

**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 156

**Hearing held at
Audience tenue à**

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

**March 19, 2013
Le 19 mars 2013**

**International Reporting Inc.
Ottawa, Ontario
(613) 748-6043**

Canada

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

This publication is the recorded verbatim transcript
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official languages, depending on the languages
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Printed in Canada

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représentée par le Ministre de l'Environnement et
l'Office national de l'énergie

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délibérations et, en tant que tel, est enregistrée et
transcrite dans l'une ou l'autre des deux langues
officielles, compte tenu de la langue utilisée par le
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), Tuesday, March 19, 2013
Audience tenue à Prince Rupert (Colombie-Britannique), mardi, le 19 mars 2013

JOINT REVIEW PANEL/LA COMMISSION D'EXAMEN CONJOINT

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

ERRATA

(i)

Monday, March 18, 2013 - Volume 155

Paragraph No.:

31318:

“...and Mr. Ryder.”

Should read:

“...and Mr. Eide.”

31367, 31368, 31393, 31417, 31421:

“...Hassle...”

“...Hassel...”

31421:

“...that Mr. Hull is pointing to.”

“...that Mr. Ho is pointing to.”

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| AQ74-C | BC Nature and Nature Canada - Hume - Freighter runs aground off Prince Rupert, stoking oil spill fears, The Globe and Mail November 21, 2012 | |

RULINGS/DÉCISIONS

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Description

Paragraph No./No. de paragraphe

UNDERTAKINGS/ENGAGEMENTS

| No. | Description | Paragraph No./No. de paragraphe |
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Preliminary matters

--- Upon commencing at 8:29 a.m./L'audience débute à 8h29

31456. **THE CHAIRPERSON:** I believe we're ready to get underway again this morning. Good morning, everyone.

31457. I'd just like to inform everyone that today we'll sit until 12:15 and then we'll break from 12:15 until 1:15 for lunch.

31458. And in addition to that, the Panel notes the Government of Canada's position in its filing yesterday was not intended to be written evidence. As such, it will be removed from the registry. The documents filed appeared to be released publicly and made generally available by the Government of Canada.

31459. The Panel will only consider evidence that is properly filed on the record. Documents should not be filed on the public registry unless they are evidence filed in accordance with the Hearing Order.

31460. Are there any other preliminary matters that parties wish to raise this morning?

31461. Mr. Crowther? Ms. Mathers?

31462. **MS. MATHERS:** Good morning, Madam Chair.

31463. On behalf of Gitxaala Nation, we'd like to revise our time estimate for this panel. I would like to revise it to two hours.

31464. **THE CHAIRPERSON:** Thank you for advising us.

31465. **MS. MATHERS:** Thank you.

31466. **THE CHAIRPERSON:** Thank you.

31467. Mr. Crowther?

31468. **MR. CROWTHER:** Good morning, Madam Chair.

31469. I understand that one of the witnesses has something arising from yesterday's testimony.

JOHN CARRUTHERS: Resumed

JERRY ASPLAND: Resumed

JENS BAY: Resumed

AUDUN BRANDSAETER: Resumed

DAVID FISSEL: Resumed

AL FLOTRE: Resumed

KEITH MICHEL: Resumed

STEVEN SCALZO: Resumed

THOMAS WOOD: Resumed

MICHAEL COWDELL: Resumed

HENRIK KOFOED-HANSEN: Resumed

31470. **MR. AUDUN BRANDSAETER:** Madam Chair, I would just like to correct the statement I made yesterday when I was -- sorry -- whether I was familiar with Thomas as well. It was close 31407 in the transcript.

31471. When I answered “No, sir, I’m not aware as in the context of that”, I didn’t realize which Mr. Thomas it was. In fact, he is a colleague of mine and I know who he am -- who he is; sorry.

31472. **THE CHAIRPERSON:** Thank you.

31473. Good morning, Mr. Tollefson. Please continue with your questions of this panel.

31474. **MR. TOLLEFSON:** Good morning, Madam Chair, Members of the Panel, witnesses.

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

31475. **MR. TOLLEFSON:** I want to continue to talk about incident types, but take it in a slightly different direction.

31476. Yesterday, Mr. Brandsaeter, you agreed that in the QRA you looked at four incident types; grounding, collision, foundering and the last category, fire and explosion. And I want to ask you, you’d agree that the other incident types can, in fact, lead to an oil spill. Would you agree with that?

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31477. **MR. AUDUN BRANDSAETER:** Other incident types were also accounted for such as during berthing and loading, to mention a couple.
31478. **MR. TOLLEFSON:** In terms of transportation -- marine transportation to and from the terminal, you looked at four incident types, the four that we discussed yesterday; is that not true?
31479. **MR. AUDUN BRANDSAETER:** During the transits from open ocean until starting the approach to the terminal, yes.
31480. **MR. TOLLEFSON:** Yeah, those four that we were discussing just a minute ago.
31481. But you would agree that in that marine transportation context that other kinds of incident types can indeed lead to an oil spill. You'd agree with that.
31482. **MR. MICHAEL COWDELL:** Perhaps you could be a little bit more specific in the types of incidents that you're proposing.
31483. **MR. TOLLEFSON:** Certainly. Well, I'll ask you this question then.
31484. The Lloyd's Registry contains records of other incident types, including hulled and machinery damage. Are you aware of that?
31485. **MR. AUDUN BRANDSAETER:** Yes, sir, I'm aware of that. Yes.
31486. **MR. TOLLEFSON:** Yes. And hull and machinery damage, sir, I would suggest to you that that can lead to an oil spill. Would you agree?
- (A short pause/Courte pause)
31487. **MR. AUDUN BRANDSAETER:** As can be seen from the TERMPOL 3.8, it was considered, but for double-hulled tankers, which are to be used here, we did not considerate it to be significant. So it was not included specifically in the -- in the QRA as a separate accident type while oil spills were still considered in total.
31488. **MR. TOLLEFSON:** So you recognize that hull or machinery damage can lead to an oil spill, but you did not consider that that was a significant risk that deserved to be considered in your study. Is that your evidence?

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31489. **MR. AUDUN BRANDSAETER:** Sorry about the problem with the mic here.
31490. It was included in the overall spill that was assessed, but it was not included as a specific and separate accident or incident type and as such listed, that is correct.
31491. **MR. TOLLEFSON:** I'm a little unclear how if it's not considered to be one of the four incident types that you look at and evaluate in your model, how it can be considered in the QRA. How is it considered in the QRA if it's not one of the incident types that you identify?
31492. **MR. AUDUN BRANDSAETER:** Is there a specific type of machinery failure to refer to since you're thinking of this?
31493. **MR. TOLLEFSON:** Are you familiar with the term "non-accidental structural failure", sir, NASF?
31494. **MR. AUDUN BRANDSAETER:** Yes, I am and that are typical type of failures that are included in the foundering category of failures. Those included in the hull or machinery type of failures related to hulls that are typically small cracks that for a double oil tanker will not be significant, insignificant then in the sense of oil spills to the environment. Maybe oil spills to the neighbour tank, but not from the cargo area out to the environment.
31495. Maybe Mr. Michel can give more information related to the construction of the vessels.
31496. **MR. KEITH MICHEL:** Yeah, it -- there have been very few incidents of double-hulled tankers having oil spills to begin with, you know, as we look at the data from 1992 to 2012 and ITOPF -- in fact I'd suggest we put up the ITOPF plot which is -- I pull B023-09.
31497. **MR. AUDUN BRANDSAETER:** Exhibit B23-09.
31498. **MR. KEITH MICHEL:** Yeah, thank you, and Adobe page 14.
31499. Yeah, this happens to be ITOPF data for oil spills and I've compared it to various other oil spill datasets. There are a number out there, Lloyd's Register

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- is one. ITOPF, which is the International Tanker Owners Pollution Federation, that's another. Anderson-LaBelle dataset is a third that's frequently referred to in a number of the intervenor evidence and responses, and a fourth that I'm quite familiar with is -- is one developed by Dagmar Etkin, which is used in a number of the National Academy of Science reports.
31500. They all show the same trends which are shown here and that's that there's been a steady and quite dramatic reduction in the number of oil spills since the seventies, but we really concentrate on the continued reduction since 1990.
31501. Nineteen ninety (1990) is when OPA 90 was passed, the *Oil Pollution Act* of 1990 which required a phase in of double-hulled tankers into the United States. In 1992, IMO passed Regulation 13F which required a phase-in of double-hulled tankers in the international fleet, and this pertained to Canada and elsewhere.
31502. That was the beginning of many, many regulatory changes that improved the environmental performance of tankers and we see a steady decline.
31503. Now, during that period from 1990 to 2006, which was the period of time in which the data ---
31504. **MR. TOLLEFSON:** I'm sorry, Madam Chair, but this is not really the question that I asked and I'm wondering if perhaps the witness could be encouraged to try to answer the question.
31505. **THE CHAIRPERSON:** Mr. Tollefson, I wonder if you can repeat the question so that the witness can be reminded again of the content of the question.
31506. **MR. TOLLEFSON:** Right.
31507. **THE CHAIRPERSON:** However, you know, there are times when the witnesses need to provide additional information and it can be helpful to the Panel. So let's have you repeat the question and we'll go from there.
31508. **MR. TOLLEFSON:** What I'd like to do actually is to have Madam Gilbert put up an exhibit please, which is D35-21-1, and it's Adobe 1.
31509. **THE CHAIRPERSON:** Mr. Crowther, did you have a comment?

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31510. **MR. CROWTHER:** No, Madam Chair, other than Mr. Tollefson should be permitting the witness to finish the answer to his question. And I'm -- he interrupted him and the answer was certainly coming and he was providing a complete and thorough answer to the question and I don't think it's helpful to you for Mr. Tollefson to be interrupting him.

31511. **MR. TOLLEFSON:** With respect, Madam Chair, I really couldn't see how in any way it could be conceived that he was answering my question. In fact, I didn't ask him the question. He jumped in, was answering a question on behalf of the witness I was questioning.

31512. So I'm just mindful of the time here and I want us to focus on getting through the questions and having them answered in a direct way.

31513. **THE CHAIRPERSON:** So Mr. Tollefson, would you please restate your question?

31514. **MR. TOLLEFSON:** Well, the question was is he familiar with the term non-accidental structural damage and he said yes and that was the answer that I was looking for and I'm ready to move on to another question.

31515. **MR. CROWTHER:** With respect, Mr. Tollefson, and in fairness to the witness, the implication in your question was that the non-accidental structural failure was an incident type or a source of an oil spill that had not been considered and the witnesses were giving you a thorough answer to your question and I would have thought that that was of considerable assistance to the Panel.

31516. **MR. TOLLEFSON:** I simply asked him if he was familiar with the term. My friend is reading things into a question that simply aren't there.

31517. **THE CHAIRPERSON:** Mr. Michel, did you have any final comments in answer to the particular question that Mr. Tollefson asked?

31518. **MR. KEITH MICHEL:** Yes, I do. I -- again, I was explaining that there's been a steady reduction in spills and the most dramatic reduction is in the terms of foundering and structural damage.

31519. In fact, there has not been a single double-hulled tanker that's foundered since 1990. There are only five incidents of double-hulled tankers that

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have had a collision of grounding that's penetrated the cargo tanks. There are none -- isn't a single incident of a significant spill from the double-hulled tanker from structural damage.

31520. **MR. MICHAEL COWDELL:** If -- if I could just add that we -- we did discuss this too in an IR response which is in Exhibit B38-9, page 71, and we -- we were asked if we -- about non-accidental structural failures and we -- we discussed exactly what Mr. Michel just talked about, that they're very rare occurrences with estimated return periods in the order of 400,000 years which is very difficult to -- to estimate given the very rare occurrences.

31521. **MR. TOLLEFSON:** So if we could go to -- yes, and I see that the document is now up -- was up. Please, the one that I was hoping to get to a minute ago.

31522. So this document is the CFN response to Northern Gateway IR Number 1 and I'd like to -- that just identifies the document. That's page 1, and I'd like to go to 26 in the document now which is where we see further reference to NASF.

31523. And you can see, Mr. Brandsaeter, that here the Proponent is asked to have produced a report authored -- co-authored by Professor Papanikolaou et al. of -- that is a conference proceeding paper. I'm wondering, sir, if you're familiar with this paper?

--- (A short pause/Courte pause)

31524. **MR. AUDUN BRANDSAETER:** I'm not familiar myself with that paper but my colleague, Mr. Michel is, so...

31525. **MR. TOLLEFSON:** Very good then. Perhaps I can ask some questions about the paper. Can we go to ---

31526. **MR. KEITH MICHEL:** Just -- I'd like to add that I haven't read this specific paper but I'm quite familiar with Dr. Papanikolaou's work in the area of tanker statistics and especially relating to Aframax tankers which I think that paper dealt with.

31527. **MR. TOLLEFSON:** So you're familiar, sir, that he is the Chair of Ship Design and Maritime Transport at the School of Naval Architecture and

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Marine Engineering at the National Technical University of Athens? Do you know that sir?

