to seek to understand Dr. Owens' perspective from his professional viewpoint and then proceed from there.

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13794. **MR. McCORMICK:** Certainly, Madame Chair. Thank you for the direction.
13795. Dr. Owens, is it your opinion that mechanical liberation of submerged oils will work as effectively at one degree Celsius waters as it would in 25 degree Celsius -- or 15 degree Celsius water?
13796. **DR. EDWARD OWENS:** I think if we go back to your previous aids to cross, the entire document looked at the issue of liberation of oil in the Marshall situation under different temperatures. So there is evidence in your aids to cross or there's information in your aids to cross that speaks to that issue. And if you want to ask questions related to that aids to cross, we'd be happy to answer them.
13797. **MR. McCORMICK:** I perhaps am a little confused, Madame Chair. I'm happy to ask questions relating to our aids to cross, but I'm also understanding that the Panel would prefer that we focus the questioning away from the aids to cross.
13798. May I continue with questioning relating to the aids to cross which have been brought up on temperature from studies from Kalamazoo?
13799. **THE CHAIRPERSON:** Mr. McCormick, the Panel would encourage you to ask whatever questions you want to ask in an efficient way and in a way that is relevant to this particular panel.
13800. **MR. McCORMICK:** Thank you, Madame Chair.
13801. Madame Clerk, could we please see again Exhibit HN PR 17? Is that what we have up?
13802. Does Northern Gateway agree with the conclusion of the United States Environmental Protection Agency that 60 degrees Fahrenheit, which I understand to be 15.5 degrees Celsius, is the minimum temperature to initiate polling in order to locate submerged or sunken oil?
- (A short pause/Courte pause)
13803. **MR. GREG MILNE:** Mr. McCormick, I'm sorry, just to ensure we

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can be responsive to your question, could you please restate it?

13804. **MR. McCORMICK:** Certainly, Mr. Milne, I'd be happy to.
13805. Does Northern Gateway agree with the conclusion of the United States Environmental Protection Agency that 60 degrees Fahrenheit, which I understand to be 15.5 degrees Celsius, is the minimum temperature to initiate polling in order to locate submerged or sunken oil? For your reference, you'll see a relevant sentence at the bottom portion of the third paragraph.
13806. **MR. GREG MILNE:** We do agree that the letter does provide direction from the EPA that -- for the specific response at Marshall that 60 degrees was selected as the minimum water temperature to perform poling work or submerged oil assessment work. That was selected as a result of a number of factors and a number of considerations specific to Marshall, again, and the circumstances of that incident.
13807. **MR. McCORMICK:** Thank you, Mr. Milne.
13808. Would Northern Gateway agree with me that the temperature of the water in the project area, including the estuary marine terminal and CCAA, will almost always be below 15.5 degrees Celsius?
13809. **MR. OWEN McHUGH:** That's true. And I think what Dr. Owens has stated is that there are a lot of different options that you would look at for determining, detecting and recovery and designing specific near shore plans if you did have oil that became submerged in near shore sediment.
13810. So I think to look at one example of poling -- and Dr. Owens will probably follow up on some other information from the Canadian SCAT Guidelines -- that it's just unrealistic to assume that just because the temperatures are less than 15 degrees there aren't other methods for detecting the potential for submerged oil, looking at what's there and determining what are the most appropriate remedial actions, if they are.
13811. **DR. GREG MILNE:** I think again -- and I've mentioned this is specific to Marshall. I think maybe a little bit of elaboration may be helpful on that.
13812. So the context of this -- the AQ that you have here, you'll note that it's

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- dated April 2012, so that's 18 months or so after the incident. So we're dealing with, you know, elements of the response after a -- not immediately after an incident but a period of time after.
13813. We're talking about a river system with very specific loadings of sediments, different water type than the marine environment we're dealing with here.
13814. So again, these are some of the factors that make this information very specific to the circumstances, to the recovery work that had occurred already at that site and such. And why it's -- one needs to be very careful in applying this in a broader context.
13815. **DR. EDWARD OWENS:** I'd like to add that I'm the author of a field guide for oil spill response on marine shorelines that has been adopted by Environment Canada -- was written for Environment Canada and is their standard manual.
13816. And there is a section in there on submerged and sunken oil. There's sub-section in there on the detection of submerged and sunken oil and that section describes various visual techniques that are available. It also describes remote detection techniques that are available. These include geophysical, acoustical ones, remote operated vehicles I mentioned or video systems. But the one that we use most of all is bottom sampling devices and these are typically either grab samples or using weighted sorbent materials.
13817. So there's a whole range of different techniques, none of which are temperature dependent that can be used for the detection of submerged and sunken oil.
13818. And similarly as I've mentioned, there's a range of different techniques that can be used both mechanical, including vacuum, manual systems. We've used them on spills before and other people have used them in many locations. And again, each technique that's going to be selected or recommended I should say and then approved by the unified command, is going to be something very site-specific.
13819. Poling is something that I personally have not used in the past. It has an application but it's very limited, very site-specific. We prefer to use other, more generally used techniques.

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13820. **MR. McCORMICK:** Thank you, Dr. Owens.
13821. And just for my information, has the field guide you mentioned been filed as evidence with the Northern -- with the Joint Review Panel?
13822. **MR. OWEN McHUGH:** It is a public document and it is referenced in the application.
13823. **MR. McCORMICK:** Thank you, Mr. McHugh.
13824. Brief couple of questions for Mr. Belore.
13825. Madame Clerk, could we please see Haisla Nation aid-to-cross examination HN PR 10? This is the document from Environment Canada Emergency Sciences and Technology Division. It's a data sheet on Cold Lake bitumen.
13826. Mr. Belore, Cold Lake bitumen is the parent oil for Cold Lake bitumen diluted with condensate samples that were used in some of the testing for fate and effects; is that correct?
13827. **MR. RANDY BELORE:** I can't be sure where this sample was taken. I don't know the genesis of it in terms of its sampling but I would -- it is a Cold Lake bitumen sample that has been analyzed here. So that's about all I can say.
13828. **MR. McCORMICK:** So wouldn't necessarily be from the same sample that was used in the studies by Northern Gateway?
13829. **MR. RANDY BELORE:** Yes, I -- yes.
13830. **MR. McCORMICK:** It ---
13831. **MR. RANDY BELORE:** Actually I can say that definitely it wouldn't be product that was used in the sample. Because I think if you look at the right-hand column, the dates for the analyses were in the eighties and nineties. So it was a rather old sample here.
13832. **MR. McCORMICK:** Thank you, Mr. Belore.

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13833. Would you agree with me that this document reports that the -- excuse me. Would you agree with me that this document indicates for the sample which was assessed that the pour point of the Cold Lake bitumen was between negative 4 degrees Celsius and 9 degrees Celsius?
13834. **MR. RANDY BELORE:** The data in the table is as it stands.
13835. **MR. McCORMICK:** And would that be the -- comparable to the pour points of the parent oil which -- the parent oil from the Cold Lake bitumen diluted with condensate that was used in the Northern Gateway testing?
13836. **MR. LANGEN:** Madam Chair, I'm questioning the relevance of this line of questioning. The document that's been put to the witness is titled "Cold Lake Bitumen". It is dealing with bitumen. It's not dealing with dilbit and we have heard extensive evidence from this Panel that dilbit is a separate and complete -- or separate and subsumed product on its own. It is not Cold Lake bitumen, it's Cold Lake -- or dilbit.
13837. **MR. McCORMICK:** Perhaps to -- we can disregard the aid-to-cross, Mr. Belore. Would you be able to tell us the pour point of the Cold Lake bitumen which was the pour point -- or the pour point of the Cold Lake bitumen that was the parent oil for the Cold Lake bitumen diluted with condensate used in the testing?
13838. **MR. RANDY BELORE:** We analyzed the Cold Lake diluted bitumen as an individual product, a product stands on its own. And the data for the pour point of the diluted bitumen is provided in B16-31.
13839. **MR. McCORMICK:** Would you agree with me, Mr. Belore, that pour point may affect the fate and behaviour of sunken oil or the fate and behaviour of oils generally?
13840. **MR. RANDY BELORE:** Yes it can.
13841. **MR. McCORMICK:** Thank you, Mr. Belore.
13842. If we can turn back to the biophysical recovery document and that would be Exhibit B83-17. Hope to look at page 171. Thank you, Madame Clerk.

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13843. This is section 7, discussion of the recovery document. I'd like you to please note the second-last sentence, in the first paragraph, under the heading 7.1 "Recovery Currents in Biophysical Environments".

13844. Now, at a different point in the study a comparison is drawn to Jones and Schmitz study. One of the studies cited in this report, which found that after about 60 percent of the indicator variables examined had shown recovery.

13845. How does Northern Gateway justify the statement that 60 percent and the 81 percent we see here are similar -- excuse me, similar frequencies?

13846. **DR. WALTER PEARSON:** I think when you go further down into the discussion you'll find a statement where we say that recovery occurs and that recovery is not rare but more common than not.

13847. So both of these numbers, the 60 percent and the 80 percent, and I believe there was another study as well, with another number, all indicate to us that recovery occurs and that it's more common than not.

13848. **MR. McCORMICK:** So this statement, the use of the terms similar in that sense, would apply equally to 99 percent and 51 percent; is that correct?

13849. **DR. WALTER PEARSON:** Say that again please?

13850. **MR. McCORMICK:** I'll attempt to clarify. More likely than not, more probable, to me would suggest frequency greater than 50 percent. So the idea that it is more probable would capture the range of -- from 51 percent up to 100 percent; is that correct?

13851. **DR. WALTER PEARSON:** That would be my understanding, yes.

13852. **MR. McCORMICK:** Thank you, Dr. Pearson.

13853. So noting the same numbers Jones and Schmitz tell us that 40 percent of valued ecosystem components affected by oil spills have not recovered. Northern Gateway's study indicates that 19 percent of valued ecosystem components affected by spills have not recovered.

13854. Does Northern Gateway believe that these results represent an acceptable recovery of valued ecosystem components in the event of an oil spill?

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13855. **DR. WALTER PEARSON:** Those numbers are derived from what happened in spills in the past, some of which did not receive clean-up activity, some of which received clean-up activity that led to more problems than they solved.
13856. We don't believe that we want -- that no spill is acceptable in -- in the situations -- in the -- no spill is acceptable to the project and we wish to, and intend to, produce a response capability that will accelerate recovery and reduce the number of -- of components of the environment that -- that take a long time to recover to the absolute minimum.
13857. The other thing to understand is that the Jones and Schmitz document looked at things like logging, deforestation, other kinds of -- of disturbances and of -- that derive from human activity that took longer times to recover and had more unrecovered instances than do oil spills.
13858. **MR. McCORMICK:** Thank you, Dr. Pearson.
13859. So using solely the Northern Gateway document, the biophysical recovery document, we see that 19 percent of valued ecosystem components had not recovered. Does Northern Gateway consider that to be an acceptable recovery rate?
13860. **DR. WALTER PEARSON:** Are you talking about what's in the history or what's in the future?
13861. In the future it won't be an acceptable recovery rate and we're taking steps to be sure that that doesn't happen -- to be the acceptable -- that doesn't happen to be the recovery rate in the future. What's past is past and the document is simply talking to that.
13862. **MR. McCORMICK:** Could we please go to page 8 ---
13863. **DR. WALTER PEARSON:** One more thing.
13864. **MR. McCORMICK:** Certainly, Dr. Pearson.
13865. **DR. WALTER PEARSON:** There's a number of these studies that -- that weren't complete or stopped before the process had -- had continued to its

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- full fruition. So some of these in reality could -- some of those that are not recovered could in reality be listed later as recovered or recovering.
13866. **MR. McCORMICK:** Now, I understand that according to the methodology that was applied in this study, if the study ended before full recovery was achieved such studies were scored as recovering; is that correct?
13867. **DR. WALTER PEARSON:** If that's what the study author said. If what the study author said is that it -- it was not recovered or that no recovery was apparent, it was -- it was scored as not recovered or none -- no recovery apparent.
13868. **MR. McCORMICK:** So the 81 percent number is for VECs that are recovered or recovering and the 19 percent left over fell into the "none" or "non-apparent" category; is that correct?
13869. **DR. WALTER PEARSON:** That's correct.
13870. **MR. McCORMICK:** And none or non-apparent category is defined as not showing recovery, long-term effects have set in, and conditions are not improving or improve very modestly; is that correct?
13871. **DR. WALTER PEARSON:** Yes, sir.
13872. **MR. McCORMICK:** Could we please go to page 8, Madame Clerk.
Thank you.
13873. If you'd please note the sentence in the middle of the page beginning with: "Recovery is common." We'll note some numbers in there.
13874. It indicates that:
- "Study authors concluded that the VEC's achieved a recovered state or recovering state by the study's end in ..." ---*
13875. **THE CHAIRPERSON:** Mr. McCormick, again we don't need to read into the record.
13876. **MR. McCORMICK:** Sorry about that.
13877. **THE CHAIRPERSON:** If you could go straight to your question

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- please.
13878. **MR. McCORMICK:** I will do my best.
13879. Would you agree with me that the corollary is also true that 14 percent, 30 percent and 50 percent did not achieve a recovered or recovering state by the study's end?
13880. **DR. WALTER PEARSON:** If you're quoting the complements of -- then yes.
13881. I would note too that those specific numbers were changed in an errata that was filed as well, but not substantially.
13882. **MR. McCORMICK:** If we could go to -- we're still on page 8.
13883. I'd like to direct the attention of the witness panel to the sentence: "*Recovery after oil spills does occur.*" It's immediately below the sub-heading "Conclusions".
13884. In noting Northern Gateway's conclusion that between 14 and 50 percent of ecological resources, subject to adjustment in relation to the errata, in the three biophysical environments examined it's shown no apparent signs of recovery.
13885. Would you agree with me that some of the concerns expressed in the intervenor evidence and oral testimony about impaired recovery are in fact valid?
13886. **DR. WALTER PEARSON:** It's important to understand why the particular cases end up in recovery or in the not recovered category. They involve particular environments that sequester and hold the oil for a long time; salt marshes, wetlands like this. They involve cases where there was no clean-up or where clean-up was ineffective. They involve cases where clean-up actually led to problems that were -- that delayed recovery.
13887. And -- and you understand that some of these come from 20 years ago, starting with the Amoco Cadiz. And Dr. Owens and his colleagues in the oil spill response corp -- in the oil spill response community don't do things the same way they did 20 years ago and so modern spill response has learned to avoid those kinds of techniques and applications that will cause problems. It's also learned to

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put high up on the priority list for protection those kinds of environments that traditionally or -- or at least historically I should say, show poor -- show slow recovery.

13888. And this of course speaks to the need for the geographic response plans that my colleagues have spoken about before in terms of -- of developing and the plans and -- and procedures to be applied in -- in the case that there's a spill.

13889. So it's interesting to me that the literature is telling us that recovery occurs. It's more common than not. It's also telling us that we need to examine why it's not recovering. And to build our spill response capability to address those kinds of things that we know are problems and to take care of that in a spill response.

13890. **MR. JOHN CARRUTHERS:** Mr. McCormick, you asked if Northern Gateway was aware of the concerns tabled by your client. And certainly I -- we were very much aware of those and -- and very genuine concerns. And that's again why when we first initiated the project we incorporated the marine transportation aspects in the review of the project when we filed our first PIP (preliminary information plan). And that was further developed through the Joint Review Panel themselves in terms of their Terms of Reference.

13891. We very much recognize those concerns and that's why we've gone into things like extended responsibility, where we looked at enhancing, prevention and response and that's why we're talking about this panel. But certainly that was very much recognized by Northern Gateway at the outset.

13892. **MR. McCORMICK:** Thank you, Mr. Carruthers and Dr. Pearson.

13893. Just directing your attention once again to that first paragraph under the sub-heading "Conclusions". It indicates -- one moment please.

13894. Just the very first sentence:

"Recovery after spills does occur."

13895. Given that not all ecological resources recover, would you agree that it would be more accurate to state that some biological and human environments recover or show signs of recovery, rather than the less precise statement,

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"Recovery after oil spills does occur"?

13896. **DR. WALTER PEARSON:** It's important to understand why we undertook this study.
13897. We undertook this study because of comments that had been made that were essentially to the effect that ecosystems simply do not recover from a spill or they never recover from a spill. We wanted to examine the evidence in the scientific literature to see whether that would hold up.
13898. It's to my gratification, and a little bit of surprise, that when you go to the evidence you find that recovery is more common than not and that it does occur. And the -- I think this whole thing, as the quote from Jones and Schmitz says, is that gloomy predictions, predictions that things are never going to recover, are not supported by the scientific evidence.
13899. The rest of the document attempts to understand exactly the circumstances under which recovery is accelerated and impeded for different VECs, what the factors are that enhance recovery in certain circumstances and impede it in others. And as a whole it leads us to, I think, a confident conclusion that recovery will occur and that if you can further enhance your confidence of that by the building and the application of a modern, robust response capability that's part of the project, which is the intent of the project.
13900. **MR. McCORMICK:** Thank you, Dr. Pearson.
13901. **MR. JEFFREY GREEN:** I'd just also like to add here, you're taking one of the conclusions by itself. And if one scrolls down the page and looks at each of the italicized text, as an example, it says:
- "Recovery...does occur...Recovery is common...Recovery takes time... The time to recovery depends on the environment, [the] VEC, and other factors...Several factors impede recovery [and] In some cases, recovery needs active human aid."*
13902. That's the story of this report.
13903. **MR. McCORMICK:** Thank you, Mr. Green.
13904. Dr. Pearson, would you agree that those individuals who continue to

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- be affected by the 19 percent of the VECs which have been studied that have not recovered, may not share Jones' and Schmitz' view on whether the results are, in fact, gloomy?
13905. **DR. WALTER PEARSON:** Now we seem to have switched from the biophysical to the human environment, if I understand your question. And I would ask Dr. -- or Mr. Wooley to comment after I make my comments on the biophysical.
13906. The -- let me tell a story. I flew into Valdez on something like the 2nd of April to join the -- to do a study of herring in Prince William Sound. And I went that night to the town hall meeting that's held every -- that was being held every night at that time. And there's no question that there was a good deal of fear about what was going to happen in the future in that community. And that fear, it was -- is real, it's not without justification, and I'm not saying that fear is without justification in this report.
13907. This report is about the history that follows after that that says things in those initial days of a spill are not clear-cut and they engender all kinds of emotion and that emotion is real and it's felt by everybody involved.
13908. That has led to this modern spill response that does more and more every year to incorporate the concerns of the people involved in order to address the issues.
13909. And so yes, I share personally -- I have shared personally the pain of some fishermen that I talked to in that situation about their future prospects and, at that time, before we'd actually done the study and gone out in the water, we couldn't offer assurances. But now we know a lot more than we do and we can say that recovery does occur and that we have these things we can do to make it more certain.
13910. **MR. CHRIS WOOLEY:** And I'll just add in the -- if we could go to page 99, Adobe page 99 of this same document? At the bottom of the page, please. In the italics.
13911. I used a quote from Dr. Jim Fall from the Department of Fishing and Games Subsistence Division, who also -- well, I guess who did study for many, many years the effects on the human environment, and his conclusion is there in italics, "*While the spill...*"

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13912. And I won't -- I guess I don't need to read it. But the bottom line was that there were concerns. I know we all shared those concerns. The spill did not cause irreparable damage to the fabric of society in the communities that were affected. And those are not -- and I guess I just point to the fact that those are the words of somebody who's spent a lot of time in those communities. Those are not my words.

13913. **MR. McCORMICK:** Thank you.

13914. Does Northern Gateway agree that a healthy, functioning ecosystem contributes to a healthy society and economy for the Haisla Nation?

13915. **DR. WALTER PEARSON:** Yes, sir.

13916. **MR. McCORMICK:** And Madame Clerk, could we please see displayed Haisla Nation aid to cross-examination HN PR 20?

13917. I believe you may recognize this document, Dr. Pearson. I believe ---

13918. **DR. WALTER PEARSON:** Yes, sir, I do.

13919. **MR. McCORMICK:** Is it correct that you were the lead author of this report?

13920. **DR. WALTER PEARSON:** I'm sorry; this report is from the Exxon Valdez Trustee Council, sir. I thought you were asking me if I recognize what's on the screen.

13921. **MR. McCORMICK:** I'm sorry. I've misread my notes. I was -- you were the lead author on the biophysical recovery document and ---

13922. **DR. WALTER PEARSON:** I was the coordinator and wrote parts of it, yes.

13923. **MR. McCORMICK:** Thank you.

13924. No, the document we see here is the Exxon Valdez Oil Spill Trustee Council. It's been addressed in previous discussions.

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13925. If we could go to page 92, please, Madame Clerk?
13926. **THE CHAIRPERSON:** I don't think we can because there's not 92 pages.
13927. **MR. McCORMICK:** Oh, I'm sorry. I've put my documents in the wrong order.
13928. Could we please pull up Exhibit B83-17, page 92? If I could ask you to scroll down the screen, please? It'll be the third paragraph we're looking at.
13929. And Dr. Pearson, I'll direct your attention to the third sentence beginning with:
- "However, herring populations have [...] not returned to pre-spill conditions."*
13930. And as well the following sentence. We could now go to HN PR 20, and that would be page 31.
13931. And just above the line across the page you'll note Pacific herring are considered to be not recovering from the effects of this spill.
13932. Could you -- I see a potential contradiction between these two statements. Could you please clarify how they reconcile?
13933. **DR. WALTER PEARSON:** There's -- it's important to understand that the collapse of the Pacific herring in 1993 was a complicating factor in the recovery of the herring resource from the localized effects that were seen in 1998 and were not detected in 1990.
13934. The attribution of that decline to the oil spill is -- has not been proven by subsequent 20 years of research. And in fact, there's a considerable convergence among the people that are studying the Prince William Sound herring that that particular -- that the decline and now the poor recovery since is not related to the Exxon Valdez oil spill or to any lingering oil, but that, rather, it's related to natural factors including -- including poor nutrition, ocean conditions and disease.
13935. The statement that it's not well understood would certainly have been

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- true five years ago. There's a lot of stuff that's come out in the last year and so -- last two, three years -- that has significantly improved our understanding. Okay.
13936. **MR. McCORMICK:** Thank you, Dr. Pearson.
13937. Do you maintain that there is no debate regarding the effects of the Exxon Valdez oil spill on the collapse of the herring population in Prince William Sound?
13938. **DR. WALTER PEARSON:** There are -- there is -- there's two kinds of debates. Let me talk to those.
13939. One kind comes from people that read the initial material that was written in 1993/1994, in that era, when the issue was not clear. And in Dr. Carls that we've spoken about before, in -- even in his 2002 paper said that there was no direct link between the oil spill and the decline, but there was an in-direct link -- they couldn't dismiss an in-direct link.
13940. And he had done some studies in the laboratory that led him to believe that. And that particular part of the studies had to do with the potential induction of disease, VHS, by exposure to oil.
13941. Four studies later, six major experiments later, all sponsored by the trustees, failed to provide that link -- that in-direct link, okay.
13942. In their 2007 document, Dr. Carls and Dr. Rice, the people most -- they're known scientists that were responsible for a lot of work, but Carls especially -- Mark Carls especially for work on herring, stated that they no longer felt that the -- you could blame the 1993 decline on the Exxon Valdez oil spill or lingering oil.
13943. In that -- they went even a little further in that document to say that the evidence of recovery of the herring population in Prince William Sound occurred before the 1993 decline. And that was three things.
13944. One, that the effects that were discovered by both sides in the first year of the spill, 1989, were not evident in the next year, 1990. That the population level of the herring in Prince William Sound was high post-spill.
13945. And most significantly to myself and others, that the '88 year class

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- that were juveniles, first -- one-year-old fish living in the near shore environment of Prince William Sound, some of those environments still being oiled, recruited in record high numbers and formed the basis of the record high catch that Dr. Maki talked about along with the fact that the old year class that was supporting the fishery, the '84 year class, continued to have high abundance.
13946. So if there had been no decline, the -- things would have been wrapped up in '94 and '95. But the decline, which comes out of the blue from other factors, sidetracked the issue -- or sidetracked the recovery.
13947. The -- so there's convergence on this and we can point to specific papers where there's convergence. Where there's still some debate is kind of a chicken or egg thing about whether poor nutrition came first and then the fish got diseased or whether disease came first and that had -- led them to have poor nutrition.
13948. And I'm open on either interpretation on that as -- there is some that feel stronger one way or the other, though.
13949. **MR. McCORMICK:** Thank you, Dr. Pearson.
13950. The literature that's cited as informing the biophysical document, Exhibit B83-17, did the authors -- did any of the authors of the report contribute to the primary literature or research cited in the report?
13951. **DR. WALTER PEARSON:** Yes. Including the gentleman sitting right next to me here, Dr. Maki.
13952. **DR. ALAN MAKI:** And yourself.
13953. **DR. WALTER PEARSON:** And myself, yes.
13954. **MR. McCORMICK:** Thank you.
13955. Madame Clerk, could we please go to Exhibit B83-17, page 21?
Thank you, Madame Clerk.
13956. I'd direct your attention to terms "dispersed, sunken, and submerged" at the top as well as the line indicating:

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“...the NRC (1999) recommends using the term 'non-floating oil.' This term is used in this document.”

13957. Would you agree with me that the term “non-floating oil” is not used again in the document?
13958. **DR. WALTER PEARSON:** I didn’t do a search and you probably have, so I take your word for it. It was a struggle to get all of the authors involved to use the same terminology throughout the report.
13959. I’m not sure whether we used the words "sunken" or "submerged" in the rest of the document, either. So it’s a -- it may be a moot point for discussion in terms of the report.
13960. It’s not a moot point because -- in terms of our whole discussions here because I think the distinction between what sinks to the bottom and stays there, what is submerged for part of the time and comes back to the surface, what’s entrained, all of those things are important distinctions to be made, and Dr. Before has spent a good deal of time impressing upon us the need to pay attention to exactly what we’re talking about.
13961. **MR. McCORMICK:** Thank you, Dr. Pearson.
13962. And subject to check, would you agree with me that the term sunken or submerged oil are not used again either?
13963. **DR. WALTER PEARSON:** Subject to check, yes.
13964. **MR. McCORMICK:** In the original ---
13965. **DR. ALAN MAKI:** If I could expand on Dr. Pearson’s comments?
13966. **MR. McCORMICK:** Certainly.
13967. **DR. ALAN MAKI:** There’s a reason as we canvassed the published literature and experience with spills world-wide, you find that are very, very few instances where oil actually sinks or get into the water column or the sunken oil scenario exists. There just aren’t many examples.
13968. The couple that we can think of are isolated instances. For example,

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- the Narragansett Bay, we had a very enclosed bay, shallow water with waves breaking in the area. That did indeed get oil into the shallow water and resulted in a lobster mortality in that case. A very singular instance; the other one we can think of is the Braer spill in Europe where tremendous seas of 30 feet were involved in the accident and that energy drove the oil into the water column.
13969. However, this was in the open coastal ocean, it did not result in any significant fish mortality in that case. So the reason we don't really discuss it is there's no real examples where oil actually sinks into the environment and causes effects that we could locate, or very few.
13970. **DR. WALTER PEARSON:** I'm told that there's one instance where we talk -- in the rest of the document where we talk about submerged oil. And I don't have an Adobe number but it's on page 6-11 -- let me back up, on page 6-17, Adobe 139, please, and it's talking about the East Walker River spill, not a marine spill but a freshwater spill.
13971. Down near the bottom where it talks about changing the level of the river in order to facilitate recovery of the submerged oil -- or level of the reservoir I should say.
13972. **MR. McCORMICK:** I do appreciate you noting that for us. Thank you, Dr. Pearson.
13973. Was there a -- in the original draft of the document was there a more robust section addressing issues associated with non-floating oil in recovery?
13974. **DR. WALTER PEARSON:** I'm sorry, I was -- could you repeat the question?
13975. **MR. McCORMICK:** I'd be happy to, Dr. Pearson.
13976. Documents such as the one we see displayed on the screen often go through multiple drafts before they reach their finalized state. In earlier drafts, was a section included that discussed recovery within the context of non-floating oil?
13977. **DR. WALTER PEARSON:** This document dealt with the recovery from the oil spill. I don't believe that we dealt with particular techniques, although we did note where if a technique impeded recovery that -- we noted that

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or whether a technique was particularly effective in speeding recovery.

13978. I'd probably have to look again in order to give a full answer to your question I think but...

13979. **MR. McCORMICK:** Would it be possible for you to provide that information by way of undertaking?

13980. **DR. WALTER PEARSON:** I ---

13981. **MR. LANGEN:** Madam Chair, I don't see the value in that. The document has been submitted in its final form. Arguably, we're crossing into, in any event, a solicitor/client privilege with respect to draft documents. I don't see the value in that. He's answered the question, indicating that he doesn't believe that the document addressed the material my friend is referencing.

13982. **MR. McCORMICK:** It is my ---

13983. **DR. WALTER PEARSON:** Sir, if the idea is that we took out a section that dealt with recovery of oil that was sunken, we didn't address it all before this -- we wrote this document.

13984. If you're talking about whether I speak to recovery of sunken oil or submerged oil like here, I think this is the only instance but if you want me to check the rest of the document, we can.

13985. **MR. McCORMICK:** Thank you, Dr. Pearson. That is helpful and clarifies. You've responded to my question. Thank you. No need for an undertaking.

--- (A short pause/Courte pause)

13986. **MR. McCORMICK:** Madame Clerk, could we please see page 31? Thank you.

13987. We see contained in this ---

13988. **THE CHAIRPERSON:** Mr. McCormick, you can just go straight to your question. Thank you.

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13989. **MR. McCORMICK:** Thank you.
13990. Regarding the definition of recovery that is used in the biophysical recovery document, is it Enbridge's -- Northern Gateway's position that restoration of an injured resource, the recovery of a VEC erases the harm caused by the initial event?
13991. **DR. WALTER PEARSON:** What do you mean? I think the key term there is erase. Would you elaborate on that please?
13992. **MR. McCORMICK:** Certainly, Dr. Pearson.
13993. Enbridge acknowledges that even if a resource is or a VEC is to recover, say 10 years after an event, that during the period of the 10 years prior to the recovery, there is still effects and negative impacts on human populations.
13994. **DR. WALTER PEARSON:** It's true that you have some sort of effect or injury at the beginning. That's why you examine a VEC for recovery and that while it's in the recovering process, its full function and the services it might provide to the rest of the ecosystem and to the human environment are impaired in some way until recovery occurs.
13995. **MR. McCORMICK:** And when referring to valuable ecological goods and services, is that limited to valuable ecosystem components that have a market value?
13996. **DR. WALTER PEARSON:** Please repeat the question.
13997. **MR. McCORMICK:** Certainly, Dr. Pearson.
13998. Just referring to the definition of recovery that has been applied in the document and to recover or restore the ecosystem to a functional state that provides valuable ecological goods and services. The term "valuable", is that limited to valued ecosystem components that have a market value?
13999. **DR. WALTER PEARSON:** It's not. Take the example of the herring which is dear to my heart, they have both -- they have everything in the sense that they have -- they're a keystone species that provides -- that are prey to marine mammals, marine birds and marine fish. So they have a key position in the food web.

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14000. They have the economic value that's associated with the commercial fishery. They have some economic value because they're used as bait in the recreational fishing and they have distinct social value to the First Indian Nations for their subsistence and ceremonial value. Very valuable and it's not just how much money's involved.

14001. **MR. McCORMICK:** Thank you, Dr. Pearson.

14002. Noting the commercial fishery -- herring fishery has not reopened since Exxon Valdez spill, in my understanding, if a similar event was to occur, resulting from the Northern Gateway Project, how would Northern Gateway compensate commercial fisheries if commercial fisheries are effected for periods comparable to the Exxon Valdez spill?

14003. **DR. WALTER PEARSON:** If I could go back to the first part of your statement, did you say there were no commercial fisheries after the Exxon Valdez?

14004. **MR. McCORMICK:** Just the herring. Is that correct that it hasn't?

14005. **DR. WALTER PEARSON:** That's not correct, sir.

14006. **MR. McCORMICK:** Thank you for clarifying.

14007. **DR. WALTER PEARSON:** There were -- there were commercial fisheries in the three years, four years after the spill, one of which was -- set record high numbers. After the collapse, there were actually two or three more years where modest fisheries were held. Two -- I'd have to check that, but two or three years. Two at least. Two -- two, and -- but since the collapse, it's clear that most of the years, there has been no fishery.

14008. Okay. So second part of the question, please.

14009. **MR. McCORMICK:** Certainly, Dr. Pearson. I will hold off on the second part of the question in light of your answer.

14010. Just bear with me for one moment, Madame Chair. I'm just going to confirm that I have nothing left, and I believe I'm very near finished.

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--- (A short pause/Courte pause)

14011. **MR. McCORMICK:** For the VECs studied in this report, either in the text or in the appendices, was data on containment or clean-up of spills evaluated?
14012. **DR. WALTER PEARSON:** In the case studies we looked at, we looked to see whether there were things in -- in the clean-up response that accelerated or impeded recovery.
14013. **MR. McCORMICK:** Would you agree that the effectiveness of containment and clean-up can have a significant impact on the recovery rates for VECs?
14014. **DR. WALTER PEARSON:** I think that's a major conclusion of the document, yes.
14015. **MR. McCORMICK:** Thank you, Dr. Pearson.
14016. Did you consider the impact of containment and clean-up in the derivation of statistics of recovery rates in Appendix A and B?
14017. **DR. WALTER PEARSON:** No, sir. We just used the -- whether the -- whether the study authors said it was recovered or not recovered. Our assessment was when we -- in the main text when we look at particular spills.
14018. **MR. McCORMICK:** Would you agree with me that many of the cases cited clean-up techniques exacerbated the adverse impacts of the oil spill?
14019. **DR. WALTER PEARSON:** Generally, the response activities accelerate recovery. There were instances mainly in the early -- in the '70s and '80s where response -- response treatment supplied exacerbated or impeded recovery.
14020. **MR. McCORMICK:** And would you be able to speak to whether that was occurring in cases where there were new and relatively unrefined spill response techniques?
14021. **DR. WALTER PEARSON:** I'm sorry, sir; please repeat.

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14022. **MR. McCORMICK:** In those instances where clean-up techniques did exacerbate the adverse impacts of oil spills, was it in circumstances where novel or untested oil spill response techniques were being used?
14023. **DR. WALTER PEARSON:** There's two from the early days of spill response that -- that are pointed to as classic examples of where the oil spill clean-up operation caused problems.
14024. One comes from the Torrey Canyon, which I believe is the -- is the first major tanker spill that -- and in there, there was -- in there, a dispersant was used that did impact -- caused the intertidal organisms more harm and caused them to delay their response or their recovery. That kind of formulation is no longer used in modern dispersants.
14025. The other was in Amoco Cadiz, where they were sending essentially heavy equipment and people into salt marshes to clean up the oil that was in the salt marsh. In the process, they changed the elevation of the salt marsh, that is, where it is in the tidal -- what tidal height it is. And the maintenance of the vegetation in a salt marsh depends on it being in a certain -- certain part of the tidal range so that when you lower it, you're putting the plants into a different tidal range with a different amount of salt water over them through the course of the tidal cycle in a day. And that changes how well they'll seed and grow.
14026. So that particular technique, the use of heavy equipment in -- in this wetland -- this marshland delayed the recovery of the marshland.
14027. Again, that's not something that we do in the modern -- the modern situation. There are some spills that we looked at, too, in the recovery document that didn't recover well because they were experimental or they were part of a spill where the environment was left -- deliberately left untreated in order to follow recovery without treatment.
14028. **MR. McCORMICK:** Madame Chair, I do note that it is lunch. If I could have the indulgence of the Panel, I should be done within 10 minutes.
14029. **THE CHAIRPERSON:** Please continue, Mr. McCormick.
14030. **MR. McCORMICK:** Thank you, Madame Chair.
14031. Madame Clerk, could we please see page -- I believe this is 83-17 on

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the screen, page 239. And if you could please scroll down, we'll be looking at line 27 and all the way over to the ninth column.

14032. Dr. Pearson, I see here you've got that when birds were studied following Kalamazoo, they were determined to be recovered. And the cited reference is Enbridge Stantec in prep.

14033. **DR. WALTER PEARSON:** Scroll over a little bit, but I believe the reference is correct. What you're saying is correct.

14034. **THE CHAIRPERSON:** Mr. McCormick, do you have a question?

14035. **MR. McCORMICK:** Certainly. Just this particular piece of information is relevant to the context of the question. I'll bring it forward.

14036. Madame Clerk, if we could please turn to ---

--- (A short pause/Courte pause)

14037. **MR. McCORMICK:** Now, it's my understanding, Dr. Pearson, that, for Kalamazoo, 196 birds were collected and 144 were released. Would it be fair to assume that the 52 that were not released had died?

14038. **DR. WALTER PEARSON:** Say that again, please.

14039. **MR. McCORMICK:** Certainly. It might help if we go to the page. Page 154, please.

14040. Looking at the third paragraph from the bottom, I will note it's Kalamazoo River, Michigan, which I believe corresponds to the row on the table that we've just looked at. The last line -- or it indicates there -- it provides numbers about birds being collected, 196, of which 144 were released back into the wild.

14041. Is it a fair statement to say that the 52 birds that were not released into the wild had died?

--- (A short pause/Courte pause)

14042. **DR. WALTER PEARSON:** The numbers are correct. The -- what

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- you're talking about here is the development of a bird rescue centre near the collection of oiled birds in the environment. They are brought into the rescue centre and rehabilitated. The 73 percent recovery rate is a good one for this kind of activity.
14043. But you're right, the others presumably expired.
14044. **MR. McCORMICK:** Didn't make it. Then I'd ask you to look just at the last sentence in the third paragraph in the bottom indicates "no reports on overall effect and subsequent recovery of bird species or communities".
14045. However, in the report or in the table we had looked at earlier on page, I believe, 239, indicated that birds had recovered. Can you please explain how the table indicates that the birds recovered whereas the text here indicates that there is no report on overall effect and subsequent recovery?
14046. **DR. WALTER PEARSON:** As I've said before, there were people writing different sections of the report -- this was written by one individual. The other individuals that were developing the -- and doing the analysis of the literature that went into the table in the back were also working independently in -- and there was a fixed deadline and we didn't have a chance to marry all of the particular sections of the report to the table.
14047. **MR. McCORMICK:** Thank you, Dr. Pearson.
14048. And were any published results or completed studies from the big spill in Kalamazoo -- or excuse me, are there any published results or completed studies in Enbridge's possession showing that valued ecosystem components in Kalamazoo have recovered?
14049. **MR. GREG MILNE:** I'm not aware as to whether or not those studies have been completed at this point in time.
14050. **MR. McCORMICK:** Madame Chair, those are our questions. We thank the witness panel for all the information that has been provided and the attention of the Panel for -- during our questioning.
14051. Thank you.
14052. **THE CHAIRPERSON:** Thank you, Mr. McCormick.

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14053. So we'll break for lunch. We'll come back with Mr. Cullen next and then after that it'll be the Heiltsuk Tribal Council with their questions.

14054. Let's be back for 10 after one, please.

14055. Thank you, everyone.

--- Upon recessing at 12:08 p.m./L'audience est suspendue à 12h08

--- Upon resuming at 1:09 p.m./L'audience est reprise à 13h09

14056. **THE CHAIRPERSON:** Good afternoon.

14057. Are there any preliminary matters parties wish to raise this afternoon?

--- (No response/Aucune réponse)

14058. **THE CHAIRPERSON:** Seeing none, the only thing the Panel would just like parties to be aware of is as you know we're going to sit tomorrow morning and the scheduled sitting is from 8:30 to 12:30.

14059. Typically when we've sat on Saturdays, I think we've tried a couple of 15 minute breaks. Next -- tomorrow we'll try taking a half hour break to give everybody a chance to get something to eat and hopefully that will help everybody in the endurance marathon of many days of subsequent hearing days.

14060. So we'll sit from 8:30 to 10:30 tomorrow morning, we'll take a break until 11:00 and then we'll sit from 11:00 to 12:30.

14061. So with that, good afternoon, Mr. Cullen. Please proceed with your questions of this panel.

JOHN CARRUTHERS: Resumed

RANDY BELORE: Resumed

JEFFREY GREEN: Resumed

ALAN MAKI: Resumed

OWEN McHUGH: Resumed

GREG MILNE: Resumed

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EDWARD OWENS: Resumed
WALTER PEARSON: Resumed
JACK RUITENBEEK: Resumed
MALCOLM STEPHENSON: Resumed
JOHN THOMPSON: Resumed
CHRIS WOOLEY: Resumed
DENNIS YEE: Resumed

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

14062. **MR. CULLEN:** Thank you very much, Madam Chair.