31528. **MR. KEITH MICHEL:** Yes, I've lectured at his classes on this particular subject.
31529. **MR. TOLLEFSON:** Very good. Well, that will be helpful. So can we go to -- the report is in evidence as a result of it being requested by the Proponent of CFN. And I want to go into the document now and I'd like to go to Adobe 31-32, bottom of 31 and into 32, down to sampling.
31530. So would you agree with me, Mr. Michel, that here at the -- maybe we could just zoom in a little at 3.2.
31531. To paraphrase -- and I'll give you a chance to look at what he describes as his methodology. But what he is looking at in this study are the various incident types that can lead to an undesired event which is the loss of watertight integrity, LOWI. And if we just flip over the page, Madam Gilbert, you can see that he depicts in Figure 7, six categories of accidents that could potentially lead to ship's loss of watertight integrity and to accidental oil pollution.
31532. And he states these as being -- these events are collision, contact, grounding, fire, explosion and NASF. And you can see in the diagram, sir, that those are all identified as being incidents that can lead to LOWI and they are highlighted accordingly.
31533. Now, do you agree with Professor Papanikolaou's approach?
31534. **MR. KEITH MICHEL:** Excuse me. Yeah, it's six different casualty types and in the QRA collision and contact, often called elision, were combined into a single casualty type. Grounding is a casualty type often split between drift and power grounding but that's correct. Fire and explosion were combined into one. And as mentioned, foundering or structural damage was considered in the QRA.
31535. There have, in fact, been numerous examples of foundering that have resulted in the loss of tankers over the last 30 years. Every single -- and those have been the -- by far the biggest spills that have occurred. Every one of those was a single-hulled tanker.

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31536. Thank you.
31537. **MR. TOLLEFSON:** Now, back to the QRA. In the QRA, the category, "Hull or Machinery Damage" is not included as one of the incident types and I would suggest to you that Papanikolaou includes NASF as a category of hull or machinery damage; would you agree?
31538. **MR. AUDUN BRANDSAETER:** I certainly agree that that type of structural failures have to be included and those are included as the founderingings.
31539. So as Mr. Michel just said, combining fire and explosions, that is one group; grounding, second group; contact collisions, third group, and founderingings, the last one. So those are exactly the ones included in the QRA. They're just not called hull and machinery failures but they are separated out, the serious ones, as founderingings.
31540. **MR. TOLLEFSON:** Could we go, Madam Gilbert, to Adobe 30?
31541. I just want to clarify what classes of tanker that Professor Papanikolaou was looking at and you can see there that he looks at five classes. For the purposes of this application, we're concerned with Aframax, Suezmax, and VLCC; is that right?
31542. **MR. AUDUN BRANDSAETER:** Those are the types that has been included, the typical ones for the project, yes.
31543. **MR. TOLLEFSON:** And you would agree that that same excerpt indicates that one of the two databases that Professor Papanikolaou looked at was once again, the Lloyd's Registry. You would agree with that?
31544. **MR. KEITH MICHEL:** Yes, that's correct. He did use the LRF database as part of his collection of data.
31545. **MR. TOLLEFSON:** Right. And it's a fairly current sampling. He's sampling until the end of 2008. Would you agree with me? That's fairly recent data, there isn't much more recent data around than that.
31546. **MR. KEITH MICHEL:** There was data through 2012. In fact, ITOPF just printed its 2012 dataset. The Anderson/LaBelle dataset is through

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- 2011 and Lloyd's Register database is updated constantly, but the 2008 data is a good indication; spills continue to decline as they have for the last 40 years. Since 2008 -- in fact, quite remarkably, 2012 saw zero large spills but it is a reasonable date to use.
31547. **MR. TOLLEFSON:** Thank you for that.
31548. I would like to go to Adobe 32, please, next. And it's below -- it's just below that diagram we were just looking at. So yes, that's the Table 1 that I want to touch on just briefly.
31549. So I want to flag once again that here, according to the data that Papanikolaou is looking at, he identifies as 18 -- in 18 percent of the cases -- the number of accidents that he looks at, 18 percent of those are attributable to NASF.
31550. And would you agree with me on that basis that he's making a finding that is consistent with your understanding, Mr. Michel, of the rate of NASF in that kind of fleet?
31551. **MR. KEITH MICHEL:** What you're looking at here is the number of accidents and I've been discussing the number of oil spills. This is correct; there have been structural damage in 18 percent of the total statistics in the Lloyd's Register database. In this case I think it was Aframax tankers, I'm not sure. But it's an appropriate number.
31552. That structural damage that insurers have to pay for involves structure, it doesn't involve an oil spill. In fact, I've gone through statistics in the last couple of months trying to develop the significant spills from double-hulled tankers. I sent it to Dr. Apostolos Papanikolaou to ask his comments on it. He confirmed he didn't have any other spill statistics. It did not include any spills from foundering or structural damage.
31553. What I found were five spills from collision and grounding and in double-hulled tankers -- seven more spills from double-hulled tankers involving the bunker tanks of those ships, the fuel oil tanks. There were five spills from cargo tanks, seven from fuel oil tanks, and three more spills of significance from operations in the terminal. And I sent that to him and asked him if he could build upon that and he said that was what his database had.
31554. So again, if you speak spills, it's quite a different number because

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- double-hulled tankers have that second line of defence. If there's structural damage, and it's usually in the form of fatigue cracks that occur between a cargo tank and a ballast tank, it's detected, the ballast is not dumped overboard and the fractures are repaired. These are small fractures. There have not been any major failures of double-hulled tankers.
31555. **MR. MICHAEL COWDELL:** I just want to highlight another aspect that Mr. Michel was talking about earlier. And that's just the period that we're looking at here of 1990 to 2008, and, you know, we talked a lot about yesterday about the underreporting of incidents and that it -- well it was not explicitly stated in the QRA.
31556. We're talking about other incident types here, but you know, again, just if we could go back to B23-9, Adobe 14-15, I'd ask Mr. Michel just to talk a bit about this. But the incidents over the period of -- maybe if we could just go to the next page, page 15.
31557. And I'll let Mr. Brandsaeter and Mr. Michel talk about this, but I don't want the Panel to be left with the impression that the QRA underestimates the incident or spill frequencies for the project traffic in the future.
31558. **MR. KEITH MICHEL:** In fact, quite the contrary. I believe that the methodology that's utilized by DNV in the QRA is very conservative and in fact overestimates the number of incidents. There -- as I've discussed, there's been a steady decline in oil spills, and you see it here in the number of oil spills.
31559. And to be fair, these should be non-dimentionalized by the number of tankers. The number of tankers have increased over this period and yet the spills are dramatically dropping.
31560. If we take the period from 1990 to 2006, this 17-year period in which the average data was used by DNV for this risk assessment, and we compare it to the trend line value, and it's a very clean fit if you put an exponential curve through this data, and it doesn't matter whether you put it through the large spills, which is the lower curve, the medium size, which is the upper curve, or the LaBelle/Anderson data, which is for crude oil spills, the curves fit very well and they all say the same thing; that if you look at 2012 data, where the trend line is today, and you compare it to the average from 1990 to 2006 we're conservative by a factor of three; that the average value in the number of spills is more than three times higher than the trend line value in 2012.

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31561. And there are many, many reasons for that and I touched on a few of them earlier. But we're very confident that that trend line steadily has come down and will continue to come down in the future, because there is many of these regulations are just coming into force that will continue to improve the number of tanker spills.
31562. **MR. TOLLEFSON:** Mr. Michel, if I could get you to talk a little bit more about the Papanikolaou article that would be helpful. I do have a question about that if we could put that back up.
31563. **THE CHAIRPERSON:** Please proceed with your question, Mr. Tollefson.
31564. **MR. TOLLEFSON:** Yes. So I'd like to go to Adobe 34 in the Papanikolaou article. She has it. It is a little problematic to be working in a document and be taken out of it but I won't ---
31565. **THE CHAIRPERSON:** We're here to test the evidence and so we need to travel throughout the evidence ---
31566. **MR. TOLLEFSON:** Very good.
31567. **THE CHAIRPERSON:** --- as is required, Mr. Tollefson.
31568. **MR. TOLLEFSON:** I understand. Do you need the document number again -- okay.
31569. Well let's try and get through the Papanikolaou article. Is that something we can work together on? It's D35-21-1.
31570. **THE CHAIRPERSON:** Mr. Tollefson, just to be clear, if the witnesses need to refer to another part of the evidence in order to answer your questions we'll need to go there to make sure ---
31571. **MR. TOLLEFSON:** Oh, of course.
31572. **THE CHAIRPERSON:** --- that the Panel has the full information required.

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31573. **MR. TOLLEFSON:** Absolutely.
31574. **THE CHAIRPERSON:** So I would suggest you keep your references handy so you can take us back after the answers to the questions ---
31575. **MR. TOLLEFSON:** Very good.
31576. **THE CHAIRPERSON:** --- to where you want to be.
31577. **MR. TOLLEFSON:** Yes. All right. So Adobe 34, please. And yes, the next paragraph down from that please.
31578. So, Mr. Michel, he's -- Papanikolaou et al are talking about the data for 1990 to 2008. So that's the reference. For the same period, casualty reports, referring to environmental pollution were investigated. In total he reports 102 accidents were reported leading to an environmental pollution by an oil spill.
31579. **THE CHAIRPERSON:** Mr. Tollefson, I just remind you that this is in evidence, so there's no need to read it. If you could just direct the witnesses ---
31580. **MR. TOLLEFSON:** Very good.
31581. **THE CHAIRPERSON:** --- to the passage and then go straight to your question please.
31582. **MR. TOLLEFSON:** I want -- I want Mr. Michel to indicate whether he agrees with the finding here that in this category of environmental pollution by oil spill, that NASF is by far the largest contributor, being the cause in 37 percent of the cases and much higher than by collision or grounding. Do you agree with that conclusion and do you agree that that conclusion flows from the data here?
31583. **MR. KEITH MICHEL:** What I -- let's see -- I'd like to bring another document up but I'm not sure. But I can speak to it actually.
31584. Yes, I do agree that over the period of time from 1990 to 2008 or 2006 the preponderance of oil spills has been due to foundering, to structural failures that resulted in large oil spills.
31585. These -- the vast majority of these have been in open ocean areas and every one of them has been a single-hulled tanker. Double-hulled tankers have

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not had the consequence of foundering. And there's many reasons for that; double-hulled tankers have increased structural redundancy; they have multiple longitudinal bulkheads; they have extra structure. There are many reasons why there have not been structural failures.

31586. Furthermore, during the -- since 2000 there's been major efforts -- the structural failures, by the way, are generally the result of extensive corrosion of surfaces leading to failure, and some of these structural failures were ships that were never coated, the Erica being an example of that, and other structural failures were ones involving coatings that had become dramatically deteriorated.

31587. And for that reason IMO passed regulations that now, for new ships, require a very high grade of coating in the cargo tanks, and starting in 2013 coatings for the top and bottom of cargo tanks, although I must say ship owners are doing that already, they have the same interest in maintaining their ships and not having to replace steel. So as a result, not only those single-hulled failures even, are mostly in the past.

31588. And again as we move into the double-hulled fleet which is subject to higher coating levels and a much enhanced inspection regime that went into effect in recent years, there are no -- none of these structural failures occurring anymore. That doesn't mean one couldn't happen in the future but it's going to be a very rare event.

31589. **MR. JOHN CARRUTHERS:** I think it also goes to the announcement that the federal government made that they're going to increase Transport Canada's oversight and enforcement capacity by equipping marine safety inspectors with the tools to enforce compliance.

31590. And they also talk about tanker inspections, that the number of inspections will increase to ensure that all foreign tankers are inspected on their first visit to Canada and annually thereafter to ensure they comply with rules and regulations, especially with respect to double-hulls.

31591. **MR. TOLLEFSON:** Mr. Michel, I do have a follow-up. In this article Professor Papanikolaou projects into the future, looking at the relationship between tanker age and accidents.

31592. And we'll get into that in a minute, but would you agree as a general proposition that since 1990 the tendency has been to build double-hulled tankers,

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that single-hulled tankers are becoming a thing of the past and represent likely around 5 percent of the fleet of tankers at this point world-wide?

31593. **MR. KEITH MICHEL:** Since 1990 there have been no single-hulled tankers built. Once OPA '90 was passed, it was not economically viable to build a single-hulled tanker and they've all been double-hulled tankers.

31594. The period of time that was used in the QRA, from 1990 to 2006, the weighted average of the number of double-hulled tankers during that time was approximately 40 percent. So about 60 percent of those ships were single-hulled tanker on a weighted average over that time.

31595. As I mentioned previously, a vast majority of the spill incidents have been from the single-hulled tankers. In fact only 5 collisions, groundings, were able to -- were cases where both the outer hull and the inner hull were penetrated and in all five of those cases only one tank was -- one cargo tank was penetrated.

31596. So the double hulls have had not only the effect of reducing the number of incidents because it's less likely for penetrations to reach the oil but they've also significantly reduced the size of oil spills.