14063. I'd like to begin some of the cross-examination today with respect to containment booms. Is it correct to say that the containment booms are the first line of defence around both vessels -- spills from vessels and from the actual terminal in the event of a marine spill in the Douglas Channel or open waters?

14064. **MR. OWEN McHUGH:** Prevention is always the first line of defence to do what you can to prevent an accident from ever occurring. But in the event of an accident, then typically booms are one of the first countermeasures that you do use.

14065. **MR. CULLEN:** Thank you. And as has been explored in some of the previous testimony, the ability to contain a spill is directly connected to the ability to use other remediation techniques such as in situ and skimming -- in situ burning and skimming?

14066. **MR. OWEN McHUGH:** Again, the goal of an effective spill response is to expedite recovery, essentially by limiting the spread of oil, containing it near the source and removing it from the surface if that's an appropriate decision to do that, either through mechanical recovery, the use of dispersants which has environmental cost that you need to weigh if you will use them because it's moving the oil into another component of the environment for the greater benefit of the environment.

14067. But again, these are always undesirable events and ---

14068. **MR. CULLEN:** Of course.

14069. **MR. OWEN McHUGH:** --- you're looking at what is the best option

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moving forward.

14070. **MR. CULLEN:** Certainly. And forgive me for speaking of only the undesirable events scenarios.

14071. I guess the key link that I'm seeking to make and this will follow further to my questions, Madam Chair, is that the -- in order for skimming in situ burning to be as effective as possible, one assumes the effective utilization of booming technology is inherent.

14072. **DR. EDWARD OWENS:** Yes, the booms themselves are part of a system that we use primarily to aid recovery -- mechanical recovery in surface removal. Booms can also be used in control burns to ensure that there's a sufficient thickness of oil contained to sustain combustion. So they have multiple purposes.

14073. They're also used in shoreline protection in an exclusion mode or sometimes a diversion mode to divert oil away from sensitive resources. So we have multiple tactical uses for booms.

14074. **MR. CULLEN:** Thank you.

14075. If we could please bring up Exhibit B25-4, Appendix B, Hydrocarbon Mass Balance Estimates - Inputs for Spills Response Planning, TDR 2011? I think if we could scroll down a bit?

14076. There's a series of surface modelling in the Kitimat Terminal area and Douglas Channel that is conducted in this piece of evidence. We see surface currents travelling at or well in excess of .513 metres per second or one knot. Question to Mr. Belore, you're working with SL Ross Environmental Research today?

14077. **MR. RANDY BELORE:** I'm here on behalf of Northern Gateway Pipelines as ---

14078. **MR. CULLEN:** Let me be more explicit then. There was a study published by SL Ross in 2004 in the World Catalogue of Oil Spill Responses; are you familiar with the study?

14079. **MR. RANDY BELORE:** I'm familiar with the document -- not its

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entire -- in its entirety. I'm not responsible for the production of that catalogue.

14080. **MR. CULLEN:** The question I'm seeking to understand is the effectiveness of booming above -- in areas of water where ocean currents are in excess of one knot. Is there a co-relation, is there an effect on the effectiveness of booms?

14081. **DR. EDWARD OWENS:** There certainly is a very strong relationship between boom effectiveness and currents. And when we deploy booms we very much take that into account. And we work with the currents so that rather than anchoring, for example, if we have a strong current, we're more likely to go with the current. And so a vessel -- we're looking at relative velocities and so we want to bring a relative velocity down so that the boom can maintain its integrity and so that we don't lose oil, particularly from entrainment below the boom.

14082. So there -- we understand very well the dynamics of booms and how they work with respect to currents and oil and work with those always.

14083. **MR. CULLEN:** So just to have some understanding, in currents in excess of one knot, anchoring of booming system strategy would be counterproductive because the relative speed that you've spoke of would render the booms less effective if they were holding against a current in excess of that one knot? Is that -- am I understanding the science right?

14084. **DR. EDWARD OWENS:** If we were to have them as a static barrier that would be the case. When we have strong currents and we're anchoring, we actually move booms then, in some cases, almost parallel to the current so we can divert them and progressively move them from one area to another.

14085. There are also -- in part we've talked in this panel about recent developments. There are now commercially available what we call fast current booms that have been designed to work in well excess of one metre per second relative current even -- even not relative currents.

14086. So there's a lot technology out there that's recent and there's also a lot of tactical developments that we use so that we can work in quite strong currents and work effectively.

14087. **MR. CULLEN:** Just so I can understand the mechanics and forgive

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me for not being up to date on current boom technology. The mechanical moving of these booms is done how? Is it -- do you commission boats? Are there motors that are attached to the boom devices themselves?

14088. **DR. EDWARD OWENS:** I'm sorry; could you repeat the question? I would like to answer it accurately.

14089. **MR. CULLEN:** I'm just trying to understand the basic mechanics. You've talked about booms not remaining static and trying to work with the currents or in some cases, parallel to currents so that the booms are not rendered ineffective by a current in excess of one knot.

14090. I'm wondering just physically how that is done. Is the boom -- do the boom manufacturers move them themselves? Do the subcontractors hook up with some tethering to boats that then move on a certain pathway?

14091. **DR. EDWARD OWENS:** Yeah. And I hope I'm not being confusing. There are a number of different tactical deployments of a boom, depending upon currents. And some would be anchored and their configuration with respect to the current would be at an angle to be effective. Other free moving booms would be attached to a vessel.

14092. They may have -- the response organization will have boom deployment vessels and we would be training with those vessel operators with booms in a variety of current conditions. So ---

14093. **MR. CULLEN:** So -- sorry.

14094. **DR. EDWARD OWENS:** --- there is a technology. There is a design of technology so that these would be free floating and moving with the current to get a low relative velocity.

14095. **MR. CULLEN:** Now, let me understand the dynamic between both a current and excess of one knot and a significant wave activity on the effectiveness of those booms. We can understand what the knots are going to be in any system, given the tidal charts that are available publicly.

14096. I'm imagining in the case of an oil spill on a night like last night, where we had, in the open water, waves in excess of three to four metres. Is there a compounding effect and does that effect then translate into how it is that you

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attack an oil spill and try to contain it through the booming systems that you'll deploy?

14097. **DR. EDWARD OWENS:** The effects of wave height are -- they're going to be obviously different wave heights in different operating conditions and we would be using different boom types for different operating environments. So within the relatively sheltered confines of the confined channel area, we would be using one type of boom.

14098. We would be using larger booms if we're working in a more open water conditions. Those booms are designed and referred to as open water booms versus sheltered water booms. So it's a matter of design to take into account there.

14099. **MR. CULLEN:** Did you want to say more? No, that's okay? Okay.

14100. The question about the open water larger booms then is there point at which with knot and compounding effects of wave height, that those booms are also rendered less effective or ineffective?

14101. **MR. OWEN McHUGH:** I think that we may have combined two operating areas now. If we think about where currents are typically faster, it's within more confined waters where tides have greater influence. So those are also areas where you don't expect to have as large waves and the fetch isn't as large.

14102. So you can have -- I'm not saying there's never places that the currents are stronger in open water but in general, that is the case. So when you look at it, you need to consider both of those elements. So there's different operating environments.

14103. **MR. CULLEN:** Thank you.

14104. So is it your evidence then that in places along the proposed route where there are strong currents, there are also not a pattern of strong wind and wave heights? And then the reverse is true, where there are strong winds and high waves that the knots that we would see in the currents are not as strong?

14105. **MR. OWEN McHUGH:** I don't think that was my evidence. What I stated was that in general, where you have more confined waters, you tend to have higher currents ---

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14106. **MR. CULLEN:** I see.
14107. **MR. OWEN McHUGH:** --- but around one knot is -- unless you're talking about a very specific site, it's within the confined channel where you do have some narrows that have fairly strong tidal currents.
14108. It's typically more protected waters so you don't end up with as large waves as you would at say, an offshore example. I think your reference was to open water in three to four metres, and as we talked about with the province and the Haisla, there are limits on the use of booms in certain environments.
14109. And that three metre mark, with certain wave steepness, is generally considered a point at which your boom successfulness of being able to contain oil is compromised and that's -- they're not quite as effective. So you're looking at other options as well.
14110. **MR. CULLEN:** Thank you. I appreciate that and I appreciate it's not a blanket statement but you're suggesting that there are patterns. And the patterns are such that where there are strong currents, they are -- they occur in more sheltered environments, where in more open environments those currents tend not to be as strong, where you'll have higher wave activity.
14111. Did I summarize it fairly?
14112. **MR. OWEN McHUGH:** That's very general. There are unique examples of course, where that might not be the case. But in general the physics are, if you have a contained body of water with a tide moving through it, that's constraining the movement and the speed would increase.
14113. When you're dealing with open waters, you're dealing with potentially more larger scale current circulations but they're not the same type of current where you'd have in a confined channel.
14114. **MR. CULLEN:** I see. So all I was seeking to understand in that line of questioning is that in those -- whether we call them rare or unique environments where those two things can be compounding factors, where we see a relatively strong current near or in excess of one knot and wave activity that also effects the effectiveness of booms, in your application to the NEB, is this something that Enbridge has considered? Excuse me, Northern Gateway has

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considered?

14115. **MR. OWEN McHUGH:** We've talked about this extensively in the last few days and yes, it's something that we would consider and have considered.

14116. **MR. CULLEN:** Thank you.

14117. With respect to submersion, it was noted in the testimony earlier this week that there's a ration that exists 1.5 times the ratio of the height of a wave to the depth at which oil can be submerged, due to the activity of that wave. I want to make sure that I understood that testimony correctly.

14118. **DR. EDWARD OWENS:** That number was taken from a piece of evidence that was entered by one of the intervenors and it was from a NOAA, a U.S. government document that indicated that temporary entrainment would take place. And I believe I recollect the term entrainment would be only a matter of seconds.

14119. A soon the physical energy that was causing the temporary submergence past, then that oil would refloat, return to the surface within a matter of seconds. But the 1.5 times the wave height is what is stated in that document that was presented.

14120. **MR. CULLEN:** So if you allow me to understand this temporary entrainment for a moment, is it the evidence that the full refloating of that oil is what is expected or do portions stay behind in the column?

14121. **DR. EDWARD OWENS:** That document -- it was for floating oils which is the oils that we have and will have in the project, that they -- because they're dense -- less dense, then water would immediately return to the surface once the energy that caused that temporary entrainment was no longer there.

14122. **MR. CULLEN:** To be fair -- and this what I'm attempting to understand in terms of the actual effect on the product, that it's not in the environments -- and I'm thinking again of some of the environments I've encountered out on these waters, the effect is wave after wave after wave, it's not one submersion, temporary or otherwise.

14123. Is it the evidence that you've considered, Mr. Owens, that under those many, many submerging activities, at all times, the oil -- the amount of oil that

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went down into the temporary entrainment is the amount of oil that always comes back up repeatedly, time and time again, with the effects of weathering, and continued application of that energy?

14124. **MR. RANDY BELORE:** I think on the -- yesterday, we discussed this, the issue of temporary submergence and over-washing. And we discussed that it's a matter of scale, that the size of the particle will affect how far it's moved into the water column and how long it might take before it comes to the surface.
14125. And even small particles will come up quickly. There will be different sizes of oil mats and oil slicks that are -- that with the diluted bitumen products will be fairly persistent oil.
14126. Under a breaking wave environment, you will have some of the surface oil over-washed and temporarily submerged with each breaking wave. It's not a -- the ocean isn't covered by -- the entire ocean surface isn't covered by breaking waves at one time. It's a certain percentage of the coverage. And as a result, a certain percentage of the oil might go into the water column with each breaking wave. And some will rise up in between waves, that sort of thing.
14127. So a portion will be on the surface, a portion will be submerged through a heavy sea situation.
14128. **MR. CULLEN:** And typically, those breaking waves -- not typically, excuse me, I want to get my language correct here. But the frequency of breaking waves increases the closer you get to shore? It's a different wave. It's not a -- we don't call it a breaking wave anymore.
14129. **MR. RANDY BELORE:** Well, I'm not an oceanographer, so that's why I hesitate to try to talk about this ---
14130. **MR. CULLEN:** As you can tell, neither am I.
14131. **MR. RANDY BELORE:** --- myself. So I leave it to possibly others to discuss the issue. It is a very complex process.
14132. **MR. CULLEN:** Sure.
14133. **MR. RANDY BELORE:** There's no doubt. But I think the issue of

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submergence is one of temporary; once the major energy is taken away, that oil will come to the surface.

14134. **DR. EDWARD OWENS:** Yeah. Breaking waves are not a common thing in the open ocean. I think Mr. Belore just said that. The physical motion of a wave is sufficient to disperse the oil and cause that entrainment. Breaking waves are typically what we see when you see a white crest. And that's what we refer to as a breaking wave. When waves reach -- when a wave reaches the shore, then that is a breaking wave condition.

14135. **MR. CULLEN:** The fact that we're discussing is the wave's energy rather than the fact of whether it breaks necessarily upon the oil that is in the water. Am I right in assuming that or they're two separate effects that can't be accounted for?

14136. **DR. EDWARD OWENS:** Yeah, breaking wave is a different -- is a very different energy condition. It is -- the energy of the wave is fully expended and lost when it reaches the shoreline. And that is a higher energy condition with respect to surface oil than would be on the outer open ocean.

14137. **MR. CULLEN:** Right.

14138. So Madam Chair, what I'm seeking to understand is that if the ratio is one-and-a-half to one essentially of the height of the wave to the amount of depth at which the oil can be submerged to, and the evidence from Northern Gateway is that the vast majority or all or near to all of that oil then resurfaces, we do know that when -- if oil contacts sediments, if oil contacts the floor, it has a much greater likelihood of remaining submerged.

14139. Have I said anything incorrect so far?

14140. **MR. RANDY BELORE:** The -- in the offshore environment away from the shorelines, there is not enough sediment in the water to cause the sinking of that oil to the bottom. We've talked about that extensively.

14141. The one situation where there may be enough interaction of sands, large sand particles with oil would be in the shore zone area at the shore. If this oil were to move into those sorts of environments, the action -- the surf's own action could mix the oil and sand into the body of that oil and thus make the product heavier than water and then it could sink in that situation.

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14142. **MR. CULLEN:** So this is essentially what I'm trying to understand. Is that in the compounding difficulties of a strong weather event -- and last night was not an untypical weather event for February on the north coast -- in which you had strong wave action and you had waves breaking or submerging oil in a near-shore environment, booms would be difficult to disperse, as we've talked about, if the weather is too strong and they're ineffective in wave heights of two to four metres.
14143. You now have an environment in which the temporarily submerging oil has an opportunity to interact with sediments that are either being picked up or actually directly in contact with the ocean floor in near-shore environments.
14144. **MR. LANGEN:** So, Madam Chair, Mr. Cullen had a lot in that question. I'm wondering if he can break it down for the witnesses.
14145. **MR. CULLEN:** Absolutely.
14146. So what we've established so far is that there is a ratio between the energy of the wave in that when a wave of a certain height hits oil on the surface, it can submerge that oil temporarily to a height of one-and-a-half times the effective height of the wave that interacted with the oil.
14147. Where -- we had testimony earlier -- I was just trying essentially trying to pull together the pieces that we've heard just this afternoon -- that there are storm events, wind factors that would allow for the -- would not allow for the disbursement of booms, oil would not be contained.
14148. One could imagine a scenario in which in a heavy weather event, an oil spill has not been boomed, it then comes into shore or near shore contact and at three or four metres of height of wave, if you do the quick math, we're talking temporarily submerging oil going down to a depth of four, five, six metres.
14149. Which -- if you then pull out the maps that we are dealing with over the proposed tanker route -- suggests that the possibility of having submerged oil remain submerged is a possibility. And I'm wondering how Northern Gateway has dealt with that.
14150. So I apologize for the steps in this, but the attempt in my cross-examination was to make sure that I was correct on each point before I came to

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anything that was approaching a conclusive question.

14151. **MR. LANGEN:** So -- and I appreciate my friend's attempt, it's not Northern Gateway's evidence that wave -- that oil will be submerged by a wave by one-and-a-half the wave height. I think Dr. Owens was quite clear that that number was presented in an AQ.
14152. So with respect to Mr. Mullen -- sorry, Mr. Cullen, I apologize ---
14153. **MR. CULLEN:** That's all right.
14154. **MR. LANGEN:** --- I don't think that was Northern Gateway's evidence.
14155. Secondly, the two times you've phrased that question, you've used two different wave heights. You've used two to four metres the first time and you've used three to four metres the second time. And that's, in part, the reason why I'm asking you to break the question down.
14156. **MR. CULLEN:** So perhaps the witnesses can then clarify. Because when I have used this ratio that was presented, and the witnesses acknowledged that it had been presented, is that number wrong? Is the one-and-a-half time factor incorrect? Is there -- and if it is incorrect, is there other evidence that suggests that the ratio is different? I assume that ---
14157. **THE CHAIRPERSON:** Mr. Cullen, again, it's helpful if you just ask one question and let ---
14158. **MR. CULLEN:** Sure.
14159. **THE CHAIRPERSON:** --- the witnesses answer it and then proceed from there.
14160. **MR. CULLEN:** So ---
14161. **THE CHAIRPERSON:** Thank you.
14162. So I think you've asked the question of seeking the witnesses' opinions on the 1.5 number. So let's get the answer to that and we'll go from there.

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14163. **MR. CULLEN:** Absolutely. Thank you, Madam Chair.
14164. **THE CHAIRPERSON:** Thank you.
14165. **DR. EDWARD OWENS:** I'm not responsible for writing that document. It's an empirical number that's based on laboratory work and field observations.
14166. It's difficult in a way to follow the line of argument of you presenting one scenario. I think very briefly, we need to touch upon what happens to an oil spill in open water and as you just said, high-energy conditions, three-metre waves.
14167. First of all, that oil has to be moving in some direction. It could be offshore; it could be along the coast, up or down Hecate Strait. That's something -- the pathway is one thing. It may not even reach the shoreline.
14168. And we've spoken earlier about the Braer spill in Scotland where a tanker ran aground and there was very little shoreline oiling. In fact, it was less than 100 metres, according to the Prince William Sound RCAC, the -- after their shoreline survey. So just because there's a spill there's not necessarily shoreline oiling.
14169. And the other point I would like to make on -- when you have high-energy conditions is that -- and we've had in evidence a diagram, I don't know where it is exactly. I'm just going to be given it.
- (Laughter/Rires)
14170. **DR. EDWARD OWENS:** Could you give me the Adobe page, if you don't mind. I'm computer-challenged on the pages, I should say. B21-2, page 79.
14171. This is a diagram which shows, if you would like, windows of opportunity, which we've discussed, that when you get into increasing wave heights -- and the dark area there is just -- is a sketch of where one would use mechanical waves, and the important axis is the one on the left.
14172. So when you start getting into wave heights that are more than a metre

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- or two metres then the natural degradation dispersion processes take over, and very often -- four of, I believe, that largest six spills that have ever taken place in open ocean -- again we've talked about this before -- have never reached a shoreline, particularly the Odyssey off the east coast of Canada. The largest spill in Canadian waters did not affect the coast.
14173. And so there's a lot of factors that have to be involved, the direction of movement and then the natural dispersion processes of break the oil down into small particles which are then biodegraded, attacked by microbes, bacteria and fungi in the ocean so that they break down and metabolized into carbon dioxide and water.
14174. So when we look at scenarios we take into account all of these various factors.
14175. **MR. RANDY BELORE:** If I can just add a little bit on this. Much of our discussion on submerged oil has looked at the scenario where the oil has weathered and has become more viscous in the form of mats, at the point where we've been discussing over-washing and that sort of thing.
14176. In the type of scenario that you've posed here, an accident occurs in a very high sea state condition, so in that particular case the oil may not be as weathered so you would have the processes that Dr. Owens is talking about here that are slightly different than some of our other discussion where the oil could naturally disperse more quickly because it's in a more fluid state.
14177. And then getting back to the one and a half times wave height situation, I think in that document they also discuss particles -- small particles of oil in that case. So the one and a half times submergence depth may refer to only the fresher oil components, and when you're dealing with a more heavily weathered product, larger patches, that may not apply in that case.
14178. So as I said earlier, it's a complex situation where you're dealing with the oil type, the wave energy conditions before you can apply generally those sorts of criteria. So you have to be careful how you define your scenario and apply these factors.
14179. **MR. CULLEN:** So from both of the -- thank you for that.
14180. Something that I'm trying to get into the mind of the lay person, which

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- is easy because I am one when it comes to this, the high energy environment that you talked about and the experiences that you've seen around the world with oil spills, and that they're -- what you said the natural degradation process takes over.
14181. And what I suppose -- I'll move onto a second line of questioning, but what interests me in that is that, as Mr. McHugh said, the ideal is not to have the accident, the second ideal, if an accident does occur, is to contain and mechanically remove or in situ burn the product.
14182. And this third scenario we're talking about where -- a third scenario we're talking about is such a high energy environment in which the oil just naturally disperses I suppose doesn't provide much comfort in the sense that -- I don't know if you follow my thinking here, Dr. Owens, that natural disbursement sounds like a pretty good thing, to the layperson it sounds like you were unable to clean up the oil from an oil spill.
14183. **THE CHAIRPERSON:** Mr. Cullen, was there a question there?
14184. **MR. CULLEN:** The -- I'd like to talk about -- no. I'd like to talk about skimmers for a moment.
14185. Is there a -- we established earlier -- I don't know if I heard it conclusively -- that skimmers are best deployed once oil has been contained and boomed. Are there scenarios -- let me clarify my question. Are there scenarios in which we apply skimmers to an oil spill in which it is not boomed?
14186. **MR. OWEN McHUGH:** Potentially an example could be if you had a small embayment that somehow had a thick amount of oil wash up near shore you could potentially use a skimmer in that type of scenario in a near shore environment where it's naturally contained.
14187. **MR. CULLEN:** I see. But outside of natural containment environments, one would assume that if it was in the channel or certainly in open water that in order for a skimmer to be effective it would require that the oil is being held in concentration, if I can say that, as being contained enough for a skimmer to be effective, otherwise the skimmer is not as effective. Is that fair to say, Mr. McHugh?
14188. **DR. EDWARD OWENS:** I think it's fair to say that there are -- the purpose of a boom is to improve the encounter, right, is to improve the

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effectiveness and the efficiency of recovery. But there are situations where -- and certain types of booms, like rope mop booms and other -- there's a new belt type skimmer called the octopus which has got a very high recovery rate, which can operate without booms in many instances.

14189. **MR. CULLEN:** But as you said at the beginning of that return that the effectiveness of the skimmer and the recovery is enhanced obviously if you contain it.

14190. I'm wondering, in your application are there commitment times for skimmer disbursement in the three main zones, the terminal area, the Douglas Channel and open water?

14191. **MR. OWEN McHUGH:** I think your question is, is how quickly could we respond essentially in the three operating zones if you wanted to think of a spill generated at the terminal in the marine environment, somewhere in the confined channel area, in general more protected waters, and then in open water areas.

14192. So if we started at the terminal, what I would say is that by having -- for an oil spill pre-boomed at the terminal, we're looking at having that initial containment. You'd also have harbour tugs that are capable of aiding an oil spill response, additional response crafts, and there'd be escort tugs in the area. So a spill at the terminal would be contained and responded to immediately.

14193. If you're looking at the confined channel, now you're talking about, again, an area where we're planning to have with oil -- with laden oil tankers a tethered escort tug and a sentinel tug, which is essentially an extra vessel for protection. So in that scenario again you're looking at having an ability to control the source of the spill, which is the tanker, in the event of an incident immediately. So again I would say that we have an immediate response.

14194. But if you're looking at the secondary backup to that, which is the major commitment for the kind of the enhanced response capability for the confined channel, it really depends on the exact location where you're looking at. So in general, what we've said is six to 12 hours for initial onsite -- within the confined channel in general. And there is a figure that we can bring up, if it's helpful. And in the open water area that could be a longer time. That's the general.

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14195. **MR. CULLEN:** Did you want to bring that figure up? I think your assistant might be helping.
14196. **MR. OWEN McHUGH:** It's B41-16.
14197. So our goal in the confined channel, the maximum is that six to 12-hour window of having a major on-water capability for response. Again the tugs would be there essentially immediately in the escorted areas, and then if you look at this you're seeing a 12-hour window is the yellow line. So quite an extensive response radius within that six to 12 hours approximately.
14198. **MR. CULLEN:** So I read through some testimony of earlier this week in which we tried to establish what that commitment meant. Now you just used the word "maximum time", the six to 12 hours in the confined channels. Did I hear you correctly?
14199. **MR. OWEN McHUGH:** Again, as I stated, it would be very dependent on the location. So we hope to have a time much less than six to 12 hours, but given the realities of how large this area is, the six to 12 hours is a realistic estimate of the maximum time to deliver major on-water capability.
14200. **MR. CULLEN:** So just help me out. Do the sentinel tugs, the escort tugs, the harbour tugs, do they all -- in your plans, are they equipped with the essential skimmers, the booms that are used for deployment or is that a secondary group that shows up?
14201. **MR. OWEN McHUGH:** Again there are two different systems. The escort tugs are capable and will have boom on them, as well as skimming units. Their primary function is to protect the tanker, which is the source of the spill. And I think it goes in alignment with what your concern was originally.
14202. If you had a heavy sea type situation where what you're doing is you're protecting the ship from further damage and minimizing the potential outflow by stabilizing that. So that's the principle behind it.
14203. And if you wanted we can pull up -- I'm not going to do that, actually, because it's assigned to another panel. But there is, within the evidence, it clearly states the exact oil spill recovery capabilities that we're planning to put on the tug at a preliminary level.

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14204. **MR. CULLEN:** And these -- these contracts for the -- the enhanced response, those -- those are all subcontracts, that's not obviously being planned to be done by your company.
14205. Within those contracts is it this -- this commitment, this six to 12 hours or less commitment that we've talked about with the confined waters -- I'd like to get to the open water in a moment, is -- is that part of the stipulation of the contract, that they must perform this. Is it -- is it a guideline? How -- who's to be accountable if not due to inclement weather or unforeseen circumstances but just human error or negligence that those -- those commitments are not followed through on?
14206. **MR. OWEN McHUGH:** We just don't see that as a realistic scenario. If you're putting in place a response organization, they will be very capable and there's no reason that they wouldn't be meeting the objectives put forward. It'll be part of their response planning, standard for the project.
14207. **MR. CULLEN:** Yes.
14208. **MR. OWEN McHUGH:** And again we talked a lot about that, is that whatever response planning standard is and the capacity exists, the capability may not always be there depending on the exact specific conditions.
14209. **MR. CULLEN:** No, I understand that, but under these response planning scenarios, you express great certainty that outside of weather events which are unforeseen that human error or negligence simply -- simply aren't an option. I would simply argue in the legacies of accidents that they -- we didn't anticipate these things but they can happen.
14210. So my question is very explicit. In the contracts that Northern Gateway is to let for these companies that will be handling the response to an oil spill, is there -- is there a condition of the contract that holds them to that account under some sort of financial penalty? I'm just wondering what your back up other than just assurance is?
14211. **MR. OWEN McHUGH:** I think the fact that Enbridge and Northern Gateway is here talking about this, committing to it, in front of the public is part of this process.
14212. It's very -- that's a lot of clout to it. But there's also the fact if you

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look what's existing in Canada right now which is Western Canada Marine Response Corporation, is that their plans are reviewed by Transport Canada and they are a licensed RO.

14213. So we would expect that making these commitments there will be, through this process, a -- a requirement for these response organizations, the project response organizations, to meet the commitments that we're talking about.

14214. **MR. JOHN CARRUTHERS:** In our -- in the agreements a response organization will have to have the capacity to respond. And that could be audited or validated independently.

14215. **MR. CULLEN:** Absolutely. And I -- I suppose all I'm trying to understand -- I would imagine for your own liability protection as a company these contracts that have not yet been let or they have been let and they've been signed and confirmed, that you would want liability protection in case that they -- they didn't perform the duties as you saw, that they were under the contract.

14216. I'm -- what I'm trying to understand and forgive me, talking about it here and making that commitment as -- as the company is doing, as Northern Gateway is doing, isn't enough assurance.

14217. What is assurance for the ability for those commitments to actually mean something in the event of a scenario usually has some connection to law or potential penalty for a company, the word "assurances" aren't enough.

14218. **MR. JOHN CARRUTHERS:** So if we go back and what Northern Gateway has committed to is very unique that no other pipeline project that's looked at the potential impacts in the marine environment nor committed to this extended responsibility to have protection and response to the extent we have.

14219. But the -- the response organizations are regulated by Transport Canada and this is not unique to Northern Gateway at all. In terms of the response organizations need to be certified and capable of responding and the test always is to the capacity that they have. In many cases we look at redundant systems as well.

14220. So as -- as Mr. McHugh would have talked about earlier this week, you don't source it all at one location you source it at different locations. So you put in some redundancy but there's certainly no expectation that there'll be any

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intentional non-commitment to our -- not meeting our commitments.

14221. But that again is a very broad consideration across Canada in terms of the response organizations, that they need to be capable, certified and tested.
14222. **MR. CULLEN:** What -- what is Northern Gateway's experience been with respect to the skimmers that are being considered? We've talked about a few of them here today and previously. In real world conditions in trying to -- to mechanically separate bitumen in the ocean -- in an ocean environment, a marine environment.
14223. How effective -- let me be more clear, how effective are these skimmers at taking bitumen out of a marine environment?
14224. **DR. EDWARD OWENS:** It's not bitumen, it's a -- excuse me -- diluted bitumen.
14225. Actually our experience goes back -- I've spoken a few times to the Arrow spill in Canada. In Canada we can go back to 1970. Many of the oils -- and that was a Bunker C spill, many of the oils which have accidentally discharged from vessels, tankers or bulk carriers like those that are parked out here today. They -- they carry heavy fuel oils and this is a similar type of oil that will be shipped. It's -- it's an oil that we've been cleaning up in cold, temperate climates for many, many years. In fact some of the recent improvements in recovery technology have been related to the more viscous oils, the ones that are harder to pump.
14226. And so we will have in -- in our response organization a range of equipment types that not only from the different environments that we talked about but also for relatively un-weathered oils as -- as well as weathered oils. In that range we have many, many years of experience.
14227. **MR. CULLEN:** So just -- just to be clear, thank you for that.
14228. Is it Northern Gateway's submission that the Bunker C essentially acts the same way under marine conditions that we're discussing here or even more difficult to recover than it would be for diluted bitumen?
14229. **MR. RANDY BELORE:** I spoke fairly extensively on the record in terms of comparing the diluted bitumen products to intermediate fuel oils and

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- heavy fuel oils. And I've talked about the progression of comparison of properties between diluted bitumens and the heavy fuel oils.
14230. And early on in the spill they'll be similar to a light fuel oil, an IFO 30 grade as they evaporate to an IFO 180. By the time they reach a fairly significant evaporation they're starting to look similar to an IFO 380 or Bunker C fuel as it would be initially spilled.
14231. **MR. CULLEN:** I see.
14232. **MR. RANDY BELORE:** So as Dr. Owens had said that we're very familiar with these skimmers and response techniques with -- on IFO 380 fuels or Bunker Cs. So even once weathered the diluted bitumen will be like that type of oil. So we're very comfortable with that technology.
14233. **MR. CULLEN:** Thank you to both.
14234. Could we bring up Exhibit B25-4, Appendix B, please.
14235. As someone earlier said if -- if we don't talk about sinking it's not -- it's not a day for the Northern Gateway hearings.
14236. I -- I listened and read some of the testimony from earlier. And I have a couple of questions with respect to -- and I'll be speaking specifically to a spill that happens near the terminal where we find near-to freshwater conditions. And further up from the terminal considering that the -- the tidal and wave actions that we've spoken about today, one could -- let me ask this question first.
14237. Could one imagine a scenario in which a spill could happen near the terminal and end up being pushed further away from the ocean and further into the river inlet itself?
14238. **MR. OWEN McHUGH:** Again, what we've shown in these scenarios if you want to talk about a spill from the terminal you're talking about having a boom around a tanker during loading.
14239. So any sort of -- of the mass balance examples that are portrayed are -- are really a -- they're not exactly realistic because you're not -- you're not allowing for that containment source. But we did that because we wanted to be able to assess the full breadth of where the oil would move ---

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14240. **MR. CULLEN:** M'hm.
14241. **MR. OWEN McHUGH:** --- or could move in the absence of that mitigation.
14242. **MR. CULLEN:** Thank you.
14243. How far along the channel can we -- depending on the tidal conditions find near-freshwater conditions? So where the salinity of the -- the water is such that it -- it exhibits and acts near-to or as if it were a freshwater environment?
14244. **MR. OWEN McHUGH:** That would change on almost a -- a daily basis and a seasonal basis, the amount of freshwater input, the tides.
14245. **MR. CULLEN:** Sure.
14246. **MR. OWEN McHUGH:** So it -- it varies all the time.
14247. But in general what we could say is that there is typically density fronts which Dr. Owen's talked about where you do have a very specific line that you can typically see flying into these regions. If you fly across the front of the Skeena, you see very defined density fronts throughout this entire regions, so -- but you could think of it as a graded approach, the further you get away from the river mouth, the less salinity you could see as you moved out of the channels.
14248. **MR. CULLEN:** The -- on October 29th, 2012, on line 18416, a witness for Northern Gateway talked about tolling standards. We talked about it earlier this week and earlier today -- that will -- tolling standards will not exceed a specific gravity of .94 for the diluted bitumen.
14249. I want to establish one thing in terms of how the industry works. Can producers of bitumen -- undiluted bitumen coming out of upgraders, I assume that specific gravity is -- can be tested for and monitored. That when bitumen is produced from an upgrader, they can test for a specific gravity?
14250. **MR. RANDY BELORE:** It's my understanding that the upgrader would create a synthetic crude, so that's not how they generate a bitumen product.
14251. **MR. CULLEN:** Excuse me. The first point at which bitumen is then

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- created and available to be mixed with condensate for transport, prior to mixing, can we establish what the specific gravity of that bitumen is? Because we have seen from industry reports that there is a range and we're trying to understand if industry knows that there's a range, they must be able to test for what the specific gravity of bitumen is prior to mixing with condensate.
14252. **MR. LANGEN:** Madam Chair, I question the relevance of the question. Mr. Cullen is pursuing the witnesses with respect to the specific gravity of bitumen. The evidence is quite clear -- it's repetitive. Northern Gateway's shipping dilbit or synthetic crude. The witnesses have spoke at length about the makeup of that product and that it is different and distinct from bitumen, so I question the relevance of my friend's question.
14253. **MR. CULLEN:** Would you like me to explain the relevance? The relevance is that the -- we have established that there is a range of specific gravity for bitumen that is created out of the Alberta oil sands.
14254. **MR. LANGEN:** Sorry, I don't know whether we have. If my friend can point to where that is on the record. I don't mean to be difficult. I'm sure there is a range, but again, I don't know where that is on the record and I don't know whether that is relevant or -- I shouldn't say I don't know, I don't think it's relevant.
14255. **MR. CULLEN:** AQ 34A, the specific gravity for Cold Lake bitumen produced by Esso Imperial Oil is reported to have a range of .9 to 1.2 specific gravity.
14256. My question is this: If producers of bitumen are able to establish the specific gravity of their product once it's produced, we know that the product is then mixed with condensate and that is what Northern Gateway seeks to ship.
14257. We also know and it has been established that there -- under weathering conditions -- and we don't know how long that weathering will go for, depending on the environment in which the oil is spilled into, the weather and whatnot -- that that product will then change, the specific gravity will also change.
14258. If we have bitumen being put into the product before mixing that has a specific gravity greater than that of freshwater, it is then weathered after mixing. Is there a possibility it could return back to a state in which it could sink in a freshwater environment?

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14259. **THE CHAIRPERSON:** Mr. Cullen, that area has been extensively canvassed in earlier evidence and so I don't think the Panel needs further information on this aspect, so perhaps you could move to your next question.
14260. **MR. CULLEN:** Certainly.
14261. Is Enbridge Northern Gateway prepared to commit to only accepting bitumen that has a specific gravity less than one?
14262. **THE CHAIRPERSON:** Again, Mr. Cullen, I can appreciate the fact that you're not here and probably haven't had the opportunity to read all the evidence that's on the record, but this is an area that has been canvassed.
14263. Perhaps the witnesses can briefly answer the question and then we can move onto your next line of questioning.
14264. **MR. GREG MILNE:** So, Mr. Cullen, this issue has been discussed and we have indicated that the product to be shipped on Northern Gateway is a diluted bitumen -- as you've mentioned yourself -- and that the upper limit for the density on that is .94 kilograms per cubic metre. So it's -- that's the upper limit.
14265. Did I -- oh, I'm sorry -- I'm converting my -- I'm getting my units all confused here -- 940 kilograms per cubic metre. Thank you.
14266. **MR. CULLEN:** No, you just wanted to get the numbers right.
14267. Here's the question, Madam Chair, and I absolutely appreciate that this has been discussed a great deal as I said at the beginning of this line of questioning.
14268. It seems like it would be an insurance policy, because the .94 that has been discussed is diluted bitumen with no weathering; is that right?
14269. **MR. GREG MILNE:** That's the limit on any product -- diluted bitumen or any other product that would be accepted on the pipeline system.
14270. **MR. CULLEN:** I understand. We've also established in previous testimony that when talking about condensate earlier today that there's an immediate off-gassing that comes off of condensate if condensate were to hit the

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ocean environment.

14271. One assumes that diluted bitumen hitting the ocean environment -- the weathering that we're talking about -- is the lighter gases and elements of this diluted bitumen which Gateway has committed to transport leaving the product and that -- correct me if I'm wrong on the science at some point here -- that as it becomes weathered, we assume that the specific gravity also changes. If it doesn't, that would be good to hear as well.

14272. **MR. OWEN McHUGH:** I think in your preamble you indicated that there'd be an off-gassing of the condensate and I do believe that we were probably discussing specific condensate spills at that time ---

14273. **MR. CULLEN:** We were.

14274. **MR. OWEN McHUGH:** --- and now we're referring to a diluted bitumen that, for clarity, can be diluted with -- and other types of oil, it can be a mixture of condensates, synthetic oil, other light oils to come up with a unique product that's blended and it's a different product.

14275. As with any oil when it's spilled, the lighter ends, the lighter fractions do tend to come off of the oil fairly quickly in the first few days of that process. But what Mr. Belore can talk about in detail is how that process plays out and how that could affect the potential density over time and the viscosity increases.

14276. **THE CHAIRPERSON:** And this is an area that has been well canvassed. Do you have a specific question in this area that -- I recognize it's difficult and you've spent time preparing and we ---

14277. **MR. CULLEN:** Certainly.

14278. **THE CHAIRPERSON:** --- want to make sure that you get as much information as possible without repeating a lot of evidence that's already on the record.

14279. **MR. CULLEN:** No, absolutely, Madam Chair. What I was seeking to establish and understand is if -- we've talked about the tolling conditions that Enbridge would accept from producers, certain tolling requirements, that if it was an option for Enbridge to only accept bitumen before it's mixed of a certain specific gravity that no matter what the weathering conditions, no matter what

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happens to the oil in the event of a spill, it would have an inherent specific gravity that would prevent it from sinking.

14280. Because we've established through much of your testimony that the question of submersion is important to the capacity of the company to be able to recover a spill after an accident.
14281. The question is sequential; if those that produce the bitumen are able to tell us and confirm specific gravity, can the company then put that in its tolling requirements to only accept oil into the pipeline -- bitumen into the pipeline, prior to mixing that has a specific gravity that would prevent it from sinking under any conditions weathering or not.
14282. What we've had a hard time understanding and I've looked through -- not all, because it's 180 pages a day -- the testimony to understand the weathering conditions and factors and what the properties of this material is when it is exposed to weathering. We know that, certainly in the immediate vicinity of the terminal, the company is committed to very immediate clean-up, that why not as an insurance policy then, make it a condition of the contracts they have with those supplying the bitumen prior to mixing -- prior to it becoming dilbit -- with bitumen that can't sink? If it's possible, if it's engineeringly possible, but I see that we've probably crossed the boundaries ---
14283. **THE CHAIRPERSON:** I just wonder if there's a question there and if there is let's try putting that to the panel.
14284. **MR. CULLEN:** So the question specifically to Northern Gateway is the company prepared to put in its tolling contracts only to accept bitumen with a specific gravity of less than one?
14285. **MR. OWEN McHUGH:** No, we've expressed quite clearly on the record is that once these products are mixed, they're a new product, so it's not a fair comparison to talk about a bitumen product with a specific gravity of less than one. These are new products that are created so it's just -- it's not a requirement. And that's where the .94 comes -- come in terms of milligrams per -- or I guess, sorry, 940 kilograms -- or per litre, if you wanted -- cubic metre.
14286. **MR. RANDY BELORE:** If I can just add one piece here. That -- we've compared the diluted bitumens to heavy fuel oils and said they're very similar.