31597. You know, if you look at, over that period of time, the number of spills have gone down by an annualized rate of almost 7 percent per year. The spilled volume has gone down by an annual rate of over 11 percent per year. In other words, not only are we dramatically reducing the number of spills from tankers even though the number of tankers are increasing, but we're also dramatically reducing the size of those spills.

31598. **MR. TOLLEFSON:** Can we go down in the article and canvass this issue of tanker age and spills?

31599. So that -- Figure 12 simply depicts the statistics that we've been talking about in terms of NASF and oil spills. And then if we could just carry on down, Madam Gilbert, a little bit further, there.

31600. Okay. So I want to canvas this with you, Mr. Michel. According to his analysis of the data, Professor Papanikolaou concludes that about 78 percent of all NASF accidents are reported for ships older than 10 years. And that is 10 years as of the date of the data that he's looking at which is 2008 data. Would you agree with me?

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31601. **MR. KEITH MICHEL:** Well I think that he was looking at data over a period of time from 1990 through 2008.
31602. **MR. TOLLEFSON:** So with the 10 years you would read into that could be -- some component of that could be single-hulled tankers?
31603. **MR. KEITH MICHEL:** Oh, a significant proponent of that is single-hulled tankers and I think a majority of that is single-hulled tankers.
31604. And again, as I mentioned, there have been a number of incidents over the last 15 years of foundering of single-hulled tankers due to failure to coat the tanks or improper coating and that has led the International Maritime Organization to put in a very rigorous inspection regime.
31605. This now requires that tankers initially have an up close visual inspection of all tanks every five years but after 10 years it goes to every two and a half years you have to have that up close visual inspection plus thickness gauging. And if in the two and a half year interval intermediate survey it's found that coating is not in good condition then you have to start inspecting every year.
31606. And these requirements have been put into effect by IMO, with the intent of reducing the number of accidents that are due to structural failure. And this increased enhanced inspection has been very effective.
31607. **MR. TOLLEFSON:** If we could just carry on in that quotation and maybe I could get you to comment on the next portion of Papanikolaou's finding. And I think that is found at the top of the page there.
31608. So what he observes from this data is something kind of interesting. He says remarkably that -- and I'll just paraphrase in interest of time -- that the frequency decreases for the older ships. In other words that the -- his finding is that the ships that have the worst performance -- and if we could go down to the chart there to show what I'm talking about, it's the grey chart.
31609. The ships that are showing the worst performance are those between -- of a vintage between 11 and 15 years. And his observation is that therefore one ought not to necessarily conclude that older ships are going to be less prone to structural failure.

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31610. Would you agree with that conclusion?

--- (A short pause/Courte pause)

31611. **MR. KEITH MICHEL:** Well, I have my theories on why this is occurring and I can speak to some of it. Again, the ships -- this was during a period of time from 1990 to 2008 and most of the ships that fell in this older age group, 11 to 15, 16 to 20, these were single-hulled tankers. Some of these were not properly maintained. Also, it is much easier to inspect a double-hulled tanker than a single-hulled tanker.

31612. A number of regulations have been put into effect for double-hulled tankers, particularly the regulation dealing with permanent means of access which means that every portion of the ballast tank and critical portions of the cargo oil tanks can be inspected close up. That means a surveyor can get within 20 feet of that and can reach it with a ladder. That's not possible with single-hulled tankers. And I feel that the blip in the data in the middle years will even out over time.

31613. I do believe that there is, overall, an increase in the number of incidents, both structural fractures and machinery type failures, in older ships. But that can be significantly mitigated if ships are well maintained and for that reason Northern Gateway on this project is implementing a tanker acceptance program with a -- you know -- a special interest in assuring that the vessels throughout their life, when they're applied to this Project, will be well maintained.

31614. **MR. MICHAEL COWDELL:** And could we bring up -- could the Regulatory Officer please bring up Exhibit E09-06-15?

31615. Sorry, could we go to Adobe page 15?

31616. Is that -- sorry, yeah, if -- if we could just scroll down, sorry. Yeah, right -- right there on -- on paragraph 45.

31617. I just want to note that it's not just Northern Gateway and -- and the tanker acceptance program that -- that takes into account older -- older vessels, it's also Transport Canada and the Port State Control inspections that they carry out.

31618. And as we can see from line 45:

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“...vessels more than 12 years old undergo an expanded inspection of the overall condition of the vessel...”

31619. So there’s actually two -- two layers: there’s the Port State Control Inspection by Transport Canada and, then, our Tanker Acceptance Program on top of that with the -- the CAP inspection that Mr. Michel just discussed for vessels over 15 years of age.
31620. **MR. JOHN CARRUTHERS:** I think some that we’ve found through advice from our experts is that Northern Gateway will require tankers of 15 to 20 years require further CAP inspection to ensure their structural integrity.
31621. And maybe, Mr. Michel, you could speak to that in terms of what we’re planning?
31622. **MR. KEITH MICHEL:** Yeah.
31623. In the -- this effort by Northern Gateway to pursue best practice, there are a couple of the oil majors that, in fact, require a CAP inspection for ships over 15 years of age and what they require is that a CAP 1 or 2 level of performance is met.
31624. Now, CAP is a voluntary program that ship owners can subject their ships to where a very thorough inspection is done of the structure and machinery and structurally it includes both thickness measurements and also analysis of the ship.
31625. And these surveys are conducted by an independent third party -- generally, a classification society such as the American Bureau of Shipping, Lloyd’s Register or -- or DNV -- and a CAP number is -- is assigned. CAP 1 is equivalent to new building. The ship is in pristine condition. CAP 2 is good condition. CAP 3 is fair and 4 is poor.
31626. And Northern Gateway, by requiring that ships over 15 years of age will be either CAP 1 or CAP 2, is assuring that these ships will have a very high level of structural integrity and maintenance and we believe that will assure that these perform as younger ships do.
31627. **MR. TOLLEFSON:** Thank you, Mr. Michel.

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31628. Could I go back to the Papanikolaou article where we were looking a minute ago? I want to look at the table we were looking at that shows that spike in terms of accidents leading to oil spills in that interval, 11 to 15.

31629. I simply want to ask Mr. Brandsaeter if he can explain what those lines are that appear above the bars, the blue bars?

31630. Do you know what those lines represent, sir?

--- (A short pause/Courte pause)

31631. **MR. AUDUN BRANDSAETER:** From the description just below the -- the figure it is -- that's their respective 95 percent confidence interval. But there's no way I can tell you how he arrived at those numbers.

31632. **MR. TOLLEFSON:** All right.

31633. And why is it important, when you're doing an analysis, to depict a -- to calculate and depict a confidence interval?

31634. Why is that an important step in the analysis?

--- (A short pause/Courte pause)

31635. **MR. AUDUN BRANDSAETER:** Confidence intervals here will typically indicate the reliability of the data that Papanikolaou used in this study ut from that I ---

31636. **MR. TOLLEFSON:** And if ---

31637. **MR. AUDUM BRANDSAETER:** --- cannot tell you why Mr. Papanikolaou or Dr. Papanikolaou presented this.

31638. **MR. TOLLEFSON:** But, when dealing with numbers as a statistician, it's important to do a confidence interval because it helps you to -- to determine the reliability of the data; is that right?

31639. **MR. KEITH MICHEL:** In risk assessment, we -- we study reliability of data in a number of different ways.

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31640. We'll do uncertainty analysis and we'll account for that uncertainty. We'll also do sensitivity studies which is another way to approach it in which we increase the balance of our assumptions to the outer balance of what we expect and we see the impacts of that.
31641. Just filling out the whole picture here, you know, I assumed this is Dr. Papanikolaou's best estimate of -- of the range of accuracy and I think it's consistent with my own experience with oil spill data. For instance, a -- an often referenced report on oil spill inputs into the oceans is the National Academy of Science 2005 Study, I believe, called "Oil in the Sea III" and the National Academy collects experts and produces these reports on behalf of the U.S. government. And that particular report, I -- I was a member of that committee as were a number of other experts including a number from Canada, Environment Canada -- and we looked at data in uncertainty ranges extensively in that work.
31642. And our determination on oil spill data of -- with the national data sets and international data sets was that the reliability was approximately 25 percent, plus or minus. And with our -- our best estimate, actually, I -- I don't mean -- we took our best estimate at 25 percent above the reported values and then we had a reliability bound about that.
31643. And so this is consistent with those numbers and -- and I believe it's correct that, you know, again as we discussed yesterday, data is under-reported. The number of incidents are significantly under-reported. I -- I think it's about a ratio of 2:1, about 50 percent.
31644. But the QRA uses the number of incidents only to get the proportions of groundings to collisions to fire and explosion -- the relative percentages. It uses the probability of an oil spill, the conditional probability to get the likelihood of spills which is really what we're interested in here, a return period of spills.
31645. And there the data is much more reliable and I believe it's the -- the 25 percent range.
31646. And that's really the key here on how DNV assure the conservative nature of this analysis. The oil spill data is the basic input that's utilized. I believe as the National Academy Report put in that that's under-estimated by approximately 25 percent. So you'd want to add 25 percent to those numbers.
31647. DNV did not specifically add the 25 percent. What they did was

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account for it in a different way. They took a very conservative assumption on the likelihood of the oil spills. And again, the way they did that is something we've been talking about this morning.

31648. They used an average value from 1990 to 2006 which overestimates the likelihood of a spill by more than a factor of three. And that was their offsetting assumption that offset the fact that in -- in my opinion and those of many others, the consensus of that committee is that the oil spill data which is the basis for estimating the probability of a spill is probably underreported by a factor of about 1. --- 25 percent -- that it's about 1.25 times the actual number of spills is the real number.

31649. **MR. TOLLEFSON:** Mr. Michel, I just wanted to get a kind of yes or nor answer to this question which is, is -- confidence interval not the gold standard in terms of testing the reliability of data, is it not the gold standard, sir?

31650. **MR. KEITH MICHEL:** No, I don't believe it is. I believe you can go at these sensitivity analyses and achieve the same balance and I've certainly done it both ways myself on studies. Again, the 2005 Oil in the Sea report is a good example where we extensively utilized confidence bounds.

31651. An example of -- my company did a report on the oil cost benefit of using escort tugs and rescue tugs in the Strait of Juan de Fuca for the U.S. Coast Guard. There we used extensive sensitivity analysis. Both of those approaches worked quite well in this regard.

31652. In both cases you have to understand the data, the bounds of your data and take that into account in your analysis. And I personally believe -- I've reviewed the DNV report extensively, I've compared it to high-level of results that I got from the Anderson/LaBelle database and from the ITOPF database, I found it quite consistent. And I believe the conservative consumptions more than offset what I believe is a 25 percent difference in the frequency of spills.

31653. **MR. TOLLEFSON:** Madam Gilbert, could we go to the conclusions of this article, please? I just want to spend a bit of time wrapping this up.

31654. **THE CHAIRPERSON:** Mr. Tollefson, do you have a page number?

31655. **MR. TOLLEFSON:** Yes, Adobe 38.

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31656. **MR. MICHAEL COWDELL:** Just to add to what Mr. Michel was saying to you just so we're all clear. In Chapter 7 of the marine quantitative risk assessment there is a sensitivity analysis and that is something that Northern Gateway was very interested in and DNV completed and it was to look at some of the uncertainties around vessel traffic and other items.

31657. So there is a sensitivity analysis in the QRA as Mr. Michel there has said that is one way that you can look at uncertainty.

31658. **MR. TOLLEFSON:** So if we could just zoom out a little bit so we could see the full paragraph, Madam Gilbert. I want to draw the witnesses' -- yeah that's good.

31659. I want to draw the witnesses' attention to the middle of that paragraph commencing with the words "Presently". And there -- this is, of course, written in 2009, so presently, at that time, 83 percent of the world fleet are double-hull. Is that -- would you agree with Papanikolaou's finding on that?

31660. **MR. MICHAEL COWDELL:** Yes, that's an appropriate number.

31661. **MR. TOLLEFSON:** Okay. And then carrying on, he says that:

"The phase out process has a significant impact on the age structure of the world fleet. And as of 2009, the average age of the double-hulled fleet is ---"

31662. Just going down a little bit there.

"--- six years." (As read)

31663. Would you say that he is accurate in his estimate that it's about six years, sir?

31664. **MR. MICHAEL COWDELL:** Well, I haven't done an analysis as of 2009 so I can't confirm that number.

31665. I would say that there have been a number of factors that have led to the replacement of the tanker fleet. Normally ships -- tankers would have age limits of approximately 25 years. Tankers are built for a design life of 25 years. IMO's gold base standards which sets the overall structural requirements for

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tankers now calls for a 25-year design life. And tankers, that's a reasonable age when tankers are retired.

31666. Sometimes they're retired sooner; in fact, some double-hulls are being retired today at 21, 22 years old -- the ones built immediately after OPA 90. And the reason for that is that there's a surplus of tankers at the moment. There's been a large number of ships built between 2008 and 2011, and therefore there's some early retirements going on.

31667. And -- so there was one surge in tanker buildings because of the passage of OPA 90 and the MARPOL 13F double-hulled requirements but that was a phase in over 15 years. So it was a surge but not a tremendous surge.

31668. There was a surge again in 2008 or '07 when there was a shortage of tankers. And this is typical of ship construction. It runs in cycles and when demand exceeds supply there's a lot of new buildings and there tends to eventually be an oversupply and then you have a period when there aren't ships built, you know, while the demand catches up with the supply. It's very typical.

31669. And so what's happened here is we had a bit of an upturn in the early 1990s and then we had a significant jump in -- between 2008 to really 2011. And today the number of tanker orders is very low because of the fact that there is this oversupply that's working its way up. Whether the six years is right, I don't know but it ---

31670. **MR. TOLLEFSON:** Okay.

31671. **MR. MICHAEL COWDELL:** --- it -- varies from time to time.

31672. **MR. TOLLEFSON:** Now -- well, let's look at the -- I think the last sentence of that paragraph is the one that I think is of most interest here. He's predicting, because of this changing age structure, that in the near future that the typical age-dependant accidents -- and he considers those to be mainly NASF -- should occur in the near future scarcely, whereas, it may be expected that will become significant after about 2020.

31673. So what he is predicting, sir, is that there will be NASF failures with these double-hulled tankers and that we'll start seeing them in a significant number after 2020; do you agree?

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31674. **MR. MICHAEL COWDELL:** I don't agree at all. I strongly disagree with him on that item. And as I said, there are many reasons that double-hulled tankers will not follow the same trends as single-hulled tankers.
31675. You have to be very careful just looking at statistics. And you have to consider what else is going around -- on around all this and there has been a large number of regulatory changes that will ensure that double-hulled tankers will not undergo the same number of -- and type of structural failures and foundering that single-hulled tankers have endured.
31676. And the data is proving that; we haven't seen one. And there are -- the ones built in the early 1990s now are 20 years -- approaching 20 years, a little older than 20 years and we are not seeing these type of failures.
31677. And again, going over some of those regulatory changes, it includes the fact that the structural requirements of the classification societies have been upgraded. They were improved for double-hulled tankers in the early 1990s. In 2006, there was a major rewrite to the structural standards now called the common structural rules. Prior to that, each class society had its own set of rules.
31678. Now there's one internet -- one international set of structural rules and that will ensure there's no competition between class societies for lower scantlings. That was a very good piece of progress that occurred.
31679. In 2010, IMO adopted these gold based standards, those are wrapped over the top -- I think they're very good addition to safety. I was the expert that served on the IMO panel and I really believe it's -- again, will help improve the safety of the ships. I think the biggest single regulatory improvement was this enhanced inspection system that I discussed earlier. And then, very important are these requirements for coatings today.
31680. So I think with all those layers of regulatory requirements, and with the increased diligence of port state -- and I certainly support what Canada is now doing with this enhanced port state control, the U.S. has similar programs, Europe, Japan and I think everything is working together to make sure this does not happen. And I don't agree with Professor Papanikolaou on his conclusion.
31681. **MR. TOLLEFSON:** There is one other part of his conclusion. I'm guessing, just guessing, you'll disagree with as well.

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31682. It's Adobe 39. If we could look at that, it's just at the top of the page. And if I could, Madam Chair, I'd just like to -- it's not long. I'd just like to read it so that we're clear.

31683. Here, he's -- maybe I'll paraphrase it -- here, he's referencing again the fact that there is a changing age structure in these tankers and that he talks about, in terms of double-hull, it's a low-age structure of the world fleet which is in effect of the phase-out of single-hulls.

31684. So he predicts an increase in NASF accident frequency will be observed within and after the next decade. And then he goes on to say this:

"It is remarkable, however, that already some very young double-hulled ships, zero to five years..."

31685. And this is from his data set:

"...suffer surprising of NASF accidents, a clear warning for the quality of some of the recent new buildings." (As read)

31686. Now, maybe you do agree with this but I would like to get your view.

31687. **MR. KEITH MICHEL:** First, I think it's helpful to understand structural failures of ships and it's useful to categorize it into a few different types of failures.

31688. One is a -- either design or construction shortcoming and that could be a misalignment of plating, it could be simply that a scant lane, which is the thickness of plate, was designed too small and it will fracture early in the life of the ship. And those are the fractures that occur zero to five years.

31689. Then, you have fatigue fractures and fatigue fractures are damage that occurs due to repetition. A ship at sea over 25 years typically sees 10 to the 8th cycles -- you know, as it goes through waves -- and over that 25 year period. So we design -- when we design for a 25-year fatigue life, which is how we design ships, we ensure with a factor of safety that we don't expect a fatigue failure in -- over the 25 year period.

31690. And if there is -- it can be due to a number of factors, either that the calculations don't fully capture the loads or that there is some residual stress, you

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- could potentially get fatigue failures and they typically occur between 10 and 25 years of age.
31691. And the third category, which is the one that primarily leads to catastrophic loss foundering is corrosion and that is, if the ships are not properly coated or properly maintained, you get failure due to corrosion.
31692. So again, I don't find it surprising that there is some fractures in the zero to five years. Those are where there was a misalignment of a plating or a -- some structural issue and those are corrected and ships go into dry dock and they fix those.
31693. There are some fatigue cracks that are detected usually, as I said, between 10 and 25 years. They tend not to be catastrophic. In the case of single-hulled tankers, they could lead to oil spills. They do not -- very rarely lead to oil spills on a double-hulled tanker because it's generally -- you have that second line of protection.
31694. And as I've said a few times, I do not believe that corrosion and massive structural failure due to corroded plate will occur in the future and that's both because of the enhanced coatings required by IMO but, more importantly, by the enhance survey inspection program that's working well.
31695. **MR. TOLLEFSON:** Do you think, sir, that in light of Papanikolaou's research -- which for the most part you agree with, -- you just disagree with the conclusion that we're looking at significant uptake in terms of NASF or double-hulled tankers.
31696. Otherwise, you agree with his research; is that right?
31697. **MR. KEITH MICHEL:** I think you need to go back through the transcript because I think I -- along the way, I agreed with some of the factors but I think I disagreed with how you were applying them and how -- some of the conclusions in this paper ---
31698. **MR. TOLLEFSON:** That's fair enough.
31699. So we'll let the transcript speak for itself and I guess my closing question on Papanikolaou, sir, is: In light of our discussion today, is it not a little surprising that, in the QRA, there is no discussion of NASF?

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31700. **MR. CROWTHER:** Madam Chair?

31701. With respect, Mr. Tollefson, I believe that's an incorrect characterization of the evidence that we've heard this morning.

31702. **MR. TOLLEFSON:** Well, if I'm incorrect, perhaps someone could show me where in the QRA it discusses NASF.

31703. **MR. AURUN BRANDSAETER:** Well, Mr. Tollefson, as I indicated earlier, the founderings are typically including all NASF.

31704. Those include the disastrous and most serious events related to structural failures and, as we have heard Mr. Michel explain here, those are the ones that primarily would occur to single-hulled tankers but we have included them still because we wouldn't like to disregard the possibility.

31705. So I don't agree with your statement that we haven't included NASF just because we haven't called them by that name but they are included in the founderings, certainly.

31706. **MR. TOLLEFSON:** Very good.

31707. So what I'd like to do now, if I can, is to discuss the plan going forward for this project, which is purporting to adopt a world class standard which is reflected, among other things, in requiring double-hulled tankers and only allowing tankers that are younger than 20 years old to visit Kitimat Terminal.

31708. Can you tell me, sir, what proportion of the world fleet of tankers will not be allowed?

31709. What percentage of the world fleet will not be allowed to Kitimat Terminal because it is more than 20 years old?

31710. **MR. AL FLOTRE:** Before we answer that question, I think there was a very important factor that the Panel should consider regarding the statistics presented on groundings, elisions, and collisions, I guess it were. The statistics that were presented were international statistics and international practice has tankers loaded with oil transiting in heavy traffic areas and near underwater hazards without tug -- assist tug.

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31711. Quite -- in a number of places in the world, they will have one assist tug but I think it's to note when considering those statistics that the Northern Gateway Project will not only have one assist tug but a second assist tug -- high powered tug capable of mitigating, to a great degree, the number of risks of collision, grounding and elision.
31712. **MR. KEITH MICHEL:** And coming back to Mr. Tollefson's question regarding the percentage of ships that might be excluded from Northern Gateway's terminal, I can't put a specific number on it because there is many factors that will come into the ships that are excluded.
31713. Dealing just with the issue of 20 years of age, if you looked at the data today, it would only be about 5 percent of the tankers that are excluded.
31714. If you looked at the data when the Project goes into effect in 10 years from now, it will be a much higher number because, you know, the ships that have been built in the past, the group of double-hulled tankers will become of age. And if you went five years later when all these ships, 2008 and 2011 become 20 years of age, you know, it's going to be even a higher number.
31715. But that's just one item that assures that high quality ships will be calling Kitimat. There's a tanker acceptance program that's being put into effect. There are -- as we mentioned, the CAP 1 and 2 requirements, many ships won't be able to meet that that are 15 to 20 years old.
31716. So I'm not sure it's really material how many ships are excluded, rather that Northern Gateway is ensuring that only high quality vessels will be calling the terminal.
31717. **MR. TOLLEFSON:** Just to recap then, you would agree that presently there is less than 5 percent of tankers operating globally that are older than 20 years?
31718. **MR. MICHAEL COWDELL:** Yes, we have -- we have seen -- seen the aid to questioning that you provided. But again, I don't -- that's only -- the 20-year requirement is only one requirement that Northern Gateway will have as part of its tanker acceptance program. So again, I'm not sure that that's -- that doesn't paint a complete picture; there's additional criteria that have to be met in addition to the 20-year age requirement.

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31719. **MR. TOLLEFSON:** Very good. I will leave to other intervenors to ask questions about those programs. And I think, Madam Chair, I'll move on to another topic.
31720. I would like to now address scaling factors if I could. Perhaps I'll ask Mr. Brandsaeter, as co-author of the QRA, can you please describe to us -- can you tell us a little bit about what a scaling factor is and the significance of scaling factors?
31721. **MR. AUDUN BRANDSAETER:** Regulatory Officer, maybe you could put up Exhibit B23-34, the QRA. You will get the page number quite soon, just a second.
31722. Adobe page 21.
- (A short pause/Courte pause)
31723. **MR. AUDUN BRANDSAETER:** As we based analysis on a wide range of data from the whole world, due to the fact that if we limited it to only local area, it will not be sufficient data to build an analysis on. We need to take local conditions into account and as explained here, that is typically the basis for using the scaling factors. It is to adjust the base frequencies so that we get as good as possible picture of the operation that we are assessing.
31724. Just applying average world-wide data would give us, of course, average world-wide results and wouldn't add much information that could be useful for the assessment of this project. So that's why we apply these scaling factors.
31725. **MR. MICHAEL COWDELL:** Also, as discussed in -- in TERMPOL 3.8, Exhibit B23-9, certain incidents haven't occurred off the B.C. coast or not in a -- in a -- not to a number that you can derive any statistical significance from. So that was one reason to go to the international data and then to get back from the international data to the local conditions, as Mr. Brandsaeter just discussed, you -- you need to apply those scaling factors.
31726. **MR. TOLLEFSON:** That's -- thank you, both of you. That is helpful.

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31727. So I would like to -- since we're in this document, and we'll be in this document for a little while, I'd like to go to Adobe 65, please. And if we could -- yeah, if we could adjust the view so that it would be possible to look at that whole spreadsheet.

31728. So Mr. Brandsaeter, these are the scaling factors that you used to scale the international data so that it would reflect local conditions; is that right?

31729. **MR. AUDUN BRANDSAETER:** That is right, sir, with one small exception, that we in the errata has corrected the -- the number in -- for route segment 8 with regard to powered grounding because due to grounding that was -- the number was disappearing. That should be 0.001 and not 0 as is shown on the -- on this page, but otherwise, that is correct.

31730. **MR. TOLLEFSON:** And so the factors that -- the incident types, sorry, that you looked at were powered grounding, drift grounding, collision and foundering. Is that right? Those are the captions that appear at the top?

31731. **MR. AUDUN BRANDSAETER:** Those are the incident types where scaling factors were applied, yes, as we have discussed earlier, we also have included fire and explosions, but that are typically events that are not much influenced by the local conditions. That's more related to the ship and the time it is in operation, so that's why we are not include the scaling factors for fire and explosions.

31732. **MR. TOLLEFSON:** Thank you.

31733. And sir, just to help us out here, where a number one appears, that means that the local conditions correspond to the international data. There's no difference; is that right?

31734. **MR. AUDUN BRANDSAETER:** That is where we have considered the local conditions not to influence ---

31735. **MR. TOLLEFSON:** Right.

31736. **Mr. AUDUN BRANDSAETER:** --- the probability of an event happening in a way that we needed to adjust it by scaling factors.