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14287. We've also talked about historical records of oil spills that have -- of heavy fuel oils. For the most -- for the most case unless the density of the initial oil is less than that of the water the oils do not weather to the point where they will sink. For the cases where there has been, few cases where there has been oils that have sank, it's usually slurry oils or heavy oils from residues from refineries where the density is heavy.

14288. And they blend those up with other diluents to make the 180s and the 380s that has been -- that has been shown that they don't sink with weathering. So that's one of the pieces of evidence that we have that illustrates that as these products weather, they won't weather to the point where they will sink by weathering alone.

14289. **MR. CULLEN:** Thank you.

14290. I'd like to talk about dispersants for a moment. What tests have Northern Gateway performed on dispersing diluted bitumen outside of a controlled laboratory environment?

14291. **MR. OWEN McHUGH:** Outside of a controlled laboratory environment? Nothing because that would entitle having diluted bitumen on a water surface such as the ocean.

14292. **MR. CULLEN:** What experience do we have with diluted bitumen on the water surface and the use of dispersants by any company in any marine environment?

14293. **MR. OWEN McHUGH:** I think we can go back to what Mr. Belore was exploring, is that there's actually a lot of experience around the globe of dealing with similar styles of oil in the marine environment.

14294. **MR. CULLEN:** But yet in testimony just now and before, we've talked about this as a very unique product. Are we assured that the diluted bitumen will react to dispersants in ways that are similar to Bunker C oil?

14295. **MR. LANGEN:** Madam Chair, I have to object. I think the question and thus the premise is unfair. I don't believe the witness has indicated that the products being shipped are unique.

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14296. **MR. CULLEN:** Is it Enbridge's testimony that the way that Bunker C oil has -- for an example, if I were to take one example that -- where we have real world conditions and real world experience that the reaction of Bunker C oil to dispersants is anticipated to be the same reaction of diluted bitumen to those same dispersants?
14297. **MR. OWEN McHUGH:** Bunker C, is the comparison that I think you're using and as Mr. Belore has pointed out it's actually an intermediate fuel oil. Bunker C is actually a heavier product.
14298. But what we're saying in general is that if you're dealing with these heavier ranges of products, if you're dealing with the type of skimmer used, the type of dispersant, a lot of times you can draw on the experience from around the world to look at what you may expect.
14299. From the specific project we have conducted dispersant testing on the -- on a few weathered states of the diluted bitumen as well.
14300. **MR. CULLEN:** What -- where -- let me call up an Exhibit B46- 40, Attachment Federal Government IR 2.71(c), page 7 -- Adobe page 7, please.
14301. So this was a test conducted by SL Ross in a laboratory environment using waves of 22 centimetres in height. The test area was over an area of 1 metre in width, 7 metres in length.
14302. **THE CHAIRPERSON:** Again Mr. Cullen, you could just go straight to your question.
14303. Thank you.
14304. **MR. CULLEN:** Are the witnesses familiar with this test?
14305. **MR. OWEN McHUGH:** Yes.
14306. **MR. CULLEN:** How effective were dispersants in these laboratory tests and how comparable are they to the 91 kilometre Douglas Channel?
14307. **MR. RANDY BELORE:** I think to answer the first part of your question, if you go to Adobe page 9 and down to Table 2, you can see the testing on fresh MKH which refers to the MacKay heavy -- MacKay River heavy

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bitumen.

14308. In the fresh -- the first item, well actually the second -- second row shows the results of the tests on 9 percent weathered MacKay River bitumen and a 91 percent dispersion by the test. The third row shows fresh MKH with 99 percent or essentially complete dispersion in this test.

14309. So what this indicates is that while the product is fresh or up to 9 percent weathered that there's a good chance that this will work well on the oil. The dispersant that was used here was Corexit 9500.

14310. And for some of the other products here the same results are shown. If you go down to the bottom and you look at the 11th row there, the 11th test, you can see that as the oil weathers the effectiveness drops off to approximately 27 percent.

14311. So admittedly when these oils weather they become more viscous. With all oils that weather and become more viscous dispersant effectiveness will be reduced.

14312. **MR. CULLEN:** I'm just wondering your level of confidence in comparing this environment to the environment in which we're discussing here today?

14313. **MR. RANDY BELORE:** Well, I've been doing these dispersant tests for too long.

--- (Laughter/Rires)

14314. **MR. OWEN McHUGH:** Twenty-five (25), 30 years. The -- my confidence in this particular test -- it's sort of, it's a meso-scale test. We've done a number of tests in this tank, we've also done similar tests in a facility called the Ohmsett Facility in New Jersey and that tank is the size of a couple football fields, to give you a rough idea of the scale; with larger breaking waves, that sort of thing.

14315. And our experience is that the effectiveness measurements that we make in this facility are quite similar to that facility. If anything, this test that we have conducted here does not impart quite as much wave energy as you would have in a full breaking wave so you may get more effective results at the Ohmsett

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Facility which is a step closer towards real world type situations.

14316. **MR. CULLEN:** So, thank you. Allow me to -- now, did you perform these same tests at the New Jersey site.
14317. **MR. RANDY BELORE:** No.
14318. **MR. CULLEN:** Okay.
14319. **MR. RANDY BELORE:** Sorry. But we have completed a number of tests at that facility with fuel oils, heavy fuel oils. Much ---
14320. **MR. CULLEN:** With diluted bitumens? Excuse me I'm ---
14321. **MR. RANDY BELORE:** No, heavy fuel oils.
14322. **MR. CULLEN:** Okay. So, this test was conducted with the diluted bitumens that are in question?
14323. **MR. RANDY BELORE:** Yes.
14324. **MR. CULLEN:** The -- I want to take up on something -- the last thing you said, that with the greater energy provided at the New Jersey site, the wave heights -- it's 22 centimetres at this test facility in Ottawa. How big, how strong does it get at the New Jersey site? Even in orders of magnitude it's twice, it's half?
14325. **MR. RANDY BELORE:** They vary a bit for the test but we do use a fairly standard -- I'm not remembering the actual value now. So I don't want to put something on the record that's wrong.
14326. **MR. CULLEN:** Sure. So your submission is that as the -- and you said in your -- just previously that at the New Jersey site, where there is greater energy that can be put into the test, and in the real ocean environment where we would obviously expect waves greater than 22 centimetres, the effectiveness of dispersants would increase because of that additive energy in the system?
14327. **MR. RANDY BELORE:** That would generally be the case.
14328. **MR. CULLEN:** I want to -- thank you.

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14329. I want to spend a moment talking about calculation of risk. Can we bring up Exhibit B23-24, Adobe page 149.
14330. Excuse me, I have page 131, Adobe 149? This is Exhibit B23-24 "Quantitative Risk Analysis".
14331. **MR. RANDY BELORE:** You've got the wrong one I think.
14332. **MR. CULLEN:** A1Z6L8? Oh excuse me. We may have previous -- is it possible to pull up 6L8 please, "Summary of mitigated and unmitigated return periods for spills".
14333. **THE CHAIRPERSON:** Who has the B number?
14334. **MR. OWEN McHUGH:** B23-15.
14335. **MR. CULLEN:** Inside panel joke?
- (Laughter/Rires)
14336. **THE CHAIRPERSON:** We call it the bingo game.
- (Laughter/Rires)
14337. **MR. CULLEN:** Is this the bingo game? I thought I was -- someone was going to call out bingo at some point there.
14338. **THE CHAIRPERSON:** I decided that I would not do it this time.
- (Laughter/Rires)
14339. **THE CHAIRPERSON:** I've been called out on it. Bingo.
14340. There's been an atmosphere of everybody working together, Mr. Cullen, ---
14341. **MR. CULLEN:** Very much.
14342. **THE CHAIRPERSON:** --- to make sure that we get to the right

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- evidence so that the questions can be posed.
14343. **MR. CULLEN:** Absolutely.
14344. **MR. OWEN McHUGH:** I believe it's page 60.
14345. **THE CHAIRPERSON:** Mr. Cullen, is this what you were looking for?
14346. **MR. CULLEN:** Yes, I believe so. Just give me one moment, Madam Chair, ---
14347. **THE CHAIRPERSON:** Sure.
14348. **MR. CULLEN:** --- just to make sure that it is.
14349. Okay, thank you very much. Thank you to the witnesses as well.
14350. I just want to understand the way risk is calculated, I know this has been a discussion with this panel at various times. That the -- calculated the mitigated return period for one or more tanker spills, greater than 5,000 cubic metres is 550 years; am I reading that correctly? Who can guide me through this particular chart?
14351. **MR. OWEN McHUGH:** That's the number in that table, yes.
14352. **MR. CULLEN:** Thank you, Mr. McHugh.
14353. Can this calculation be translated into other terms that a layperson might understand, percentages perhaps? Does Northern Gateway conduct such risk analysis that way?
14354. **MR. OWEN McHUGH:** The reason that we chose return period is actually that it's -- we feel it is probably one of the easier methods to understand. So it's what you would anticipate.
14355. And again, we've talked a lot about what risk assessments are for, and what I like about this table is it shows how we've applied mitigation to increase what we consider for a return period, which would be the anticipated timing, based on probabilities of events occurring. And that doesn't mean an event would

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occur within that window, it's just -- it's a measure and what's important is the difference between the unmitigated and the mitigated return period.

14356. **MR. CULLEN:** Understood. There were some oral statements before this panel in January 7th of this year and then a letter of comment of August of last year from Dr. Graham, taking these numbers and attempting, Madam Chair, to -- essentially what I asked. I appreciate Mr. McHugh saying that he understands and appreciates the way that this table works out. I as a layperson find that sometimes confusing to understand what the risk factor is.
14357. Mr. Graham's translation of this 550-year return period puts it at an 8.7 percent chance of tanker spills greater than the 31,500 barrels that are discussed in this table. And if we increase the capacity of this project to 850,000 barrels, does it not also change the mitigated risks, moving it to -- from 8.7 percent, perhaps to 15 -- 14.1 percent? Do you agree with these calculations?
14358. **MR. LANGEN:** Madam Chair, my friend has put a number of calculations to the witnesses. If he wants to break down his question, he's welcome to do so but he's referencing another party's evidence that's not before this panel, or not adopted by this panel, clearly.
14359. And additionally, he's also referencing a project that's not before this panel. The capacity of the pipeline and the terminal are well known and they're applied for and they don't include the values that my friend has used.
14360. **MR. CULLEN:** Let's move on to spill size for a moment. There's been some evidence before this panel that there's a correlation between spill -- the size of a spill and its effect on the environment. Yet it's also been recognized that even in small spills there can be a significant effect; is that correct, Dr. Owens?
14361. **DR. EDWARD OWENS:** I'm sorry, could you repeat the question?
14362. **MR. CULLEN:** Well, there's a correlation between a large spill having a large environmental impact, there is also the possibility that small spills, depending on location, can also have a significant impact on the environment.
14363. Looks like, Mr. Green, you're the one stuck with this question. I liked watching that get passed down the line. That was entertaining.
14364. **MR. JEFFERY GREEN:** I'm going to have to ask you to repeat the

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question, I'm sorry.

--- (Laughter/Rires)

14365. **MR. CULLEN:** Sure. That there's a correlation between large spills and large environmental impacts; a large spill one would see correlating to a large impact, potential impact on the environment. But it's also been recognized in the industry that small spills, depending on location, can also have a significant impact on the environment. Is that a fair statement?

14366. **MR. JEFFERY GREEN:** I don't think it is a fair statement. What we've said before is there isn't a direct correlation between spill size and the effect; there's many factors determine the effects of a spill.

14367. **MR. CULLEN:** Excuse me, I missed it where you said -- you said there is or there isn't?

14368. **MR. JEFFERY GREEN:** There is not ---

14369. **MR. CULLEN:** There's not a correlation?

14370. **MR. JEFFERY GREEN:** --- a direct correlation between the size of a spill and the environmental effects. I have made lists of the factors previous ---

14371. **MR. CULLEN:** Sure.

14372. **MR. JEFFERY GREEN:** --- in these proceedings. We can go through those again if you like.

14373. **MR. CULLEN:** No, it's okay.

14374. Just for the establishment, can we pull up Exhibit B23-9, TERMPOL Surveys and Studies, Section 3.8, Adobe page 13. If we could scroll down just a bit more? Excellent, that's good.

14375. So is -- let me just ask it to make sure. I don't think you are, but Enbridge or its subsidiary companies are not members of the International Tanker Owners Pollution Federation, I assume?

14376. **MR. JOHN CARRUTHERS:** That's correct.

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14377. **MR. CULLEN:** Thank you. It classifies spills of 700 tonnes, or 5,131 barrels as a large spill. So 5,131 barrels, by the International Tanker Owners Pollution Federation. Can you explain why Northern Gateway chooses 31,500 barrels, here listed as 5,000 cubic metres, as the basis to figure a -- what you call, a large or significant spill?
14378. **MR. LANGEN:** Sorry, Madam Chair. I believe this document is assigned to the Shipping and Navigation Panel.
14379. Sorry, Mr. Cullen.
14380. **MR. CULLEN:** Not at all.
14381. **MR. LANGEN:** This question, I think, is properly put to the Shipping and Navigation Panel. This document's assigned to that panel.
14382. **MR. CULLEN:** So aside from the document, Madam Chair, let me ask this then of you, is the line of questioning around the designation of a size of a spill appropriate here or at a further panel?
14383. **THE CHAIRPERSON:** Why don't you try your question and see how far we get, Mr. Cullen, with it.
14384. **MR. CULLEN:** Sure.
14385. So I looked around to understand how people classify large or significant spills and what the size of that spill would be, and we looked at the International Tanker Owners Pollution Federation, which is the industry body, they designate a large or significant spill to be at 5,131 barrels.
14386. Northern Gateway, in its application, is choosing a much higher number, six times higher in fact, of 31,500 barrels to then determine that to be a significant spill.
14387. I'm wondering, why the discrepancy between what the International Tanker Owners Pollution Federation classifies as a large spill and what Enbridge classifies as a larger significant spill?
14388. If that's an inappropriate question I can hold it to a future panel.

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14389. **MR. LANGEN:** Sorry, Mr. Cullen, if you can -- you've referenced this document and then you're referencing Enbridge calling a spill a significant spill and you've identified a volume for that. If you can help the witnesses by pointing to where in the evidence Northern Gateway has identified a significant spill and the language you've used?
14390. **MR. CULLEN:** Thank you. Oh -- in terms of -- sorry, you want me to identify in this document or in Enbridge's own terms, what it classifies as a significant spill?
14391. **MR. LANGEN:** As I understand your question you've pointed to this document and you've cited an authority that's identified here.
14392. **MR. CULLEN:** That's right.
14393. **MR. LANGEN:** And the terminology that's used in this document.
14394. **MR. CULLEN:** That's right.
14395. **MR. LANGEN:** And you're questioning the witnesses with respect to this terminology and a terminology that you used in your question, which was what's Northern Gateway's significant spill. You used a volume in your question and what I'm asking you to do is to point in the record ---
14396. **MR. CULLEN:** Sure.
14397. **MR. LANGEN:** --- where you identify Northern Gateway has called a spill a significant spill and assigned a volume to it.
14398. **MR. CULLEN:** So perhaps we can pull up the previous document which talked about the risk assessment in which we had the -- this was exhibit -- you'll have to give me a second.
14399. The previous document that we had up -- thank you very much, it's here.
14400. **THE CHAIRPERSON:** It's there.
14401. **MR. CULLEN:** Oh, it's just -- you're so good.

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14402. **THE CHAIRPERSON:** Ms. Niro is magic. She is magic.
14403. **MR. CULLEN:** If anyone wants a job in Parliament, we don't have this kind of help or service in the House of Commons, I can guarantee you that.
14404. So the use of the 550-year terminology here in Enbridge's application, the number of 5,500 barrels was the terminology or the standard used for a significant or large spill.
14405. **MR. OWEN McHUGH:** I think we're talking about -- sorry, Madam Chair.
14406. **THE CHAIRPERSON:** Mr. McHugh, please proceed.
14407. **MR. OWEN McHUGH:** We're talking about two very different things. What the ITOF is, is it's essentially the way that they calculate their standards when they're looking at incidents, and DNV, that is their document and they will be able to speak to that.
14408. And so what that is, that is what informs the international database of small, medium, and large spills in terms of categorizing events. What we've tried to portray, and if you pull up page 58 in the same document, is that we've showed what the potential probability associated with any spill volume may be and how we've mitigated that. And again, DNV can explain these numbers as shipping and navigation can explain these numbers in a lot more details.
14409. So when you look around the globe at spill size, and people have been very concerned with the large style events, something like an Exxon Valdez, which was approximately 42 -- 44,000 tonnes, is that what we wanted to ensure that was the information was in the application was for people to realize the probabilities associated with those types of events, a very unlikely large-style events.
14410. So in this figure, what's really important is that if you look at what we've picked as the response planning standard, which is 36,000 cubic metres, you're looking at very low probability events far -- and designing to that standard is unheard of in Canada. This is -- this extended responsibility piece that we've talked about.

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14411. **THE CHAIRPERSON:** Mr. Cullen, we usually take a break in the afternoon. Do you have some more questions that you want to continue on this piece and then identify a time that would be appropriate ---
14412. **MR. CULLEN:** I have a question for you that may then satisfy your determination of when I'll finish. I have a ---
14413. **THE CHAIRPERSON:** I'm not here to give evidence, let's be perfectly clear on this.
- (Laughter/Rires)
14414. **MR. CULLEN:** Yes, I know. I know. I have a series of questions on the effectiveness of tugs, but my suspicion is, and it has to do with risk analysis, and just hearing Mr. McHugh's response as well and from the testimony earlier today, I'm suspecting it's going to be better suited to the next panel.
14415. If that's the case, then I can end my cross-examination now and you can move on to the Heiltsuk after your break.
14416. I don't know if the counsel for Northern Gateway has an opinion.
14417. **THE CHAIRPERSON:** I was -- not knowing your questions, it's difficult to know if they're the right questions.
14418. **MR. CULLEN:** I understand.
14419. **THE CHAIRPERSON:** Why don't you start with your questions, and we'll see where we get to.
14420. **MR. LANGEN:** Perhaps we can take the break and I'll speak with Mr. Cullen offline.
14421. **THE CHAIRPERSON:** Then we'll do it that way.
14422. **MR. CULLEN:** We're just not this collegial in Parliament, I object. I object.
14423. Thank you, Madam Chair.

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--- (Laughter/Rires)

14424. **THE CHAIRPERSON:** Did you say you object?

14425. **MR. CULLEN:** No, not at all. That wasn't me. That was somebody else.

--- (Laughter/Rires)

14426. **THE CHAIRPERSON:** Let's take our afternoon break and we'll come back for 2:45, please.

--- Upon recessing at 2:28 p.m./L'audience est suspendue à 14h28

--- Upon resuming at 2:42 p.m./L'audience est reprise à 14h42

JOHN CARRUTHERS: Resumed

RANDY BELORE: Resumed

JEFFREY GREEN: Resumed

ALAN MAKI: Resumed

OWEN McHUGH: Resumed

GREG MILNE: Resumed

EDWARD OWENS: Resumed

WALTER PEARSON: Resumed

JACK RUITENBEEK: Resumed

MALCOLM STEPHENSON: Resumed

JOHN THOMPSON: Resumed

CHRIS WOOLEY: Resumed

DENNIS YEE: Resumed

14427. **THE CHAIRPERSON:** Good afternoon.

14428. We have a new set of questioners at the table. So I understand Mr. Cullen has completed his questions.

14429. Good afternoon, Ms. Humchitt, Mr. Ralston. Who will be asking the questions this afternoon?

14430. **MS. HUMCHITT:** I will be starting.

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14431. **THE CHAIRPERSON:** Thank you, Ms. Humchitt. So please go ahead with your questions of this panel.