31737. **MR. TOLLEFSON:** And a number lower than one, that reflects that

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- the local conditions present less risk than the international data; is that right?
31738. **MR. AUDUN BRANDSAETER:** Could you please repeat it?
31739. **MR. TOLLEFSON:** Sure. So why don't I ask you, what does a number lower than one reflect on that table?
31740. **MR. AUDUN BRANDSAETER:** A number lower than one in this table for each of the -- of the factors would represent a segment and a condition that would cause the probability of an event inside that segment to be lower than the world average and we are for here relating it to probability of incidents per nautical mile sailed.
31741. **MR. TOLLEFSON:** Thank you very much.
31742. So to derive these scaling factors, can you describe the process you undertook, please, in thumbnail, in a short form?
31743. **THE CHAIRPERSON:** I would invite the witnesses to add anything beyond what's already filed on the report, so that we don't repeat the evidence.
31744. **MR. AUDUN BRANDSAETER:** I believe that's fairly thoroughly explained in Chapters 4 and 5 if I'm not wrong, I think it's 4 and 5.
31745. **MR. TOLLEFSON:** That's a good answer and I think I'll take Madam Chair's guidance here.
31746. So let me ask this before we get into that process. So in this section, section 4, it comprehensively describes to the best of DNV's ability, the process that they used to derive these scaling factors. It's an attempt to comprehensively describe the process. Is that right?
31747. **MR. AUDUN BRANDSAETER:** It's an attempt to describe it in an appropriate way, yes. I wouldn't say to the best of DNV's ability. I guess we could elaborate on this for several volumes, as well as weeks and years, so it could definitely be done even more thoroughly. No such analysis will ever be perfect, but of course, yes we have tried to explain it in a way so that it's understandable for those who have a need to use this report, yes.
31748. **MR. TOLLEFSON:** So one of the inputs, one of the early inputs into

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- this process was views from -- collected from experts who met in Vancouver for a day, one day in April of 2009.
31749. Would you agree with me?
31750. **MR. AUDUN BRANDSAETER:** Could you take us to the page, sir, wherever that is described?
31751. **MR. TOLLEFSON:** Sure. That's Adobe 52, and it's just down a little ways further, a little ways further. Okay, there.
31752. **THE CHAIRPERSON:** Again, Mr. Tollefson, the evidence has been adopted by the witnesses. So if you could proceed to questions that test the evidence as opposed to confirming what's on the page that would be very helpful.
31753. **MR. TOLLEFSON:** Very good. I was simply trying to orient the witness but I will try to move to the question, which is that these experts -- and there's some more listed over the page. These experts gave you their views in terms of rankings of hazards for each route segment; is that right?
31754. **MR. AURUN BRANDSAETER:** Yes, that is right. But in addition to that, my colleagues that participated in this meeting of course also took well note of all the input that was given and that was used as the base for establishment of the scaling factors.
31755. And of course, this is also not the start of this process. This is based also on the thorough work that DNV has done in several other similar project previously. So it's based on the long record of experience within our organization.
31756. **MR. TOLLEFSON:** And to be specific, one of the issues discussed, one of the hazards identified was collision due to traffic density; is that right?
31757. We could help you out ---
31758. **MR. AURUN BRANDSAETER:** I ask you to guide us to where in ---
31759. **MR. TOLLEFSON:** Yes, Adobe 53. There is a chart which indicates that for collision with other vessels, there is a variety of causes and

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traffic density is indicated as C3 there. So you'd agree that that was one of the topics of discussion with these experts? They ranked it that particular metric?

31760. **MR. AURUN BRANDSAETER:** Yes, they were asked to give their professional opinion on to what extent these listed in nine different -- or rather to say, during the course of that hazard meeting, they come up together, with the facilitators, that these were elements that should be considered and based on that ranking of hazards.

31761. **MR. TOLLEFSON:** And did DNV have them fill out forms and did that documentation -- was that maintained? Do you have it?

31762. **MR. AURUN BRANDSAETER:** In line with our standard procedure for conducting a hazard workshop like this, the participants were presented with some guidance on how to establish the input and their input was then not taken in by any forms but it was punched into a spreadsheet in that meeting so that everyone in the meeting could see what result that gave. And as such, yes, that was used as input for the further QRA.

31763. **MR. TOLLEFSON:** And does that spreadsheet still exist somewhere?

--- (A short pause/Courte pause)

31764. **MR. AURUN BRANDSAETER:** The results of that spreadsheet is what is presented on the next page, in Figure 4-4 in the report.

31765. **MR. TOLLEFSON:** So we should go there, I think, just to be clear. That's Adobe 55, and that is the table that Mr. Brandsaeter is talking about.

31766. So there is no intervening document, no notations made by any of the individuals? They all agreed exactly with each other in terms of these designations?

31767. **MR. MICHAEL COWDELL:** Perhaps I can just in here and they were -- it was done as a group exercise. They -- detailed comments were not taken and recorded. The process was described to the participants and they were asked to provide some rankings that were inputted into the chart that you see in front of us. I would also add that we had some, I guess, difficulty eliciting their opinion on certain incident types.

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31768. And Mr. Flotre might be able to add a little bit to this but given some of the incident types had not occurred, when we tried to ask them to identify segments where they could -- where a certain hazard might exist or might be higher than another segment, it was hard for them to sometimes quantify that because they were not -- a certain incident type had never happened or they believed that the hazards were so low that it was impossible to make any sort of a relative comparison between the different risks.

31769. You know, one of those, for example, would be traffic. The traffic density is very, very low. I don't know if ---

31770. **MR. TOLLEFSON:** It sounds like to me that this was somewhat of a subjective exercise, not a quantitative exercise; would you agree with that?

31771. **MR. AUDUN BRANDSAETER:** I can certainly agree with that, yes. That is the typical nature of how hazard identification works. We'll not call it subjective but a qualitative assessment by professionals with expertise within the area but it's absolutely correct that in its nature, it's not a quantitative assessment.

31772. **MR. TOLLEFSON:** We could -- I'd like to talk about the next stage in the process. As I understand, it involved interviews with local stakeholders -- and I'll get the page reference for that imminently. Yes, so that's Adobe 34. Sorry, that is Adobe 58. Sorry.

31773. So were -- Mr. Brandsaeter, were you present for those meetings?

31774. **MR. AUDUN BRANDSAETER:** No sir, I wasn't.

31775. **MR. TOLLEFSON:** Okay. Are you aware of what happened at those meetings?

31776. **MR. AUDUN BRANDSAETER:** To some extent, yes.

31777. **MR. TOLLEFSON:** Right, okay. Who identified these stakeholders and what process was used for that identification?

31778. **MR. JOHN CARRUTHERS:** That was part of the discussion we had this week in terms of -- we did propose a working group comprised of Aboriginal, environmental and community organizations to help oversee the

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completion of the QRA. Ten (10) Aboriginal groups, 11 environmental organizations, 2 municipal organizations and 2 federal departments were contacted regarding their interest and capacity to participate in the working group.

31779. **MR. TOLLEFSON:** The hazard working group we're talking about, Mr. Carruthers?

31780. **MR. MICHAEL COWDELL:** The members -- the participating members of the quantitative risk analysis working group assisted us in identifying people that we could meet to complete the local interviews, and those interviews were scheduled by Northern Gateway given DNV's presence over in Norway, and we reached out to people that we felt would have some appropriate level of knowledge of the local waterways.

31781. And I should add that, you know, this step is very much in addition to the meeting that we had in Vancouver with the B.C. coast pilots. And I was present for all the meetings. And, you know, I think a lot of HAZIDs like this probably would have stopped at the B.C. coast pilot interviews but we took the additional step of wanting to go out to the local communities and meet with some of the local users of the waterways just to see whether they had a different perspective than the B.C. coast pilots who guide the type of vessels of the size that we're proposing for the Northern Gateway Project.

31782. And to me, the interesting part from the local interviews, was that a lot of the comments were in alignment. So when the B.C. coast pilots expressed some -- and I should clarify, it wasn't just B.C. coast pilots at the HAZID meeting in the Vancouver there were also some other master mariners who were not B.C. coast pilots.

31783. But the feedback that we got at both meetings -- or actually all three meetings, Vancouver, Prince Rupert and Kitimat, and actually back down in Vancouver again because we met with Seaspan as well -- were all very consistent. So, you know, the need for improved navigation needs in Camano Sound was one piece of information that was consistent. The need to avoid the winter weather in Camano Sound at certain times of the year was another piece of consistent feedback. So it was -- it turned out to be a very useful exercise.

31784. **MR. TOLLEFSON:** Can you give us a little bit more detail as to exactly what happened at each of these meetings? How many people attended? And it's quite oblique, really, the discussion there as to what the feedback was.

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Would you agree?

31785. **MR. MICHAEL COWDELL:** I think we have an IR response that talks about the number of people we spoke to and what groups they were from. We could bring that up if you like.

31786. **MR. TOLLEFSON:** That would be helpful.

--- (A short pause/Courte pause)

31787. **MR. MICHAEL COWDELL:** I think if we bring up Exhibit B43-4, page 2, I think this may -- may answer the question you were asking.

31788. **MR. TOLLEFSON:** So this differs from the other session, in that it says there that each stakeholder was interviewed individually so that there was no element of collaboration or looking for consensus; is that right?

31789. **MR. MICHAEL COWDELL:** Sorry, could you just repeat the last part of your question?

31790. **MR. TOLLEFSON:** Certainly. This is quite different than the other expert process that you were describing, insofar as each of these stakeholders was interviewed individually. Is that right?

31791. **MR. CROWTHER:** Mr. Tollefson, should I understand you to be asking something that's not already appearing on the screen in response to Part A of the information request?

31792. **MR. TOLLEFSON:** I'm just -- I'm just confirming the answer there. If that's the answer it's the answer.

31793. **MR. MICHAEL COWDELL:** Each group -- we had a scheduled meeting time with each group.

31794. **MR. TOLLEFSON:** Okay. I don't see any First Nations, individuals or organizations referenced there. Is that because you did not meet with any First Nations, individuals or organizations?

31795. **MR. MICHAEL COWDELL:** I think you have to go back to the QRA working group process that Northern Gateway went through to understand

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that part of the process.

31796. **MR. TOLLEFSON:** Well, in terms of a developing scaling factors, can you simply confirm that you didn't talk to any First Nations, organizations or individuals?

--- (A short pause/Courte pause)

31797. **MR. MICHAEL COWDELL:** I'm sorry; I'm just trying to find an exhibit here. Just give me one moment.

--- (A short pause/Courte pause)

31798. **MR. JOHN CARRUTHERS:** Maybe we can bring up the IR, what goes back to the groups that we invited to participate, and some chose not to, some -- some did participate, some participated as an observer, and some chose not to participate.

31799. So fundamentally what we're doing we invited them to participate and they may or may not have participated.

31800. **MR. TOLLEFSON:** It appears from that record that they chose not to.

31801. **MR. JOHN CARRUTHERS:** Throughout the process some participated in some aspects and some did not participate. But again, we weren't forcing people to participate, we invited them to participate.

31802. **MR. TOLLEFSON:** If they did participate you'd agree with me that it would be referenced there?

31803. **MR. JOHN CARRUTHERS:** Yes, it would have been a separate category.

31804. **MR. TOLLEFSON:** Thank you.

31805. Is this a good time to take the break, Madam Chair?

31806. **THE CHAIRPERSON:** Yes, thank you for identifying it, Mr. Tollefson.

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31807. Let's be back for 10:30, please.

--- Upon recessing at 10:12 a.m./L'audience est suspendue à 10h12

--- Upon resuming at 10:28 a.m./L'audience est reprise à 10h28

31808. **THE CHAIRPERSON:** Thank you very much, everyone, for being back promptly.

31809. Mr. Tollefson, please continue with your questions.

JOHN CARRUTHERS: Resumed

JERRY ASPLAND: Resumed

JENS BAY: Resumed

AUDUN BRANDSAETER: Resumed

DAVID FISSEL: Resumed

AL FLOTRE: Resumed

KEITH MICHEL: Resumed

STEVEN SCALZO: Resumed

THOMAS WOOD: Resumed

MICHAEL COWDELL: Resumed

HENRIK KOFOED-HANSEN: Resumed

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

31810. **MR. TOLLEFSON:** Thank you.

31811. I think I'll have a question or two for Mr. Cowdell.

31812. Still talking about these meetings with local stakeholders, if we could put that -- the IR that lists the -- that we were looking at just before the break? If we could do that?

31813. **THE CHAIRPERSON:** Mr. Tollefson, do you have the exhibit number?

31814. **MR. TOLLEFSON:** I think Mr. Cowdell put it up, so I don't have the number.

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31815. But it appears to be B43-4.

31816. Very good. Thank you.

31817. I don't see in that list, Mr. Cowdell, any reference to commercial fishermen. Am I missing -- was there discussions with stakeholders from that -- from that community?

--- (A short pause/Courte pause)

31818. **MR. MICHAEL COWDELL:** Yeah, I -- there -- commercial fishermen in terms of how most of us would think about it, no.

31819. There were sport fishing charters that we talked to in -- as part of the interviews, as you can see on the third bullet there, under (b), and they were familiar with the area throughout the Confined Channel Area, which was the area we were primarily interested in.

31820. But again, I'd go back to the fact that, you know, the local interviews were very much in addition to the Hazard ID that we had with a very large group of B.C. Coast pilots and master mariners from B.C. And you know, I might just turn it over to Mr. -- to Captain Flotre to perhaps just explain a little bit more about the knowledge that his colleagues have of not just the Confined Channel Area but also the open water area that we were talking about.

31821. **MR. AL FLOTRE:** Yes, I didn't attend the meeting, but I'm very familiar with the pilots that were attending the meeting and you probably had about 120 years of experience at that meeting in pilots who have piloted a ship throughout the area many, many times.

31822. As a note, I can say that one of those pilots was First Nations.

31823. **MR. TOLLEFSON:** A follow-up on that, by going back to the QRA to Adobe 58, which contains a record of some of the -- yes, exactly.

31824. It says there, Mr. Cowdell, right before the second set of bullets:

*"The main topics of discussion related to:
Exceptional weather conditions [...] along the route
Areas of increased traffic*

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Areas of difficult navigation."

31825. So those -- those were the main topics in all of the interviews, the solo interviews that you did; is that right?

31826. **MR. MICHAEL COWDELL:** We were interested in any feedback the people that we met with had to give us with respect to navigation of vessels in -- along the routes that we propose or anything else they had to add.

31827. It was -- we -- there was no set agenda. We tried to guide them through a process of the concerns we were interested in, but all the comments that they wanted to offer, we were interested in.

31828. **MR. TOLLEFSON:** And did you keep a record of those comments somewhere in a document that's still in existence?

31829. **MR. MICHAEL COWDELL:** Unfortunately, detailed minutes of those meetings were not kept.

31830. But as I said earlier, I was there and, like I said, the feedback that we received was generally quite consistent for the items that we were concerned about.

31831. **MR. TOLLEFSON:** Did you keep non-detailed minutes?

--- (A short pause/Courte pause)

31832. **MR. MICHAEL COWDELL:** I don't -- there is a record provided if we scroll down on page 58. I think that probably summarizes the -- the salient points that came from the interviews.

31833. **MR. TOLLEFSON:** So nothing from those interviews, apart from the bullets listed, was fed into the scaling process?

31834. Those bullets were fed into the scaling process, and nothing more?

31835. **MR. MICHAEL COWDELL:** It's not a definitive list.

31836. DNV was present for all those meetings, not Mr. Brandsaeter, but his colleagues. They sat through all of the meetings and all of the input that was

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received was taken into consideration in their assessment.

31837. But I'd leave it to Mr. Brandsaeter to comment more on how DNV goes about their work. It's not appropriate for me to probably comment on that.

31838. **MR. ANDUN BRANDSAETER:** Yes.

31839. And, in general, I would just like to add that the process followed here with the extensive knowledge of the pilots and the master mariners in the meeting in Vancouver as well as these meetings locally, both in Kitimat and here in Prince Rupert, to a large extent is much, much better than what is normally in the Hazard ID process in most QRAs.

31840. My company do this for a living all the time and we would have been more than satisfied if we had one pilot and one master mariner that we could involve to such a degree that was done here, whereas here we had numerous mariners and pilots with extensive knowledge plus the opportunity to talk to other people with local knowledge.

31841. So we believe that the input we gained here was -- was far better than what we are used to.

31842. **MR. TOLLEFSON:** Can I ask, specifically: Was it raised -- in either your expert consultation or in the meetings with the local stakeholders -- was the concern about a grounding associated with a tanker having to take evasive action to avoid a fishing vessel?

31843. Was that a concern that was raised by anyone at any time?

31844. **MR. CROWTHER:** Mr. Brandsaeter, just before you answer the question, I, for one, am having a little bit of difficulty hearing you, so if you could pull the microphone closer to you, I think that would probably help.

--- (A short pause/Courte pause)

31845. **MR. MICHAEL COWDELL:** Can you just repeat the question?
Thank you.

31846. **MR. TOLLEFSON:** At any time in your consultation with your group of experts or in any of the individual consultations with local stakeholders,

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was the concern raised that an incident could arise by virtue of a tanker having to take evasive action to avoid a fishing vessel?

31847. **MR. MICHAEL COWDELL:** That topic was discussed. The feedback we got from the users of the local waterways that avoiding commercial shipping was not a problem and that people were familiar with the regulations, and that they did not foresee that being an issue.
31848. **MR. TOLLEFSON:** Is that a reference to the first bullet there? Is that where that input is recorded?
31849. **MR. AUDUN BRANDSAETER:** Yes. And as such of course one of the reasons for a vessel grounding would be if it has to deviate from its course in order to avoid collisions with others. But I think Mr. -- Captain Flotre has much more experience than me in how that could be accommodated.
31850. **MR. CHRIS TOLLEFSON:** Can we perhaps bring up an AQ? To make the discussion a little bit more specific I'd like to reference AQ entitled "Hume 2012" at Adobe 1.
31851. Mr. Brandsaeter, are you aware of this incident that happened quite recently here in this harbour? Are you aware of this?
31852. **MR. AUDUN BRANDSAETER:** I have seen ---
31853. **MR. AL FLOTRE:** If I could answer the question for Mr. -- as I am very familiar with the incident and have firsthand knowledge of what occurred.
31854. In the first case, the situation where that incident happened is an area of a very narrow channel and with an 80 degree turn to port. The options that the pilot had on that particular -- was to -- he was in contact with the radio. The radio communications are recorded and the VTS was and he was having difficulty getting the fishing boat to comply with his requests. And it came to a situation where he had two options; run over the fish boat or go aground.
31855. So none of those conditions, with a very limited channel, a sharp turn to port exist on the tanker routes. So comparing this incident with that incident in Prince Rupert is completely -- you know, they don't have the same factors involved.

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31856. **MR. MICHAEL COWDELL:** And just to add to what Mr. Flotre -- Captain Flotre has just been discussing. If you take into account the other risk mitigations that the project has proposed, including the use of escort tugs, land-based radar and others that the chances of something like this repeating are very, very small.
31857. **MR. AUDUN BRANDSAETER:** And of course the -- in any circumstance situations where a large vessel will have to deviate from its course in order not to hit a smaller vessel, that is situations that occurs anywhere else in the world and as such included in the base frequencies we have applied.
31858. But as just mentioned by my colleagues here, the fact that we introduced the risk mitigation by use of the escort tug and the tethered tugs is a very effective measure to mitigate the possibility of that happening.
31859. **MR. TOLLEFSON:** So you do acknowledge that there is a risk of grounding associated with a tanker having to take evasive action to avoid a small vessel? That is a generic risk. Not just one that would occur where there is other navigational issues, it can cause an incident on its own. Would you agree with that?
31860. **MR. AUDUN BRANDSAETER:** That hazard is inherent also in the base frequencies and is events that could possibly happen. However, even more likely other places where the traffic is much more dense than what we will see in these areas where it's generally it's very low traffic.
31861. But as I said, it is taken into account just through the base frequency of the world-wide data which includes such type of events.
31862. **MR. THOMAS WOOD:** Madam Chair, as an ex-tanker Captain with a lot of experience, over 35 years, the situation of meeting fishing boats with tanker traffic, whether or not the tanker is tethered with tugs or is free running, it is something that is encountered and is something that was -- is dealt with by the normal rules and regulations for prevention of collision at sea and good seamanship.
31863. And in the case of the routes that we have, these routes are -- they are wide enough and there is sufficient water for evasive action. Some evasive action may take the course of altering the vessel's course, other evasive action may take the course of reducing speed or slowing down.

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31864. In the case of the mentioned incident there off Prince Rupert, those options were not available to the pilot. They would be in our case.
31865. **MR. TOLLEFSON:** So in that case, that vessel had a pilot, as it required by law, and still the accident occurred. Is that the evidence that you're giving?
31866. **MR. AL FLOTRE:** No, the evidence I'm giving is that the situation that that pilot was in would not occur anywhere on the traffic routes as proposed by Northern Gateway.
31867. Pilots have been dealing with fish boats since time immemorial and in most recent years the lack of fish has greatly reduced the interaction between fish boats and large ships.
31868. But the pilots, a number of years ago when the fishing was still going strong, had a Fishermen's Liaison Committee and established a whole set of protocols where fish boats and pilots would take certain actions. And that protocol -- or those protocols were very successful. And the incidents of interaction between deep ships -- deep water ships and fish boats are minimal.
31869. The best example of this is in the Fraser River where it is a very large fishery, even to this day, and the pilots are piloting ships on the Fraser River are very limited in their channels. They have a -- depending on the draft of the ship they don't have any ability to alter and yet they have managed, while working with the fishermen, to have incident-free transit in the river.
31870. And the main thing that the pilots agreed to was that when the fishery opened for the first 25 hours they would not transit the river and give the fishermen the opportunity to maximize their fishing for the first 24 hours. And after that the fishing starts to peter out and then in return the fishermen agreed to pull up their nets and get out of the way of the ships as they transited the river.
31871. So there are -- we have great experience in dealing with these issues and they are virtually non-existent.
31872. **MR. TOLLEFSON:** Captain Flotre ---
31873. **MR. JOHN CARRUTHERS:** The Fishing Liaison Committee is

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something that the Northern Gateway Project has proposed as a mitigation measure.

31874. **MR. TOLLEFSON:** I'm just curious; Captain Flotre seemed to know a fair bit about this particular incident. Sir, to your knowledge, has the Transportation Safety Board issued a report on this accident yet?

31875. **MR. AL FLOTRE:** Unfortunately that usually takes up to a year. So the answer is no, there's no report out yet.

31876. **MR. TOLLEFSON:** Thank you, sir.

31877. I'd like to go back to the QRA report, which is B23-34, Adobe 65. We've been previously to this table and I'd just like to ask a few follow-up questions.

31878. And I think I'm going to focus on the column which is captioned "K, Traffic Density" the scaling factors for traffic density which appear as part of the collision heading. You'll notice, Mr. Brandsaeter, that the scaling factor for traffic density in segment two is 0.6, whereas the scaling factor for traffic density in segment three is 0.4.

31879. Can you just walk us through how that calculation is made, what it's based on, for both of those numbers, giving us a comparison?

--- (A short pause/Courte pause)

31880. **MR. MICHAEL COWDELL:** Perhaps it would be helpful if we scrolled back up to around Adobe page 32. And I'll let Mr. Brandsaeter talk about the -- this part of the QRA which took traffic estimates from other TERMPOL studies that had -- that were being completed at the time.

31881. **MR. AUDUN BRANDSAETER:** If you'd then scroll up a little bit further so that we can see -- it's the page before in fact. Sorry, maybe I was -- yeah, even a page further up. About this page we will find the table, I think. Two pages more. Sorry. And we need to go to Table 3-2 and 3-3.

31882. Here you can see the traffic that was found in TERMPOL 3.2, as you can see on the top of the table. This indicates the volume of traffic in Wright Sound. We also have similar information from Douglas Channel in this area.

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31883. And based on the known traffic of other vessels in the area and the number of tankers that were assumed to pass in this area, we have estimated this to be from 40 to 60 percent in these two segments.
31884. Though it should be mentioned that this is a scaling factor for the frequency, probability of an event happening is not directly proportional to the traffic density. It would rather be something close to the square. So these figures are most likely still very, very high compared to what we would really see.
31885. The traffic density factor of the order of one would correspond to a passage where you expected to meet approximately five vessels an hour, whereas in this area we have much lower density of traffic than that.
31886. **MR. TOLLEFSON:** That's helpful. I'm curious, though, I mean, there is a difference between the number that's recorded for segment two and segment three. And I'd like to take you to Adobe 74, back in the original document. That's right. Just down from there, table -- yeah, Table 511. Okay.
31887. So there you have recorded, I believe, from what we've discussed, the input from the experts that you consulted as to these various segments. And that input -- would you agree with me that that input is reflected in the comments? Is that right?
31888. **MR. AUDUN BRANDSAETER:** No, sir. The comment here is rather related to -- sorry, this is related to the nature of the area and as well as the traffic.
31889. It's not very detailed, I admit that, but yes it was based on the input from the experts and the assessment of the shots of the area and the input from the table we just saw from -- that was based on TERMPOL 3.2 relating to the traffic from all the vessels in the area.
31890. **MR. TOLLEFSON:** Well, can you help us to understand how based on that comment and any underlying data, how is it that for segment two it's .6, and for segment three it's .4? What's the mathematical basis for that?
- (A short pause/Courte pause)
31891. **MR. AUDUN BRANDSAETER:** There is no direct mathematical