--- EXAMINATION BY/INTERROGATOIRE PAR MS. HUMCHITT:

14432. **MS. HUMCHITT:** Thanks, Madam Chair.

14433. My first question is relevant to the previous line of questioning asked by the Haisla Nation. In particular, in regards to the provision of gas vouchers suggested by the panel as a measure in case that we can't harvest FSC resources.

14434. And I would like to ask a question of the panel in regards to this. Is the panel aware of the applicability of the AFS agreements in terms of our FSC harvesting?

--- (A short pause/Courte pause)

14435. **MR. JOHN CARRUTHERS:** Sorry, the confusion came, I'm just not certain what you mean by -- did you say AFS vouchers?

14436. **MS. HUMCHITT:** No, AFS agreements. That's applicable to First Nations with the DFO in regards to the areas which we are able to harvest for FSC.

14437. **MR. JEFFREY GREEN:** Yes, so this is the Aboriginal fisheries strategy, and my understanding is that it gives priority allocation for certain fisheries over commercial and recreational use.

14438. **MS. HUMCHITT:** So are you -- is the panel aware that we are limited to certain areas for fishing for FSC? And as such, how could travelling longer distances to harvest FSC be reconciled with the DFO restrictions?

14439. **MR. JEFFREY GREEN:** If we could just return to the starting premise about the gas voucher, that was one example of a compensation. So it wouldn't be the only mechanisms.

14440. The intent would be to work with communities, so when we refer to these community response plans the intent is to identify the types of measures that might be used in the unlikely event of an oil spill with effects on traditional harvest.

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14441. **MS. HUMCHITT:** So there has been no discussion with the DFO about Coastal First Nations being able to go beyond our area limits to harvest FSC?
14442. **MR. JEFFREY GREEN:** No, we have not had any of that type of discussion.
14443. **MS. HUMCHITT:** Further to that line of questioning, are you aware that if we were to go to farther areas to access FSC that we might be encroaching upon another nation's territory?
14444. **MR. JEFFREY GREEN:** The answer is yes, that I think it would depend on the conditions of the spill and the size of the spill. From our understanding of the Aboriginal fishery, most assuredly it could likely mean -- a clan might be harvesting or having to harvest in a different area so there -- it really depends on the size and location of the spill as to whether or not that would occur.
14445. **MS. HUMCHITT:** So these proposed mitigation measures haven't been fully thought out by the Enbridge Northern Gateway?
14446. **MR. CHRIS WOOLEY:** There -- if I could speak to them, I think the discussion previously was along the lines of a potential framework to be discussed and agreed upon by participating and potentially affected First Nations and other parties.
14447. Essentially to learn from past spills and address some of the socio-economic, and indeed in very important cultural concerns that may come into play in a spill response, specifically related to traditional foods, food safety, access to resources and sharing and so on. And so the spill response is -- addresses some of the important cultural issues.
14448. **MS. HUMCHITT:** And I heard from the last -- previous to Nathan Cullen, in regards to advisory boards and that there would only be one seat for various First Nations. So how would the Enbridge Northern Gateway consult with the nations, would it be through a board in regards to this matter?
14449. **MR. OWEN McHUGH:** I think that we were talking specifically about one very technical scientific advisory committee at that component that has

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a very specific mission, which is to investigate scientific research and options.

14450. We've also talked a bit about developing community response plans and working with communities to look at these exact, specific types of mitigations that could be applied and what we outlined were potential options that could work.

14451. And maybe if we pulled up D85-3-12, I think that may help to put a little bit in context in terms of the reality associated with an event.

14452. So I won't try and read into this too much because it is the evidence of the Heiltsuk. But my understanding is that when you look at a map like this is that you're seeing quite a large area that is traditionally used for collection of something like the green dots, marine molluscs and crustaceans, or the red dots, marine plants and marine harvesting.

14453. So when you think about the unlikely event of one major style of incident where you're looking at -- and we totally -- we recognize that these would be very significant incidents. But they again, were applying mitigations to prevent these type of things from happening.

14454. But even in event such as that, when you look at the breadth of the area that's covered, we're -- what we are saying there -- we understand there's probably preferred sites within these areas as well, but working with communities to find out as much information as possible before an event ever occurring, having this in place as a plan to look at the options of how would the community like to be compensated in the event of these kind of unlikely events or what mitigations could be put in place.

14455. **MS. HUMCHITT:** And when you speak of a community, are you referring to Aboriginal communities in particular or is the general public included in that?

14456. **MR. OWEN McHUGH:** The intent when we were referring to community response plans for -- what we're talking here is we'd be talking about a specific individual community -- looking at what the best options are for that individual community, and that could include a non-Aboriginal community or an Aboriginal community.

14457. **MS. HUMCHITT:** And are you aware that there are specific rights

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with an Aboriginal community which sets us apart from the general public?

14458. **MR. JOHN CARRUTHERS:** Yes, we would recognize that. And again, we would work with the community -- the specific community to address the geographic response plan for that specific community.
14459. **MS. HUMCHITT:** That doesn't really answer my question. Are you aware that there are constitutional considerations when consulting with an Aboriginal community apart from the general public?
14460. **MR. LANGEN:** Madam Chair, sorry. I believe the question my friend has directed at the panel is a legal question. It is a complicated question and I don't think the panel is in a position to respond, they're not legal experts.
14461. **MS. HUMCHITT:** I'm just differentiating between Aboriginal communities and a non-Aboriginal community for the purposes of this panel.
14462. I'd like to continue.
14463. In regards to Chris Tollefson's inquiry on February 4th, he spoke of cultural risks in regards to First Nations and the project. And do you agree that the Heiltsuk Nation and other Coastal First Nations' perception of risk should inform this assessment?
14464. **MR. JEFFREY GREEN:** Northern Gateway would agree with that and that's the intent of these sessions, both the oral sessions and the session we're currently in is to have that evidence presented.
14465. **MS. HUMCHITT:** And it's been stated throughout the panels that one of the problems with determining cultural impact is the general lack of TLUS studies; is that correct?
14466. **MR. JEFFREY GREEN:** I would say that during the completion of the environmental assessment, we did not have access to a great deal of traditional land use information. Through the information request process and the filing of evidence -- and this map is an example of that -- that there's a much greater amount of traditional land use information on the record.
14467. **MS. HUMCHITT:** Has the Enbridge Northern Gateway sought to seek alternative sources of this knowledge to inform the assessment?

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14468. **MR. JEFFREY GREEN:** When we completed the assessment, we used as many sources as we could find. As an example, the provincial database that's been referred to that underpinned the environmental sensitivity atlases was provided to the team. We recognize that was a dated information base but it did provide us with some information on where harvesting occurred. We did have access to more general traditional use information for the coastline and then there was professional judgment.
14469. But in terms of completed traditional studies -- or traditional land use studies, we did not have a completed study from a Coastal First Nation at the time we completed the impact assessment.
14470. **MS. HUMCHITT:** Have you approached the Heiltsuk Nation or any other of the Coastal First Nations to seek out traditional knowledge holders to help inform this assessment?
14471. **MR. JEFFREY GREEN:** I can speak generally to that. There's people on the Engagement Panel that would be better able to provide details.
14472. But I do understand that Coastal First Nations in proximity to the confined channel assessment area were offered opportunities to have funding provided to undertake a traditional land use study and that discussions were held with a number of those communities.
14473. **MS. HUMCHITT:** But you did not approach the Heiltsuk Nation specifically in regards to seeking out traditional knowledge holders apart from a TLUS inquiry?
14474. **MR. JEFFREY GREEN:** We don't -- unfortunately, don't have the individual that was leading the traditional land use component from a technical side. But what I can say is that typically the discussions that were held with the Coastal First Nations communities as well as communities along the pipeline right-of-way were -- was first a discussion about how did they want to conduct a traditional land use study.
14475. And typically the preference was for the nation themselves or the Aboriginal group to conduct their own study as opposed to us going into communities and asking questions directly. So it tended to be more of a community initiated study as opposed to us coming into a community and asking

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questions.

14476. **MS. HUMCHITT:** So the answer is no?
14477. **MR. JEFFREY GREEN:** I would say the answer is no, we did not approach the Heiltsuk directly to ask you questions about traditional use.
14478. I wasn't personally involved in engagement so I don't know what exactly occurred between Northern Gateway and the Heiltsuk but people on the Aboriginal and Community Engagement Panel would be able to answer that question.
14479. **MS. HUMCHITT:** Thank you. I'm going to move on to a different line of questioning.
14480. In regards to the past speaker, Nathan Cullen's inquiry in regards to there's never been a study on bitumen oil spills in an open water area nor a confined channel area and that a study is not able to be done in regards to that; correct?
14481. **MR. JEFFREY GREEN:** I'm sorry, could you just repeat the question, I'm not sure I understood the question.
14482. **MS. HUMCHITT:** Yeah. I'm just seeking clarification. I believe the response was that there has never been a study done on bitumen oil spills or a test of that because it would involve testing in an open water area?
14483. **MR. OWEN McHUGH:** I did state that referring to the fact that there's never been a major spill of diluted bitumen into a marine environment. There was a small spill in Vancouver harbour of a diluted bitumen that gave some insight, but what we've heard over the past weeks is that there are other examples of heavy oil spills around the world that we would anticipate to have similar styles of weathering in the environment and similar environmental effects.
14484. But if you go back to what one of the principles is is that the potential outcomes of a spill are always very specific to the individual incident.
14485. **MS. HUMCHITT:** Further to that, would you not agree that the spill in Michigan in the Kalamazoo is the closest to approximating how a bitumen spill may react when impacting an area such as the Kitimat estuary and river area?

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14486. **MR. OWEN McHUGH:** Again, as I stated, every spill is very unique and dependent on the conditions of the actual time of the incident so -- and we are here talking about the marine environment and given the differences between a marine and freshwater environment, it's a very different scenario.
14487. **MS. HUMCHITT:** And you are aware that tides can blow into a river environment and estuaries?
14488. **MR. OWEN McHUGH:** Maybe you can just help clarify that question a little bit. I think you said the tides will blow up into river and estuarine environments?
14489. **MS. HUMCHITT:** Yes, that there is a meeting between saltwater and freshwater in the river environment, but beyond that there is a river environment which is akin to the Michigan River.
14490. **MR. OWEN McHUGH:** Again, a potential spill to a pipeline river was discussed at length as part of Panel 3, the Pipeline Operations and Emergency Response Panel, and we are talking about the marine environment and they are very different scenarios.
14491. **MS. HUMCHITT:** Yes, I realize that, but they do interact, the saltwater and the freshwater in the Kitimat estuary and river.
14492. **DR. EDWARD OWENS:** We don't anticipate that the -- because of the strong outflow from the river that the saltwater intrudes into the Kitimat River itself, even during relatively low flow conditions. In fact, typically the saltwater/freshwater interfaces several kilometres south and away from the estuary itself.
14493. **MS. HUMCHITT:** You don't anticipate it but you do realize that there are very strong storms in the area which may cause that?
14494. **DR. EDWARD OWENS:** I think we discussed this the other day that wind is not the primary factor for any oil that is spilled on the water surface within Douglas Channel area. Provided that there is an outflow than oil does not cross that interface between the saltwater and the dense -- and the less dense seawater so that even if winds -- strong winds were able to blow some little portion, wind-blown oil, that would still be carried down river, downstream

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southwards.

14495. **MS. HUMCHITT:** You said “anticipate” but you can’t say with any degree of certainty, because, as you’ve recognized, there has never been a spill of this type in this area?

14496. **DR. EDWARD OWENS:** That’s correct, there has not been a spill in this area. And perhaps I was -- I have a high degree of confidence in what I say. We never want to say never because that’s an absolute, but it is extremely unlikely from a spill into the Douglas Channel any of that oil would migrate upriver into the freshwater component which is outflowing.

14497. **MS. HUMCHITT:** Are you aware that there have been recent tsunami warnings in the area?

14498. **MR. OWEN McHUGH:** Yes, there were warnings put out after some events recently.

14499. **MS. HUMCHITT:** M’hm. And you are aware of the Japanese tsunami?

14500. **MR. OWEN McHUGH:** We are aware of that event.

14501. **MS. HUMCHITT:** Has Enbridge Northern Gateway anticipated dealing with such an extreme weather event, in consideration there have been tsunami warnings in the area?

14502. **MR. JOHN CARRUTHERS:** Can you give us some context in which you’re asking the question? Are you talking about the terminal, marine operations; what’s the context of your question please?

14503. **MS. HUMCHITT:** Well, the context is my community, in addition to a number of communities in this area were issued tsunami warnings in October and in January this year.

14504. The tsunami in Japan threw a lot of debris our way, all the way from Japan. Actually there was a ghost ship that showed up on the shores of Haida Gwaii, and this is relevant in regards to tanker traffic. And is Northern Gateway prepared to deal with such an event?

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14505. **MR. OWEN McHUGH:** Yeah, the Shipping Navigation Panel would be able to speak to this. But in terms of terminal design, you do account for those types of events. And major earthquake style events are not anticipated to cause tsunami waves in the upper Douglas Channel area where the terminal is located.
14506. **MS. HUMCHITT:** Further to that -- I'm glad you brought it up -- you're aware there has also been earthquakes in the area that coincided with the tsunami warnings?
14507. **MR. OWEN McHUGH:** Typically the tsunami warnings were generated from an earthquake event.
14508. **MS. HUMCHITT:** Does the Enbridge Northern Gateway realize that such events aren't easily predictable and are they prepared to deal with that?
14509. **THE CHAIRPERSON:** Ms. Humchitt, we are discussing marine emergency response preparedness ---
14510. **MS. HUMCHITT:** M'hm.
14511. **THE CHAIRPERSON:** --- on this panel. So can you help the Panel understand the context that you're raising, earthquakes, with ---
14512. **MS. HUMCHITT:** Yes.
14513. **THE CHAIRPERSON:** Thank you.
14514. **MS. HUMCHITT:** In regards to that, the actual earthquakes occurred in the marine environment which led to the tsunami warnings. I can cite the actual dates, if you would like, Madam Chair.
14515. **THE CHAIRPERSON:** No, that's fine, Ms. Humchitt. I was just wondering, what's the point of reference that you're asking about the earthquakes in terms of this particular panel? Is it in the open area -- open water area or the confined channel assessment area, or -- just trying to understand the context for your question so that we can understand the answers.
14516. **MS. HUMCHITT:** Yes, both the earthquakes they did result in earthquakes in the open water area, but there was also onshore impact, so I can't separate them because they occurred on both areas.

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14517. **MR. JOHN CARRUTHERS:** Maybe -- we did talk quite a bit about the terminal design in terms of how we design for that type of incident, and certainly the earthquake at the time was well within that design capability. I think it was at 10 percent, if it serves me. But that was well covered under Panel 3 from a terminal perspective. And the Shipping and Navigation Panel will be able to speak to ship design -- for that panel to answer those specific questions.

14518. **MS. HUMCHITT:** Okay, I will move on.

14519. Further to one of the comments from the panel that there are relevant spills which can be studied globally, what, in the panel's expertise, are some of those spills which can be applicable to this assessment in terms of study?

14520. **DR. EDWARD OWENS:** Experience with oil spills is a very collective one. I mean, as you say, spills were world-wide. We study different spills for different reasons to understand behaviour of oil on the water, the fate and effects of oil on the water, and so it's pretty much a collective of everything. And my experience goes back to 1970 starting with spills in Canada.

14521. I think perhaps the more recent spills are the ones that provide some better information. I can, in my own case, relate to the Seledang Ayu in the elution chain, which is not dissimilar and about the same latitude in some respects. But Dr. Maki can relate to some other aspects of the Exxon Valdez spill in Prince William Sound.

14522. So we each have our own areas of expertise and which we've also been directly involved in oil spills. It's not just studies but it's also the -- the experiences that we have in those that help us today design and look forward to developing a spill response prevention and response capability that will mitigate the risk of having an accident in this area and should there be one mitigating that.

14523. **MS. HUMCHITT:** Is the panel aware of the Nestucca oil spill?

14524. **DR. EDWARD OWENS:** I was on that spill.

14525. **MS. HUMCHITT:** And you are aware that tar balls formed as a result of that spill?

14526. **DR. EDWARD OWENS:** I am aware of that.

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14527. **MS. HUMCHITT:** And further that they travelled a distance of a 175 kilometres and landed on Vancouver Island; isn't that correct?
14528. **DR. EDWARD OWENS:** I was on Vancouver Island at that time.
14529. **MS. HUMCHITT:** M'hm. And given that there hasn't been a -- a bitumen -- diluted bitumen spill, is it possible that tar balls may form from this and travel the same way?
14530. **DR. EDWARD OWENS:** The -- I must point out that the Nestucca had no attempt at source control or any mitigation in the open ocean.
14531. The -- those tar balls that travelled north, there was no attempt to intercept them near to Gray's Harbour before they left U.S. waters and because of other conditions there was no attempt to mitigate the movement of that oil into Canadian waters or once they reached Canadian waters.
14532. So that's -- that's an example of an unmitigated spill. In our case, you know, emphasis as we have said numerous times is on, first of all, prevention and then secondly, source control.
14533. **MS. HUMCHITT:** I recognize that. But that doesn't prepare in the event such a spill happens. And if the -- it does form into that -- okay, I'll go with that.
14534. Wasn't the majority of the oil spilt from the Exxon Valdez within six hours?
14535. **DR. ALAN MAKI:** That is correct.
14536. **MS. HUMCHITT:** And given that the Enbridge Northern Gateway anticipates a response time of six to 12 hours, doesn't that mean that we would have a spill before an adequate response can happen?
14537. **MR. OWEN McHUGH:** Again, I think we've discussed at length the fact that we would have escort tugs with the tankers in the confined channel and within the escort zone.
14538. Additionally, there are some major differences between the Exxon

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Valdez spill and what -- how -- the kind of tankers that would be calling at the terminal. And that's the double-hull and that will influence the way that oil flows out and how much oil could flow out of a tanker and how the damage actually occurs. So that's another important consideration.

14539. I do believe within our scenarios we talk about an outflow and I think it's over approximately 12 hours or it's an initial outflow that's at a higher rate and then an extended period of time where the -- we consider their continual outflow.

14540. **MS. HUMCHITT:** Just a moment please.

14541. **DR. ALAN MAKI:** Expanding on Mr. McHugh's comments. The Exxon Valdez incident is probably not a good example to compare simply because it was 24 years ago now next month and the measures we currently have in place within Prince William Sound simply didn't exist at that time.

14542. The escort vessel system, the response system, all of that has been implemented since then. And it's important to note that since the SERVS system was implemented in Prince William Sound, there have been no major tanker spills in -- in the Sound.

14543. In fact there have been a couple of tankers that have lost power recently but immediately the tug escort system was able to take over and provide safe anchorage for those tankers until they were repaired.

14544. So to compare with the system that existed in 1989 versus what Enbridge is proposing here is -- is really apples and oranges.

14545. **MS. HUMCHITT:** But wouldn't you agree that even with the improvement of technology and systems, the actual percentage of, for example, recovered oil hasn't improved noticeably?

14546. **MR. OWEN McHUGH:** I think what you -- when you talked about -- we have talked a lot about what's a recoverable oil and considered in that so I won't go into that.