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- relationship there. This is based on a qualitative process, as we discussed earlier this morning.
31892. So the traffic is higher, there's more crossings in segment two where you're crossed in the passage. In the segment three you go out to the -- off the passage. There are also some traffic that could cross under or at least one sharp turn which also could cause it. So this was the result of the expert panel's estimation.
31893. **MR. TOLLEFSON:** So then, given what you've just said, it would be wrong to surmise from the difference between those numbers, that segment two is 50 percent more dense than segment three in terms of traffic?
31894. **MR. AUDUN BRANDSAETER:** As these are qualitatively set, and it's not a direct mathematical formula, you cannot estimate traffic density or relative traffic density based on these numbers.
31895. **MR. AL FLOTRE:** From local knowledge I can give a logical reason why the traffic there is more dense at Wright Sound because there's two other channels introduced, the Grenville Channel to the north and the channel -- the Inside Passage Channel to the south. So you have an area where four channels are feeding into although a wide open area but the traffic is denser because of that.
31896. **MR. THOMAS WOOD:** I could also add that the relevance of segment 2 which is Wright Sound. The figures that were previously shown were an annual traffic of 5,552 vessels which is equal to roughly 15 per hour which transmits to an average daily traffic frequency of 0.6.
31897. **MR. TOLLEFSON:** From that, are you agreeing with Mr. Brandsaeter that this is a somewhat qualitative process or are you suggesting it's a quantitative one, Captain Wood?
31898. **MR. THOMAS WOOD:** Could you repeat the question please? I ---
31899. **MR. TOLLEFSON:** From your intervention, I take it that you were offering a quantitative justification for the numbers, whereas Mr. Brandsaeter, I believe, is suggesting that this is more of a qualitative enterprise. Do you take a different view than Mr. Brandsaeter?
31900. **MR. MICHAEL COWDELL:** I think Mr. Wood was -- Captain

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- Wood was trying to add some context to the discussion that we were having. I think my colleagues to the right, Mr. Brandsaeter and Mr. Michel can talk perhaps a little bit more about that despite the fact that this is titled a quantitative risk analysis, as is the case with any risk analysis, there are qualitative inputs into the risk assessment. And I'd ask perhaps Mr. Michel to comment on that or Mr. Brandsaeter.
31901. **MR. AURUN BRANDSAETER:** I could first briefly mention that of course even though it's a qualitative assessment that sets the number, the quantitative information like the traffic density or the number of vessels that we just saw in the other tables gives very valuable information in that process and of course we don't disregard it.
31902. And if you have numbers of the traffic into areas that are comparable, everything else like, then of course the number of traffic will be a very significant guidance of how to set that scaling factor.
31903. **MR. TOLLEFSON:** I'd like to go back, if I could, to the original table that depicts all of these scaling factors, which is at Adobe 65, please. And if we could zoom in on the data that is depicted under the caption, "Collision". So we'll need to go a little bit further over and maybe we could zoom in actually on, "Collision" there a little bit. Okay, excellent.
31904. I want to understand, Mr. Brandsaeter, the relationship between -- let's take -- we can't see which is segment one anymore. Segment one is the top row there. Is that right -- with numbers in it? Very good.
31905. So we've established that that's segment one and I want to understand the -- how those three numbers; one for traffic density, one for measures, and one for navigational difficulty, how those combine to create a sum under the local scaling factor collision for segment one. How do those three numbers combine, sir?
31906. **MR. AURUN BRANDSAETER:** These are -- those numbers are simply multiplied together to get the total scaling factor. For scaling factors, those are used quantitatively. Even though they are set qualitatively, they are used in order to give a factor to multiply by the base frequency in order to get probability of incidents per nautical mile.
31907. **MR. TOLLEFSON:** Thank you. That's helpful.

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31908. **MR. AURUN BRANDSAETER:** I could just add, if I didn't make that clear. This product of these three factors is the total scaling factor for collision, and of course, as such, not only related to the traffic density but also the other aspects that influence the probability of a collision happening in this area.
31909. **MR. TOLLEFSON:** Thank you. That's helpful.
31910. So could we go to Adobe 74? I know we're bouncing back and forth but I'm interested in this density question. It's Table 5-11 and it's just below where we're looking right now.
31911. So in summary, for all of the segments depicted there, you concluded that -- you used the term "little traffic" as a short-hand for something. What does little traffic mean in a quantitative way? Does it have a quantitative meaning?
31912. **MR. AURUN BRANDSAETER:** It is a relative term, certainly. We have indicated that a factor of one would correspond to world average. And we also indicated that that from other sources have been seen to be of the order of passing or the possibility of intervening with one vessel every 10 to 12 minutes or an average five vessels per hour.
31913. **MR. TOLLEFSON:** And the descriptions offered here, those reflect the work done to produce this QRA during a time period 2009 or early 2010. Would it be fair to say that it's current to 2009 or is it more up to date than that?
31914. **MR. AURUN BRANDSAETER:** As we saw a little bit earlier, the tables from TERMPOL 3.2, those had the dates on it. I can't remember them immediately now but it was from the period before the QRA was filed. That's correct.
31915. **MR. TOLLEFSON:** Would it help you if we went to those TERMPOL references so we could get the date?
31916. **MR. AURUN BRANDSAETER:** Maybe we can get the month and the date if that is important, yes.
31917. **MR. TOLLEFSON:** I would like to know as of what date the descriptions that are offered are current.

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31918. **MR. AURUN BRANDSAETER:** In the TERMPOL 3.2, I know at least that the date for Douglas Channel was taken from 2005, if that is sufficient for you at this time.
31919. **MR. TOLLEFSON:** So shall we proceed on the footing that the data that is described is current to 2005 in this QRA?
31920. **MR. AURUN BRANDSAETER:** The QRA is based on the data that is referred in the QRA, so earlier in it. There's no reason to believe that data not listed here was -- or newer data has been included and that's absolutely true.
31921. **MR. TOLLEFSON:** Thank you.
31922. I'm sure Mr. Brandsaeter and others on the panel are well aware that over the last year or so, there have been many announcements about development in this part of British Columbia around LNG facilities, five in the regulatory process. Are you aware about those announcements, sir?
31923. **MR. MICHAEL COWDELL:** Yeah, we are aware of those announcements.
31924. **MR. TOLLEFSON:** And have you been monitoring them and trying to determine their impact in terms of traffic density going forward?
- (A short pause/Courte pause)
31925. **MR. AUDUN BRANDSAETER:** We included the project that was known at the time of doing the QRA and we also did a sensitivity analysis to take account of possible additional ones.
31926. So to some extent, we have but, of course, the information that has become available after we prepared our analysis that was, unfortunately, not possible for us to take into account.
31927. **MR. MICHAEL COWDELL:** If we could bring up Exhibit B23-3, Adobe page 108?
31928. The sensitivity analysis in the QRA was -- that's in Chapter 7 of the QRA -- refers back to this table and I guess one of the -- there's a couple of important notes to make in the sensitivity analysis that we did undertake for future

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projects that were known at the time that the QRA was completed. The Merrill Lynch/Teekay project has been cancelled.

31929. The base traffic that we've been talking about for the last -- since the break is -- includes traffic to the Eurocan Marine Terminal which also ceased operations.
31930. So even in the time since the QRA was completed, what we -- the projects that we did know about, some of them have been cancelled and some of the existing marine terminal operations that were in place have ceased operations.
31931. And maybe it would be helpful, actually, if we just jump to -- back to the QRA in B23-34, Adobe page 112 and we can look at how this was incorporated into the QRA.
31932. **MR. AUDUN BRANDSAETER:** And then, the correlation probability -- correlation frequency was assessed -- or sensitivity related to this was assessed in two ways, both with regard to increased traffic to and from the terminal in the Northern Gateway Project as well as increase in general traffic which is what we can see as a result of in this table that is on the screen just now.
31933. **MR. TOLLEFSON:** So when you did the analysis, as Mr. Cowdell has indicated, the Kitimat LNG Project that was on the radar, that was kind of taken into account.
31934. Is that right?
31935. **MR. MICHAEL COWDELL:** Yes, that's correct.
31936. We -- I think we just looked at that table.
31937. **MR. TOLLEFSON:** Yeah.
31938. But in terms of LNG development and by virtue of when you were doing the QRA, none of the other developments that are pending, none of them have been taken into account?
31939. **MR. KEITH MICHEL:** I think it's important to take this in context to how this study was done.

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31940. You can do a risk assessment in one of two ways looking forward. One approach is what was done here: a point in time at the time that the risk assessment was done, best available data was utilized to do a risk assessment and determine probabilities. And it was assumed that that would be constant over the 50-year period.
31941. The other approach you can take is to estimate the change in traffic over that 50-year period and then you have the challenge you need to both evaluate the change in traffic and the change in operations and regulatory approach that might reduce the likelihood of collisions in this case.
31942. And you can go at it both ways and, depending on the project, you know, my company that's done many of these, we've done it both ways. We tend to try to map out the future and we never go to 50 years, that's impossible. But if we're going out 20 years, if it's international shipping, you can often estimate the change in traffic by basing it on the change in expected GDP and overall traffic. It's more difficult on smaller projects to estimate that so we tend to analyze a point in time -- which was done here, the date that the QRA was carried out -- and assume it's constant over the project.
31943. I have always found, in hindsight, that that's a very conservative assumption because the increases in traffic and other factors are always -- in every project that I've worked on over 40 years that I've been doing this -- in each case it's been outweighed by the improvements that have occurred in ship design and ship operation in local factors such as vessel traffic systems and navigational -- that all tends to reduce the likelihood of accidents and that gets better all the time.
31944. We have ECTUS today, we have ISM, International Ship Management, which improves operations, We have many things that have been added and we have many regulations, as I discussed earlier, that have just been put in place and are just beginning to reap benefits and there'll be many more. Shipping is a continuous improvement process.
31945. And so in this case, no, these future projects, which may or may not occur, were not included in the analysis. It was a point in time analysis but with the recognition that traffic will increase in the future but, also, ships will improve in their operational performance, their environmental performance.
31946. **MR. JOHN CARRUTHERS:** I think one of the best examples we have of that is the Government of Canada has proposed amendments to the

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Canadian Shipping Act to strengthen ship-sourced oil spill prevention and response, introduced new requirements for oil handling facilities and established new offences for the contravention of pollution prevention provisions in Canadian waters, including administrative monetary penalties.

31947. And it goes on to some of their aspects of, again, they will look to strengthen Canada's tanker safety system through tanker inspections; the number of inspections will increase to ensure that all foreign tankers are inspected on the first visit; they'll review existing pillage and tug escort requirements to see what will be needed in the future; more points will be designated for traffic control measures starting with Kitimat ---
31948. **MR. TOLLEFSON:** Madam Chair ---
31949. **MR. JOHN CARRUTHERS:** --- and the Canadian Coast Guard will ensure a system of ---
31950. **MR. TOLLEFSON:** --- somewhat facetiously, but could I just get a ruling here?
31951. **MR. JOHN CARRUTHERS:** --- aids to navigation of comprised of buoys, lights and other devices to warn ---
31952. **MR. TOLLEFSON:** Mr. Carruthers ---
31953. **MR. JOHN CARRUTHERS:** --- of obstructions and to warrant location of preferred ---
31954. **MR. TOLLEFSON:** --- seems to be reading into the record ---
31955. **MR. JOHN CARRUTHERS:** --- shipping routes, it's ---
31956. **MR. TOLLEFSON:** --- what you've directed shouldn't be on the record.
31957. **THE CHAIRPERSON:** Mr. Tollefson, first of all, one person speaking at a time, please.
31958. **MR. TOLLEFSON:** Yeah, I just wanted to get a ruling on that before we finished.

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31959. **THE CHAIRPERSON:** Mr. Carruthers, are you finished?

--- (No response/Aucune réponse)

31960. **THE CHAIRPERSON:** Mr. Tollefson, did you have something you wanted to bring up?

31961. **MR. TOLLEFSON:** Well, I just wasn't sure how that related, honestly, to the question.

31962. But I'm happy to, if Mr. Carruthers considers that it's relevant, to move on to my next question.

31963. **MR. MICHAEL COWDELL:** I think just to add to the last question too that, you know, we are aware of the planned projects for the area.

31964. I think there's a lot of -- there's been a lot of announcements over the last year or slightly more. It seems unlikely that all those projects would go ahead. If they did go ahead, you know, from our assessment, we're talking about it's still a very, very small increase to the total amount of shipping on the B.C. Coast or the B.C. North Coast; somewhere in the range of another ship-a-day to Kitimat and perhaps another few ships in the -- two to four ships in the Prince Rupert MCTS area.

31965. And I think Captain Flotre could just add a couple of comments to that just to put the context of current traffic on the B.C. North Coast in context with the traffic levels on the B.C. South Coast, which is also carried out very, very safely.

31966. **MR. AL FLOTRE:** I had two points that I'd like to make and the first was to reinforce what -- that navigation equipment and instruments have improved in the last 10 years tremendously and has virtually taken the surprise out of traffic situations.

31967. For example, if you're coming to a corner, in the old days, you'd come around the corner and you could be faced with a situation that you didn't know anything about.

31968. Presently, ships have an AIS system, Automatic Information System,

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where they are broadcasting their course, their speed and their present position on a continuous basis probably every 10 seconds. So any vessel within 50 miles or of VHF radio range can see that ship and where it's going and what it's doing.