14547. But we did talk about one event in Norway, I think it was called the Gosprey and I think it's 2008, around that general timeframe. And -- and in that example it was a -- it was a -- I believe it was -- it wasn't a tanker, it was another

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- type of ship. But in that example they had a prompt response and they were able to mechanically recover over 50 percent of the oil. So there's an example of something happening in an area that had immediate source control available.
14548. And I'm not aware of other examples where you have the level of initial containment and source control and general preparedness that this project's proposing where there's been a major incident, (a) because you have the prevention side to prevent those incidents from occurring, and (b) if they do occur they tend to be minimized by those prevention measures.
14549. So it's hard to compare these past examples with what you'd anticipate with an event in a modern -- modern era.
14550. **MS. HUMCHITT:** And are there warning systems on these tugs for loss of power?
14551. **MR. OWEN McHUGH:** I'm not sure I follow your question.
14552. **MS. HUMCHITT:** Well specifically if there are loss of power on the tugs that are supposed to assist in the spill is there a backup system for that?
14553. **MR. OWEN McHUGH:** Well, there will be two tugs with loaded tankers, so I would say that that is a backup.
14554. And the Shipping and Navigation Panel will be able to talk to the reliability of the actual tugs. And what I can say is these fleets will be very well maintained and they'll be in rotation so that they can be serviced appropriately.
14555. **MS. HUMCHITT:** So there will be pre and post-arrival inspections of the tankers and tugs when they are arriving and leaving the Kitimat port?
14556. **MR. LANGEN:** Madam Chair, I think -- I think that question's probably best directed at the Shipping and Marine Navigation Panel.
14557. **MS. HUMCHITT:** Very well.
14558. Could I ask that Exhibit D85-5-15 be pulled up please, page 16.
14559. And the Enbridge Northern Gateway is -- because of the expertise on the panel, I assume aware that human factors, human errors have contributed to

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- many of the spills?
14560. **MR. OWEN McHUGH:** We are aware that human factors have been one element.
14561. **MS. HUMCHITT:** And how is this element being dealt with in terms of the assessment and emergency preparedness?
14562. **MR. OWEN McHUGH:** Again, if you want to talk about the operation of the tugs or the tankers and the human elements that may lead to an incident I would suggest it's probably more appropriately directed to the Shipping and Navigation Panel.
14563. But the way from an emergency response perspective is that you -- you deal with -- it's not a human factor, it's more of a -- a training and exercise program making sure that people are very familiar with the procedures in place. They practice; they're exercising. They're working continuously throughout the year to -- to know the various scenarios that could come out of an incident practice notification, drills, field exercises, ICS or incident command structure training.
14564. So it's -- there are systems in place on both sides and I'll speak -- we can speak to the marine emergency side and Shipping and Navigation could speak to the on-ship.
14565. **MR. JOHN CARRUTHERS:** They'll be able to discuss the redundant systems that are put in place to minimize the chance of an occurrence.
14566. **MS. HUMCHITT:** If I could go to page 17 of the exhibit please.
14567. Is anyone in the panel familiar with this document?
14568. **MR. OWEN McHUGH:** Not -- not intimately, we have -- I have looked at this, but again, I would look at the very title on the first page which is "Tanker Technology Limitations of Double Hulls". So I'd probably say that it's more appropriate for this to be addressed to the Shipping and Navigations entire document. I also note that it's filed by Living Oceans who are an intervenor in this process.
14569. **MS. HUMCHITT:** I am pulling this out and I will ask a direct

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question, apart from this document. Enbridge Northern Gateway recognizes that spills can still happen despite double -- double-hulls.

14570. **MR. JOHN CARRUTHERS:** Yes.
14571. **MS. HUMCHITT:** Thank you.
14572. And getting back to emergency response, in regards to the Kalamazoo spill, isn't it true that local residents suffered from exposure to vapours released from that spill?
14573. **MR. LANGEN:** Madam Chair, that question would have properly been directed at the operations -- the Terrestrial Operations Panel. As I've indicated previously, there was a large number of witnesses available to speak directly to the Marshall incident and the spill itself.
14574. **MS. HUMCHITT:** My apologies. I wasn't present at that panel. Is the -- speaking to this emergency preparedness, specific to Kitimat, is the Enbridge Northern Gateway prepared to deal with such an event?
14575. **MR. OWEN McHUGH:** Yes, this would be part of the planning for the project. Human health and safety is always top priority in the event of an incident.
14576. **MS. HUMCHITT:** There has been questions earlier on in the panel, this panel in particular, in regards to the liability of oil spills. And the Enbridge Northern Gateway has affirmed that they would be relying on the international conventions, IOPC and marine shipping schemes for liability of spills; is that correct?
14577. **MR. JOHN CARRUTHERS:** We're not -- it's not just Northern Gateway reliance on that. Again, those are national and international conventions in terms of dealing with tanker spills, so we all rely on those, yes.
14578. **MS. HUMCHITT:** And I have heard the reference by members of the panel to the BP Gulf Oil -- sorry, Horizon spill, correct?
14579. **MR. OWEN McHUGH:** Typically, we've talked about that as only an example for very specific items. It's not a very comparable incident to this project.

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14580. **MS. HUMCHITT:** In terms of liability, the -- my understanding from that spill is that the company voluntarily put \$20 billion in a compensation fund, would Enbridge Northern Gateway be prepared to do such a contribution to such a fund?
14581. **MR. JOHN CARRUTHERS:** Are you speaking of a -- a tanker spill?
14582. **MS. HUMCHITT:** Yes, a compensation for tanker spill fund.
14583. **MR. JOHN CARRUTHERS:** And -- and the parties that are responsible for that would be the tanker owner?
14584. **MS. HUMCHITT:** M'hm. Yes, Enbridge Northern Gateway has stated throughout this panel that they have gone above and beyond the regulatory framework in terms of mitigation measures, that's why I made the inquiry if they would go above and beyond the liability schemes as a mitigation measure.
14585. **MR. JOHN CARRUTHERS:** You're -- you are correct. Northern Gateway has assumed what we called extended responsibility which went to the -- the prevention and then prompt mitigation of a spill. And -- and in that, we've expended a lot of dollars, one in the assessment of it and two then in -- in the investment, in weather information.
14586. We proposed increased beacon, buoys, lights, radar and even the whole system of using the tug system and all the prevention methods we go to have significant cost to the project. So we've very much taken a very active role in -- in what I'd call the -- taking on some of the cost aspects to the prevention and immediate response for a spill.
14587. So we have done that, but in terms of if people are looking for certainty for a spill, there's a couple principles; you'd want to know who pays and that's why these conventions go into deeming the tanker owner to be the responsible party. It eliminates the litigation that might go with who's at fault.
14588. So certainly that aspect's covered under these conventions. It also goes to ensuring there's sufficient compensation available through the national and international funds, and that's something that the Government of Canada looks at periodically.

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14589. **MS. HUMCHITT:** That still hasn't answered my question. Would Enbridge Northern Gateway considering going above and beyond that to establish such a fund?

14590. **MR. JOHN CARRUTHERS:** Again, I think if you look at who's responsible for a spill, you'd look at the tanker owner and typically, you don't go on either side of the value chain. You don't go up and say those who transport the product to the terminal are responsible, and you don't go and say those who use the product are responsible. So certainly, you keep it to, typically people want the person who's responsible or who has the responsibility for moving it to take responsibility for any potential costs and that's the tanker owner.

14591. So it wouldn't make sense -- that's where you actually want the liability to the one who controls that asset and that's the tanker owner and that's convention, like I say, national and international convention.

14592. **MS. HUMCHITT:** Isn't it true though, that after the Exxon Valdez spill, there were Exxon tankers and that's when it changed from being private tankers as opposed to oil company tankers?

14593. **DR. ALAN MAKI:** After the Exxon Valdez spill, there was a wholly owned subsidiary called Sea River Maritime formed and all of the tankers were chartered under that subsidiary of Exxon Mobil.

14594. **MS. HUMCHITT:** So it is -- did it change after Exxon then?

14595. **DR. ALAN MAKI:** The Sea River Maritime relationship was established after Exxon Valdez.

14596. **MS. HUMCHITT:** Thank you. And I take it from your response that the answer is no, in terms of a voluntary compensation fund?

14597. **MR. JOHN CARRUTHERS:** My answer again goes back to if you're looking at the principles, you want to make sure you have certainty of who pays and you want to have certainty that there's sufficient funding.

14598. Both of those are answered very well through national and international conventions and it's the responsible party, the tanker owner, who's responsible for the costs and then, in terms of the funding available -- it's a very

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relevant question for people to ensure because ships are quiet transient, so they want to make sure there's funding available, and that's why they do have to have compulsory insurance and that's why we participate in the funds, the international and Canadian funds. And those funds presently are in the order of \$1.3 billion. And again, the Government of Canada has the ability to look at that, reassess that if that's sufficient.

14599. **MS. HUMCHITT:** I understand that the issue of Kalamazoo has been gone through quite extensively, so I apologize if this is a repetitive question. But it is an Enbridge pipeline; was the cost of cleaning that spill more than a conventional oil spill?

14600. **MS. LANGEN:** Again, Madam Chair, and I appreciate my friend's comments. The panel that spoke to the Kalamazoo -- or sorry, Marshall incident was Panel 3 -- the Operations Panel. The individuals with knowledge to speak to the evidence of Northern Gateway with respect to that spill are not sitting on this panel and that question -- and I appreciate my friend's comment again, but that question should have been properly put to that panel.

14601. **MS. HUMCHITT:** In terms of emergency response and I understand that this panel has said that they provided -- are going to provide top training and support towards the emergency response didn't the emergency response in Kalamazoo take 17 hours?

14602. **MR. LANGEN:** Again, Madam Chair, I repeat my comments earlier, and I believe if my friend were to review the transcripts that that subject matter may have been addressed.

14603. **THE CHAIRPERSON:** Ms. Humchitt, that was extensively canvassed in a previous panel, in the panel that Mr. Langen has referenced and there is a lot of evidence on the record with respect to many aspects of that spill.

14604. Again, this panel today that's in front of you is to deal with marine emergency preparedness and response, and so if you could focus your questions on that aspect it would help us.

14605. **MS. HUMCHITT:** Yes, my apologies. I was not at that panel. Okay, I'll shift my questions ---

14606. **THE CHAIRPERSON:** It's amazing that there are some people who

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are just not always with the Gateway file; I just don't understand it.

--- (Laughter/Rires)

14607. **THE CHAIRPERSON:** Ms. Humchitt, now that I've interrupted you, it is 3:30 and that's typically when we stop sitting for the day, but I know in previous conversations that sometimes you have travel arrangements where if you don't get on a specific ferry you might not get back home for another week or so. Is it of help to you if we could sit up to an extra hour this evening?

14608. **MS. HUMCHITT:** Yes, I'll just give you an idea where I am. I have 120 questions. I'm about 30 questions in. We could sit another hour but that most likely will not take me through all my questions.

14609. **THE CHAIRPERSON:** Well this panel's still -- the witness panel's still looking pretty chirpy so let's keep going.

--- (Laughter/Rires)

14610. **MS. HUMCHITT:** Okay.

14611. **THE CHAIRPERSON:** We'll get as far as we can for you ---

14612. **MS. HUMCHITT:** Okay.

14613. **THE CHAIRPERSON:** --- this afternoon.

14614. **MS. HUMCHITT:** And in terms of actual travel conditions, I've heard reference by this panel to the grounding and sinking of the Queen of the North. So is it fair to say that this panel has knowledge of that incident?

14615. **MR. OWEN McHUGH:** We're aware of it in general, but it's not something that we're intimately familiar with. There is a review going on currently.

14616. **MS. HUMCHITT:** And specifically -- and this matter is quite a live one right now -- the actual departure of the BC Ferries has been delayed today until tomorrow because of heavy weather conditions. And my question in terms of Enbridge Northern Gateway is whether they would do the same thing with their tankers should weather conditions warrant it?

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14617. **MR. OWEN McHUGH:** Absolutely. It's quite clear on the record that there will be operational conditions in place and the Shipping and Navigation Panel will be able to speak to those in terms of what they would consider in the future.

14618. **MS. HUMCHITT:** M'hm. I just have to pull up an exhibit. Okay, just a moment.

14619. If I could refer to number 3 on my list -- there is no exhibit number to it, it's the JRP slide show and if I could have number 13 pulled up, please?

14620. **MR. LANGEN:** So Madam Chair, I know I've never seen this and -- but I don't know whether the witnesses have seen this so we'll just see where my friend goes, but ---

14621. **MS. HUMCHITT:** M'hm.

14622. **THE CHAIRPERSON:** Ms. Humchitt ---

14623. **MS. HUMCHITT:** This was actually ---

14624. **THE CHAIRPERSON:** Ms. Humchitt, is this ---

14625. **MS. HUMCHITT:** --- entered in a previous ---

14626. **THE CHAIRPERSON:** Sorry, this is from oral evidence, is it not?

14627. **MS. HUMCHITT:** Yes, it was entered as oral evidence previously.

14628. **THE CHAIRPERSON:** Thank you.

14629. **MS. HUMCHITT:** I believe it's Slide Number 13. Oh, I think that might be -- or it might be 11. My apologies.

14630. **THE CHAIRPERSON:** They're lovely pictures to look at again.

--- (Laughter/Rires)

14631. **MS. HUMCHITT:** I'm sorry. I'm just going to -- hang on a

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moment.

14632. Yes, sorry, that was my error. Pull up Slide Number 7, please.
14633. Yes, I'd like to ask the panel, are you aware that the act of fishing is a crucial cultural component of fishing and this cannot be replaced by a replacement food and/or country food purchased or gathered from another area?
14634. **MR. CHRIS WOOLEY:** Yes, I believe we understand that harvesting is very important part of Aboriginal culture and that it's the keystone of sharing and other cultural activities in the communities.
14635. And I'd just like to say that in the event of a spill, I know we've discussed the fact that there should be a planning process for that eventuality to ensure that there is a culturally appropriate process in place to deal with any possible effects.
14636. And I could just also, if I could, emphasize that my experience on spills and the effects on harvests are that the effects are short term and they're not welcome, but they are not permanent. They're understandably upsetting to harvesters and that's the reason why prior to -- that a planning process would be put in place to ensure that local input would be incorporated into the response.
14637. **MS. HUMCHITT:** If I could refer to another aid to question, and this one doesn't have an exhibit number as of yet, it's number 16.
14638. **THE CHAIRPERSON:** Ms. Humchitt, just before we move away from that ---
14639. **MS. HUMCHITT:** M'hm.
14640. **THE CHAIRPERSON:** --- from that one, were you presenting that today as an AQ, is that my understanding? The slides that you referred to, were they being presented today as an AQ?
14641. **MS. HUMCHITT:** Yes.
14642. **THE CHAIRPERSON:** I'm sorry. I thought that they had -- I thought that we'd seen them before with -- in oral evidence.

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14643. **MS. HUMCHITT:** Yes, Madam ---
14644. **THE CHAIRPERSON:** I thought that they had been ---
14645. **MS. HUMCHITT:** --- Chair, I think that you did ---
14646. **THE CHAIRPERSON:** Okay.
14647. **MS. HUMCHITT:** --- but there are members of the panel who ---
14648. **THE CHAIRPERSON:** Okay.
14649. **MS. HUMCHITT:** --- I don't think have seen these.
14650. **THE CHAIRPERSON:** So while I've disturbed you, Ms. Niro,
could we get an AQ number please, for Heiltsuk Tribal Council?
14651. **THE REGULATORY OFFICER:** That will be AQ66.
- AID TO CROSS-EXAMINATION NO./AIDE AU CONTRE-
INTERROGATOIRE No. AQ66:**
- Heiltsuk Tribal Council - Aids to cross-examination*
14652. **MS. HUMCHITT:** And if I could ask that the AQ Number 16 be
pulled up. And that is on Adobe page 144 and 145.
14653. **THE CHAIRPERSON:** So this is a transcript from the proceedings.
14654. **MS. HUMCHITT:** Yes, it is.
14655. **THE CHAIRPERSON:** So, thank you. It's not an AQ per say -- it's
not an AQ. It's on the record already.
14656. **MS. HUMCHITT:** Yes, it is.
14657. **THE CHAIRPERSON:** Thank you.
14658. **MS. HUMCHITT:** And I'm looking at paragraph number 28623.

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14659. And I would ask the panel -- this panel if they are aware that if we were not able to harvest that this would be considered to be a form of genocide to our people?
14660. **MR. LANGEN:** Sorry, I don't mean -- I do mean to interrupt, I don't mean to be rude, though. I'm just curious what transcript volume this is in, that's all.
14661. **THE REGULATORY OFFICER:** Thirty-eight (38).
14662. **MR. CHRIS WOOLEY:** I'd like to answer -- am I free to answer that now? Okay.
14663. I'd like to answer that by going to B83-17, Adobe 257. And partway down the page -- right there, that's fine.
14664. I'd like to just reply by saying that we understand that there is a strong connection between harvesters, the resources, the land, the water, and that's a long tradition. We recognize that and we respect that.
14665. Unfortunately, terms like genocide that were applied to the Exxon Valdez spill effects where it's really not -- that's not what happened. There were upsetting effects from that, but there were short term effects from that event. And as upsetting as those were, they were short term. The effects on the local food supply, food safety, et cetera, were not permanent. And that's the reason that I understand that this group has talked about putting together a plan, a framework to ensure that there are not unmitigated effects from an oil spill.
14666. **MS. HUMCHITT:** Okay. I'd like to go to my next question in furtherance of that and the statement that these were short term effects.
14667. And is -- the panel is aware, as a result of past testimony, which I've heard in here, that there are three species which are still considered to be not recovering after the Exxon Valdez spill, which include Pacific herring, the pigeon guillemots, and the killer whales; isn't that contrary to your statement that there were no long-term effects?
14668. **MR. CHRIS WOOLEY:** I was speaking to the long-term cultural effects that were, I guess, described in the terms of -- pretty strong term of genocide. And that's -- that term just doesn't have bearing and it's not borne out

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by the history of the cultural effects of the Exxon Valdez spill or any other oil spill.

14669. Now, I know that our other colleagues can talk to the biological effects of those other species, but I just wanted to reiterate that I was responding to the discussion of cultural effects. And that the species that the Alutiiq people rely on to this day are intact and that their harvest levels are back, and within a few years, were back to where they were prior to the spill.

14670. **MS. HUMCHITT:** Further to that, isn't it true that herring could not be harvested after Exxon Valdez for 15 of the 21 years since the spill there?

14671. **DR. WALTER PEARSON:** I'm sorry, ma'am, could you repeat the question on the herring please?

14672. **MS. HUMCHITT:** Is it not true that the herring could not be harvested after the Exxon Valdez spill for 15 of the 21 years?

14673. **DR. WALTER PEARSON:** That's approximately correct, ma'am.

14674. **MS. HUMCHITT:** Thank you.

14675. **DR. WALTER PEARSON:** That's not due to the spill, that's due to the decline in 1993, which evidence now indicates is not due to the spill but to natural factors.

14676. **MS. HUMCHITT:** Would you agree there's contrary research and studies in regards to that?

14677. **DR. WALTER PEARSON:** There's been a number of studies, 20 years worth, and in the early ones, that was the case. Even Dr. Carls, as I spoke about this morning, was one of those that wouldn't dismiss an indirect effect of the spill in relationship to decline.

14678. Now, after a lot of work, some of which he helped commission and some of which he conducted, and Dr. Rice, who was involved in some of the design of that work in 2007, are willing to state that they can find no connection between the Exxon Valdez oil spill or lingering oil and to the decline -- or, to the poor recovery following the decline.

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14679. So there's convergence. Even though there was disagreements initially at the time of the decline as to what the cause was, there's been a lot of convergence as to the cause and it's not centering on the spill, it's centering on other factors.
14680. **MS. HUMCHITT:** If I could pull up exhibit -- well, AQ Number 20, it hasn't been assigned an exhibit number yet, "Coastal First Nations Potential Impacts", page 67, please.
14681. **MR. LANGEN:** Sorry, just for clarification, is this evidence that's been filed by the Coastal First Nations?
14682. **MS. HUMCHITT:** As far as I know, it has been filed. Unfortunately, Coastal First Nations has pulled out, but the Heiltsuk Nation is one of the Coastal First Nations.
14683. **MR. LANGEN:** That's fine, we're just trying -- we didn't receive any AQs, so we're just trying to make sure that we're dealing with documents that are on the record.
14684. **MS. HUMCHITT:** M'hm.
14685. **THE CHAIRPERSON:** Anybody got the exhibit number for this one?
14686. **MR. JOHN THOMPSON:** Yes, it's D35-14-4.
14687. **THE CHAIRPERSON:** Thank you, Mr. Thompson.
14688. **MS. HUMCHITT:** Page 67, please.
- (A short pause/Courte pause)
14689. **THE CHAIRPERSON:** Is this the page you were looking for, Ms. Humchitt?
14690. **MS. HUMCHITT:** Yes, it is.
14691. So in looking at this statement it appears that there is research out there which is contrary to that posed by Dr. Maki. So are you confirming that you

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are in disagreement with these researchers in regards to their findings?

14692. **DR. ALAN MAKI:** Well, as Dr. Pearson has explained earlier today, the literature cited in that paragraph goes back now some 15 years. Those citations were evolving, and as we now currently have today, we have a consensus from both sides of the argument, the trustees, as well as researchers working for Exxon Mobil, that the spill indeed did not cause -- was not the cause of agent for the herring decline. Dr. Pearson's given you detailed reasons as to why that happens.

14693. I mean, it was very difficult for us to conceive how a spill in 1989 could have brought about the 1993 collapse and kept it down for the ensuing years when we know there are no hydrocarbons in the open water or in their spawning habitats. So there simply was no vector for exposure that made any sense.

14694. And based on that understanding now, the work of Dr. Pearson and his crew, and the work of Alaska Department of Fish and Game have now converged and we agree that it's a nutritional issue with a food supply, and concurrent with that, the disease instance that's referred to in the last sentence of your highlighted paragraph.

14695. A combination of food source changes and weight loss of the herring is well documented and the occurrence of the Ichthyophonus infection is also well documented in the herring population. Both of those combine to suppress the population to this day, but it is not related to the oil spill.

14696. **MS. HUMCHITT:** So you're in disagreement with the study that the mean mortality of Pacific herring eggs and larvae was three times higher in these oil sites than in those not exposed to oil?

14697. **DR. WALTER PEARSON:** That's in 1989 during the height of the spill, and in that time Ms. Biggs, who became Mrs. Brown, is cited in that -- in that document -- same lady, led for the trustees' studies of the herring in Prince William Sound at the time of the spill. I led studies on Prince -- on herring under contract to Exxon.

14698. Both parties saw results or impacts on the eggs in 1989. There was a difference of opinion about the extent of that. Both parties in 1990 saw no effects on the eggs in Prince William Sound.

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14699. If you would like to go -- if you would go to the recovery document, B83-17, and go to Adobe page 54, we discuss -- there we discuss the recovery of herring.
14700. Page down a bit please. Scroll down a bit please. There's a figure I'm seeking. A little bit more please. A little bit more. Sorry. Right here.
14701. This is work that was done in 1990 after the -- a year after the spill, where we also went to Sitka, an area completely separate from the effects of the spill, as well as looking at control areas within the spill region.
14702. And as you can see, the kinds of endpoints in this document, the profile there for developed eggs, viable larvae, hatched eggs and larvae with pericardial oedema, which we've heard about in other places and times here today and in previous days, which is an indicator of affect, is virtually identical across the board there from Prince William Sound oiled areas, Prince William Sound reference areas and Sitka.
14703. There's similar data that Dr. Brown -- now Dr. Brown, as well as Mrs. Brown -- has ---
- (Laughter/Rires)
14704. **DR. WALTER PEARSON:** She was single, she got married, she then went to school and got her doctorate, and all in this time she's been studying herring.
14705. I'm sorry for the aside.
- (Laughter/Rires)
14706. **DR. WALTER PEARSON:** To get back to this, essentially, whatever the effects that were in -- that were localized in 1989, they didn't occur in 1990, nor did they translate to population level effects, and that can be seen in other data that has to do with the total biomass in Prince William Sound and the very strong recruitment of the '88 year class, which I spoke to earlier today.
14707. But if we would scroll down just one -- a little bit more, maybe a page, there should be another figure here. Just -- okay, let's go down to the bottom figure and then we'll come back to the other figure.

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14708. This is the change in the gain in weight over the winter. If you're a herring you need to eat a lot in the spring and summer and fall in order to have the ability to go through the winter, and this is because there's much food for you in the wintertime.

14709. And what's happened, if you look at what's going on here, is that in the middle of the 1980s -- so let's back up. So what this graph measures is here's the weight for a particular year class in the fall versus the weight in the spring. And so what you see is that in the 1980s they were continuing to gain weight between the fall and the spring, but as time went on that gain got smaller and smaller, until in the 1992-93 era it went negative. So they were essentially losing weight over the winter.

14710. So there's other condition factors that we can show and other slides but essentially all this is evidence about that there was a change in the structure of the Gulf of Alaska for the herring that led to them not having nutritional sources that would support them over the winter.

14711. And if you go back one you'll see that these are samples taken of zooplankton, the food of herring, the prey of herring, taken in Prince William Sound -- not by me but by other people, and in the document that -- by Dr. Cooney of the University -- he's now retired, but of the University of Alaska that shows that the prey field was better in the 1980s when this gain was going on than in the period just before and after the spill, one year though where it was very high.

14712. So the -- what's happened is that the people that have been looking at this have now understood that there's this nutritional component to what went on with the decline that -- for which there's evidence.

14713. Other people have done work on what's called age structured assessments of stock and Dr. Deriso did some work with us and when he used that age structured assessment -- I won't go into the details because it's -- he wrote a whole book on it, but it essentially -- he has a way of testing hypothesis about coverts and what would be significant factors in the population and the dynamics.

14714. His work showed that there was no effect of the oil spill indicators that we put in there. There was effects that were associated with nutrition, ocean factors and significant interactions with pink salmon releases from the hatcheries

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in Prince William Sound. Pink salmon releases got up to over 600 million fry a year, a substantial number of fry.

14715. Another study that also used -- actually, there were two more studies done by the trustees that also looked at the age structured techniques. The conclusion of the latest one in 2008 by a gentleman Dr. Holston -- Holson concluded that it was a nutritional problem that led to the decline.
14716. It was not overharvesting or other factors. It was a nutritional problem and that predisposed the population to a disease, which as you pointed to that fact in the document that you had up.
14717. The kinds of debates right now that are going on are about the role of disease relative to nutrition; whether nutrition came first or whether disease came first.
14718. **MS. HUMCHITT:** Could I refer to the previous exhibit please? I believe it's number D35-14-4. And I understand that you said that there was a convergence of opinions on the research since the event. I'm just going to read out a statement from a portion of here:
- "The pacific herring population in Prince William Sound collapsed in 1993 and despite the four year time gap from the initial spill event, the EVOS is at least one of the factors that contributed to the collapse." (As read)*
14719. And what's referred here is a study by Thorne and Thomas dated 2008. Isn't this contrary to what you say is the convergence of opinions on this?
14720. **DR. WALTER PEARSON:** Actually the -- that study was in fact addressed squarely by the Holson study which was funded by the Exxon Valdez Trustee Council in which they -- which they again reiterated that it was nutrition.
14721. What I'm trying to say is that -- let's back up a little bit. In 1993 -- well in 1992, if you looked at what was going on, the spill had happened, there had been no effect on the eggs the next year. There'd been the strong recruitment, the continued presence of the '84 year class supporting the fishery. The strong recruitment on time and in great numbers of the '88 year class which had been juveniles, one year old fish at the time of the spill living in the near shore areas of Prince William Sound, high biomass and a record high harvest.

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14722. So at that time, 1992, things looked good for the herring and Dr. Rice and Carls now point to that as evidence of recovery. In -- and then there was a prediction that the biomass in 1993 was going to be an all-time record and a very good and promising year for the fishery.
14723. Instead, we had something like 20 -- depending on who you read, 20 to 30 percent of the biomass didn't show up -- I'm sorry, what showed up was only 20 to 30 percent of the biomass with no good explanation right at that time.
14724. So what happened was that everyone -- I'll not say everyone -- a number of people pointed directly to the spill as the issue. There were studies done then to talk about the implicated disease as well, in a short time after the decline.
14725. **MS. HUMCHITT:** This doesn't ---
14726. **DR. WALTER PEARSON:** Well I'm trying to say ---
14727. **MS. HUMCHITT:** --- get to my question.
14728. **DR. WALTER PEARSON:** Well I'm trying to say -- I'm trying to describe the convergence for you. And what I'm saying is there was a -- the divergence was in 2003 and there were really only two or three competing hypothesis; the oil spill, disease, and some sort of natural factors without specification of those.
14729. So time went on, papers were written, studies were funded, the disease issue was investigated, the potential link between disease and oil was investigated and these hypotheses began to be discounted.
14730. And so now the hypotheses that are left -- the explanations that are left are nutrition, disease in some form, natural factors regarding ocean conditions that lead to the nutrition and not much else.
14731. **MS. HUMCHITT:** This still doesn't answer my question. I was simply seeking that there are different perspectives on -- regards to the contribution of the Exxon Valdez spill in regards to ---
14732. **DR. WALTER PEARSON:** Okay. There were, there are still are but

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things are much, much closer now, after 20 years of research than they were in 1993. I guess that's my point.

14733. **MS. HUMCHITT:** So it is correct then that there are differences of opinions in regards to the contribution of the Exxon Valdez spill to the herring collapse?

14734. **DR. WALTER PEARSON:** There is but I'm trying to say they're not near as far apart or as frequent or between all of the parties as there were in 1993.

14735. If I've got another point, I need to speak to the fact that I looked at Figures 5.3, 5.4 and 5.5 in the recovery document, B38-7 ---

14736. **THE CHAIRPERSON:** B83-17.

--- (Laughter/Rires)

14737. **DR. WALTER PEARSON:** Thank you. Thank you.

14738. **MS. HUMCHITT:** And are you -- is members of the panel aware that herring is currently a species of concern in areas along the tanker route?

14739. **DR. WALTER PEARSON:** We're aware that some of the -- that the central coast area has stocks that have not been allowed to be fished probably since -- for four or five years now.

14740. **MS. HUMCHITT:** And given that herring is a species of concern along the tanker route, is it also not possible that even one spill could wipe out this delicate population?

14741. **MR. LANGEN:** Sorry, Madam Chair, my friend asked the witnesses whether or not herring was a species of concern and Dr. Pearson responded, indicating that some of the stocks are not being fished. And in her last question, she -- the premise assumes that there was an affirmative to the last question and I don't think she obtained that.

14742. **MS. HUMCHITT:** Could -- perhaps the panel can clarify that?

14743. **THE CHAIRPERSON:** Ms. Humchitt, could you ask your -- restate

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- your question?
14744. **MS. HUMCHITT:** Is the herring -- pacific herring stock of concern in the marine areas along the tanker route?
14745. **DR. WALTER PEARSON:** It's not a stock of concern in the sense that it's been listed as a threatened or endangered species. It is -- the word "concern" here seems to be troubling. They're not listed with SARA -- under the SARA Act.
14746. **MS. HUMCHITT:** But they're ---
14747. **DR. WALTER PEARSON:** However, you're correct that DFO has looked at the stock levels and has not -- has chosen not to allow fishing in order to -- as a preventative -- or, precautionary measure -- to keep the stock from further depletion.
14748. **MS. HUMCHITT:** But killer whales are a species at risk in the marine areas along the tanker route; correct?
14749. **DR. WALTER PEARSON:** Yes.
14750. **MS. HUMCHITT:** And this is one of the species that never recovered after the Exxon Valdez spill?
14751. **DR. ALAN MAKI:** Again, this is another species that is still up in the air for a cause and effect relationship. The Trustee Council work to date has not definitively identified the spill as the cause.
14752. There is work done by individual researchers that have tried to implicate the spill but it's a case of no bodies were found, the mortality were not related or could not be related to the spill. So what we have is we're left with the significant question of what did happen to members of the pod, AB pod and AT1 pods.
14753. As you look back into the 1980s, the literature indicates that was the period when the long-line fishery took off in Prince William Sound. Long-line fishery involves putting a baited string of lines overboard and fishing for bottom fish like black cod and halibut.

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14754. The result was that once the fishery took off and it was very productive, the killer whales soon learned to recognize the sound of the hydraulic winch pulling the line in and equated that to the dinner bell.
14755. So that when you pulled your long-line in, all you got was literally the heads of black cod and halibut. The body had been very neatly clipped off just short of the hook. This obviously was a classy case of competition for resource utilization, if you will.
14756. The fishermen were understandably angered by this and it led to an incidence of, for several years, where the fishermen were blatantly shooting at the killer whales with high-powered rifles. The work has been documented by Dr. John Hall. This was published by Hall.
14757. The incidence of bullet wounds in the dorsal fins, in the backs of whales is well documented through the late 1980s. That is one of the problems we have in confounding what exactly happened to those killer whales.
14758. It recently has been summarized -- this information recently has been summarized in a publication by Mark Fraker of Victoria, B.C., that was peer-reviewed and recent -- just published a couple of months ago. He also summarizes the alternative causes, as I've tried to detail.
14759. So it is not at all clear. The Trustee quotes are ambiguous at best. We cannot definitely say that the spill was a cause of killer whale mortalities.
14760. **MS. HUMCHITT:** So it can be said that there's conflicting research on the subject out there; correct?
14761. **DR. ALAN MAKI:** There are -- there is conflicting research. That's correct.
14762. **MS. HUMCHITT:** Isn't it -- I think you referred to -- I believe where you were going was that whales are smart and can be trained to avoid certain things from your past comment. Is -- did I get that correct or...
14763. **DR. ALAN MAKI:** Whales are indeed intelligent and they rapidly acclimated to the sound of the hydraulic winch pulling in the line. And that's what -- they would rapidly identify that with an easy meal and halibut and black cod were picked off the line. So yes, they did acclimate to that sound.

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14764. **MS. HUMCHITT:** Is it not true that within 24 hours of the Exxon Valdez grounding, killer whales were photographed swimming through oil slicks in Prince William Sound?
14765. **DR. ALAN MAKI:** Excuse me. The photograph you refer to appeared in the Los Angeles Times. And this is one of the mysteries we've never been able to resolve. I personally dispatched legal aid to the office of the L.A. Times to try to find this source and the root of that photograph.
14766. And to this date, the original photograph nor the source of it have never been recovered, so it still remains a mystery as to the source of that photograph and its authentication.
14767. **MS. HUMCHITT:** Well, I'm looking at a copy if you want a copy.
14768. **DR. ALAN MAKI:** Oh, I understand, I have a copy of it, but nobody can find the original nor the authentication as to who exactly took it or when.
14769. **MR. JEFFREY GREEN:** Maybe what will help is in the first week that this panel sat, we spent quite some time discussing the killer whale issue and I think the conclusion is, is that no one can say whether oil hurts cetaceans or not at this point. We can't say that EVOS didn't have an effect on killer whales.
14770. But I think what Dr. Maki has been speaking to is that there was a number of other confounding factors that make the interpretation very difficult and we'll likely never know the outcome.
14771. I think what's really important from the point of view of this project is that no one is debating that an oil spill, especially a large oil spill at the right place at the right time, would not have a significant adverse effect on the environment.
14772. And therefore, prevention and rapid response becomes the really key elements. So I don't think any of us are here today to debate that animals weren't affected. Even the species you're speaking to, you know, it's hard to say whether or not they were. But no one is debating the adverse effects on herring, for example, or killer whale, or birds, or other species. The -- I think just by -- it's obvious that it's an element in the environment that shouldn't be there in large volumes and it does have effects.

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14773. And so we're -- we can -- there's a number of examples in Exxon Valdez where there's contradicting evidence, but I think the point of the work that was done by Dr. Pearson was that recovery can occur under circumstances, as we went through this morning.

14774. **DR. ALAN MAKI:** I think that's the learning for the panel here is that the species -- the three species that you've mentioned all have conflicting rationale behind their cause and effects. It's not at all clear that the spill brought about the effects.

14775. One of the bigger issues with killer whales, we know there are a total of six pods, individual pods, totalling over 117 individuals in Prince William Sound and yet the remaining pods were unaffected.

14776. So why was it just these two that we know are -- were acclimated to the fishermen's lines? Why were these two the only ones that disappeared? So we don't really know. And no one, that's the bottom line, it's unknowable at this time exactly was it the spill or was it fishermen interference or something else.

14777. But the learning here is that rather than being totally assured that killer whales in this geographical region would be affected in the remote event of a spill in the future, recognize that they are very smart animals and that they indeed have ways to avoid these and it's not at all a certainty that killer whales would be impacted if there were a spill in this area.

14778. **MS. HUMCHITT:** Is it not true, though, in the Exxon Valdez spill, that there were killer whales who are unable to reproduce after being exposed to the oil spill?

14779. **DR. ALAN MAKI:** That issue is related to the AT pod. The fact is that they haven't had a viable calf in that pod since 1984. There just hasn't been reproduction. They're what we call a senescent pod. The females are very old, the males are old, and we're not aware that's there's been a calf produced since well before the spill. So to say that any reproductive impairment of the AT1 pod was due to the spill is not reasonable.

14780. **MS. HUMCHITT:** Is it also fair to say that there is also a conflicting research out there on this subject as well?

14781. **DR. ALAN MAKI:** I think it's pretty well understood.

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14782. Killer whale biology is a very interesting and -- and kind of a curious issue. All of the -- all the killer whales in the Pacific Northwest are maintained and identified by a singular photo library maintained by Graeme Ellis and I believe it's John Ford now taking it over. Graeme Ellis at the Nanaimo lab here on -- on Vancouver Island is the definitive authority for having identified each and every individual killer whale.
14783. And he maintains an ongoing catalogue by photo identification of the way the dorsal fin is pigmented; the colour white and black. How it's -- how it's - - they're variable enough that you can tell them apart. Sometimes they sag to the left, sometimes they sag to the right. All of these are individual identifiers so that each one is indeed identified.
14784. The fact of the AT1 pod being senescent, the fact that they are -- haven't produced a calf since 1984 is well accepted on both sides and there is no controversy of that fact.
14785. We also know from post-Valdez research that that particular pod of whales has some of the highest contaminant levels of chlorinated hydrocarbons. PCB, dieldrin, DDT and the long-term residual chlorinate hydrocarbons of any marine mammal. And it is indeed the levels they carry in their tissues are sufficient to cause concern over their ability to reproduce.
14786. So whether it's those levels of contaminants or whether it's their age or some combination thereof, there still hasn't been a recognized calf since that time period. And there's no disagreement about that fact.
14787. **MS. HUMCHITT:** Just about the research as to the cause?
14788. **DR. ALAN MAKI:** Well, the cause is accepted by both sides as either senescence or a high level of chlorinated hydrocarbon contaminants.
14789. **MS. HUMCHITT:** And is -- are the members of the panel aware of the cultural significance of the killer whales to First Nation communities?
14790. **MR. JEFFREY GREEN:** Yes we are.
14791. **MR. CHRIS WOOLEY:** Absolutely.

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14792. **MS. HUMCHITT:** Can you explain it?
14793. **MR. JEFFREY GREEN:** I'm not sure I can.
14794. **MR. CHRIS WOOLEY:** I have a general understanding that the species are understood to be a transformation species.
14795. **MS. HUMCHITT:** You're unaware that there are crests of killer whale clans?
14796. **MR. JEFFREY GREEN:** We're aware that in a number of the coastal Aboriginal groups that there are killer whale clans, raven clans, wolf clans and the like.
14797. That's my familiarity. And the -- as I understand it the other name is black fish I believe.
14798. **MS. HUMCHITT:** And you are aware that the Heiltsuk Nation considers themselves to be one with the animals that inhabit our seas?
14799. **MR. JEFFREY GREEN:** I'm aware of reading the evidence submitted by the -- the Heiltsuk of that. Yes.
14800. **MS. HUMCHITT:** Madam Chair, I'll be going onto a different line of questioning. If you wanted to take a break for today and come back tomorrow to continue.
14801. **THE CHAIRPERSON:** Thanks for identifying that for us, Ms. Humchitt.
14802. When we come back tomorrow morning could I ask you to have identified where, if you're pulling up anything in the exhibits, what the exhibit numbers are so that we'll be able to -- to pull those up, and if you could give that list to Ms. Niro that would be very helpful.
14803. In terms of if there is -- if there's material that isn't already on the evidence but that you are planning to put to the panel in terms of what we've defined as AQ or aids to questions, I understand you haven't presented any of that material to the witnesses yet and so that could be a problem because they haven't had a chance to review it.

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14804. So if I could just get you to -- to sort out what it is that you're referring to that's already in the evidence, to have those exhibit numbers available for us. And then we'll go further you and Mr. Langen may want to have conversation offline about the potential use of -- of any AQ's when we start.

14805. **MS. HUMCHITT:** Yes. Actually Madam Chair, we did submit it. Unfortunately some of the items had exhibit numbers and some did not have exhibit numbers.

14806. I do have a stick which I can provide my friend if he would like to have his own copy to review with the members of the panel.

14807. **THE CHAIRPERSON:** It's just helpful to us if we know that it's already on the record. And then Ms. Niro can pull it up right away as being on the record. And we all know that it's already on the record.

14808. **MS. HUMCHITT:** Yes. I'll submit it to Ms. Niro.

14809. **THE CHAIRPERSON:** Thank you. Thank you for making sure that we have that information.

14810. So we'll finish for today and we'll see each other again at 8:30 tomorrow morning.

14811. Thanks everyone. Good night.

--- Upon adjourning at 4:26 p.m./L'audience est ajournée à 16h26