31969. In addition, they have -- the VTS system is greatly improved and will be improved in these tanker routes here to have shore-based radars where they can warn the ship that's coming of concentrations of fish boats which may or may not have the AIS information.
31970. So in the modern-day age of navigation, there are -- the surprise has been taken out of traffic situations.
31971. And the other situation I wanted to -- or the other point I wanted to make was the present traffic situation in the North Coast area or the Triple Island pilot station, they have slightly more than 900 boardings and disembarkings of pilots, so that would be that many movements of deep sea waters through the Triple Island pilot station. The -- that is compared to -- in making a comparison to Brotchie or Victoria where there are slightly over 6,000 embarkations and boardings of pilots.
31972. So even if these proposed installations all came to pass, the traffic volumes in the North would -- wouldn't reach anything near what there is in Victoria.
31973. Now, Victoria, every ship that arrives in Victoria -- except for a minor few that go into the Gulf Islands or the about 200 cruise ship calls at Victoria Harbour -- but the rest of the ships go past the position at East Point where the channel narrows to one mile and where the currents are much stronger than anything you would see in the inland waters or the confined waters up, you know, in the Kitimat proposed routes.
31974. So those transits in and out of Vancouver from Victoria and to the other ports are completed with no traffic-related incidents, so that any accidents or -- that have happened with ships are not related to dealing with other traffic.
31975. So I would -- well, I'd like to say that I -- in my opinion, this proposed installations of -- on the Kitimat area and the Prince Rupert area, although are going to increase the traffic, easily can be handled with the modern navigation and the skill of the pilots in the area.

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31976. **MR. TOLLEFSON:** Thank you, sir.
31977. So I want to go back to the two projects that have now got export -- federal export licences. One is the project -- the Kitimat LNG Project that is part of the analysis done in the QRA. The other one is a much larger project.
31978. Would you agree with me, more than double the size of the Kitimat LNG, and that's the LNG Canada project?
31979. Mr. Cowdell?
31980. **THE CHAIRPERSON:** Mr. Tollefson, if you could just hold that for a minute?
31981. I just want to confirm with the transcripts that we were able to capture all the evidence of the witness that was being presented when we had two people talking over each other.
31982. Okay. So we'll get that reviewed to make sure because we want to make sure that the transcript is clear on all the information that was presented on the record.
31983. So we'll follow up with that and come back after lunch if there's a need to. But with that, Mr. Tollefson, go ahead with your question.
31984. And please, I would ask everybody, one person speaking at a time so that we make sure we capture everything on the transcript.
31985. **MR. TOLLEFSON:** Do you want me to repeat the question, Mr. Cowdell?
31986. Would you agree with me -- are you familiar with the LNG Canada Project and would you agree with me that it is substantially larger and more significant in terms of its impact on tanker traffic than the Kitimat LNG Project that is already part of the analysis here?
- (A short pause/Courte pause)
31987. **MR. MICHAEL COWDELL:** The Canada LNG Project was not proposed at the time we undertook these assessments, and I'm not familiar with all

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the differences between what they're proposing and what Kitimat LNG is proposing.

31988. **MR. TOLLEFSON:** Are you familiar with it to the extent that it has approval to -- its approved capacity is in the neighbourhood of 1.7 billion cubic feet per day up to 5 billion cubic feet per day?

31989. Are you familiar with that aspect of their process and their project?

31990. **MR. MICHAEL COWDELL:** Again, I have not reviewed that project in detail.

31991. **MR. TOLLEFSON:** All right.

31992. And so you can't advise the JRP as to, going forward, what the tanker traffic associated with that project would be?

--- (A short pause/Courte pause)

31993. **MR. MICHAEL COWDELL:** We're generally aware of the scale of project that Canada LNG is proposing and the fact that it could lead to traffic increases beyond what was contemplated in the sensitivity analysis that we've been talking about in the quantitative risk assessment.

31994. However, it still, as we -- as I think I've already said, it's a very small number, perhaps another ship a day, something in that range. So I think from what Captain Flotre has just told us as well, I'm not sure that it's a -- another ship a day coming to Kitimat would be of concern and can be safely managed.

31995. **MR. TOLLEFSON:** The evidence in your possession doesn't really tell you one way or the other how many ships a day are going to be travelling in that area; does it?

31996. You're guessing.

31997. **MR. AL FLOTRE:** I -- from my experience, it would be very hard to make an estimate because one of the first steps of LNG proposal is to have conversation with the pilots to find out what restrictions there are and the B.C. Coast pilots have a stack of proposals, you know, seven or eight inches high and we've yet to see -- both for export and import -- and we've yet to see an LNG

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- project come to fruition. And I'm talking going back almost 30 years.
31998. So it's very hard to make an estimation of what traffic's going to be unless you actually see the proposal start to construct and become operational.
31999. **MR. CROWTHER:** And in fairness to the witness and with respect, Mr. Tollefson, the characterization of "guessing" is uncalled for, especially when you asked him to provide his views on the impact of the potential project on traffic in the area.
32000. **MR. TOLLEFSON:** My point about guessing is that it's not an evidence-based prediction; it's a number that he is offering without any real back-up.
32001. **MR. KEITH MICHEL:** I would like to reiterate an earlier explanation that this is a 50-year project. It is not possible to predict what's going to happen to traffic over that 50-year period. It could go up. It could go down. Likely, it will increase.
32002. Again, experience has shown that ships also improve and you have to pick a point in time and evaluate that point in time. It'll be different tomorrow. It will be different 10 years from now.
32003. But we have lots of experience that the improvements in ship operations outweighs the changes in traffic and you also have the opportunity of adding risk mitigation measures in the future if the environment should significantly change.
32004. **MR. TOLLEFSON:** Well, let's -- maybe we could be a bit more specific here.
32005. At the time of the QRA, you did do a sensitivity analysis with respect to traffic density and that was based upon the assumption that there was a -- a likelihood or a possibility -- I'll leave it to you to -- to put that -- put the right word on it -- but that you used a range of 25 to 50 percent expansion in terms of -- of density.
32006. Can you -- can you tell us what was counted in that 25 to 50 percent estimate?

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32007. What elements were part of that equation?

--- (A short pause/Courte pause)

32008. **MR. AUDUM BRANDSAETER:** Based on the ship traffic that we saw cited from TERMPOL 3.2, we established new scaling factors with -- which was intended to accommodate an increase of 25 to 50 percent.

32009. Independent of what kind of project cost that increase, it was in order to see the effect on the collision risk more than -- more than any specific project that could come to place.

32010. **MR. TOLLEFSON:** In calculating that number -- in coming up with that number, did you notionally count different aspects of growth, different contributors to increased density going forward?

32011. I appreciate the problem of predicting actual numbers but I'm wondering: Did you count cruise ships as a -- as a category in that number, coal exports and so on?

32012. Did you -- did you count all of the various contributors to that density in that calculation?

32013. **MR. MICHAEL COWDELL:** Are you talking about Kitimat specifically or?

32014. We need -- we need to -- when we're talking about increases to traffic, we need to talk about a certain spatial area.

32015. **MR. TOLLEFSON:** Yeah.

32016. Yeah, I think that the 25 to 50 percent is in relation to Kitimat terminal -- calls at Kitimat or in the Kitimat Arm.

32017. And we can direct you to the reference that I'm relying on is at Adobe 112 in the QRA.

32018. If we could just go up a little bit, please?

32019. There is referenced in the last sentence of that paragraph the range of

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25 to 50 percent growth in traffic.

32020. I guess all I'm asking about is: What were the elements that you combined to come up with those numbers?
32021. What were growth drivers here?
32022. And -- and what proportion did they contribute to that 25 to 50 percent?
32023. **MR. MICHAEL COWDELL:** Can -- can you explain what you mean by "growth drivers"?
32024. I'm just having trouble understanding the -- the -- the question.
32025. **MR. TOLLEFSON:** Okay.
32026. Well, what component of that 25 to 50 percent represents increasing exports in coal?
32027. **MR. AUDUN BRANDSAETER:** Nothing increased by 25 to 50 percent, it was a general growth where we wanted to check both effect that would have on the total risk figures rather than referring you to any specific project.
32028. So there was no specific distribution of types of vessels or -- or exact locations.
32029. **MR. TOLLEFSON:** So it was -- it was a general estimate based upon the fact that the region is growing, therefore, we need to factor that in and we'll pick a number, 25 to 50 percent.
32030. Is that right?
32031. **MR. AUDUN BRANDSAETER:** That was an increase we thought, at that point in time, that was relatively realistic.
32032. So that's why we used that number, yes.
32033. **MR. MICHAEL COWDELL:** I -- I don't think any -- anyone at that particular time could have foreseen the -- the increased announcements of LNG

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traffic.

32034. But again, the collision risk is a very small component of the overall risk to -- to tankers transiting to Kitimat and -- and can be mitigated through the -- through the measures that we've -- we've discussed this morning: the AIS and land-based radar and -- and the escort tugs.

32035. It's -- I'm not sure that the -- the one extra ship a day perhaps should be -- be of -- of great concern in the overall discussion that that we -- we were trying to have in the QRA about -- about the hazards and the risk to tanker traffic and the mitigation measures that could be applied.

32036. **MR. AUDUN BRANDSAETER:** It is also quite important that, when we increase the general traffic, we took a count also of a lot of vessels that could cross the routes to and from Kitimat which, of course, with regard to collision, it's -- includes a somewhat higher possibility of -- of collision whereas vessels travelling parallel to and from the same pump doesn't have the same risk of collisions.

32037. **MR. TOLLEFSON:** In terms of baseline data, I'm hoping that you can help us out with respect to both the Kitimat and the Port of Prince Rupert.

32038. As at the time that the QRA was completed, what was the baseline number of tanker calls or large vessel calls to those two ports?

32039. **MR. AUDUN BRANDSAETER:** Could you, please, repeat the question?

32040. **MR. TOLLEFSON:** Thank you. We'll take these one at a time maybe.

32041. What was the baseline number of tanker or large vessel calls to the Port of Kitimat as of the date that you completed the QRA?

32042. **MR. AUDUN BRANDSAETER:** The traffic to and from Kitimat that was included in the -- in the report is -- those we saw earlier and I referred to that -- that was, in fact, numbers from July and October in 2005.

32043. But the knowledge we had at the point when we did the QRA was that -- that was still applicable. And, of course, then we added on the -- the project-

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related traffic.

32044. **MR. TOLLEFSON:** You just -- can you help --

32045. **MR. MICHAEL COWDELL:** If we could go to page 29? Adobe page 29. Yes, it should be the same. It might shed some light on the question being asked I suppose.

32046. **MR. AURUN BRANDSAETER:** Except that it's on the bottom of the page, the table underneath. There you'll see it.

32047. **MR. TOLLEFSON:** So that's Table 3-3. What size of vessels are being described in those totals for July and for October 2005?

--- (A short pause/Courte pause)

32048. **MR. MICHAEL COWDELL:** Sorry, can you just repeat the question one more time? Thank you.

32049. **MR. TOLLEFSON:** Those numbers in bold that say total vessels, 57 for July 2005; 41 for October 2005; can you describe what vessels -- what size of and type of vessels those numbers refer to?

32050. **MR. MICHAEL COWDELL:** So the reason we're struggling a little bit is TERMPOL 3.2 goes over the area traffic in great detail. There's many figures and many tables that explain this all in much greater detail.

32051. The -- I'll ask Mr. Brandsaeter or Mr. Michel to comment here but I mean, for the purpose of the risk assessment, it was simply the total commercial traffic to and from Kitimat that was of interest. And TERMPOL -- the traffic studies that are in TERMPOL 3.2 were provided to DNV for this purpose and as you see, are summarized here.

32052. So we can't be certain what the deadweight tonnage, what type of tankers or ships those are referencing. We have no knowledge of that.

32053. **MR. TOLLEFSON:** Madam Chair, maybe this would be an undertaking situation?

32054. **MR. MICHAEL COWDELL:** Perhaps -- I'm just trying to

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- understand the question. I mean TERMPOL 3.2 speaks to the types of vessels that frequent Kitimat, and Mr. Flotre can elaborate on that some more.
32055. If we go to page 163 of Exhibit B23-3, Adobe page 163.
32056. **THE CHAIRPERSON:** Was the exhibit ---
32057. **MR. MICHAEL COWDELL:** Sorry, sorry. Sorry, B23 -- B023-03. You can see the historical record of vessels coming to and from Kitimat and I think we've already talked about the time period of traffic that we were looking at. So...
32058. **MR. AL FLOTRE:** I can speak to the types of vessels that called at Kitimat. The size of vessels that called there were limited by the berths. The Alcan smelter berth was quite shallow and they would -- vessels calling there would be in the neighbourhood of 25,000 deadweight tonnage. The berth at Auselot, later called Methanex, was built for small parcel tankers and when the methanol export ceased the import of condensate tankers started but they again were limited by the size of the berth.
32059. At Eurocan, again, 25 to 40,000 deadweight tonne ships came because they were specifically forest product carriers and that's the size of vessel that are in that trade. So none of the vessels would be in excess of probably 40,000 tonnes deadweight.
32060. **MR. TOLLEFSON:** Thank you, Captain Flotre.
32061. We had a look at the District of Kitimat website which reports that currently -- and it does confirm the deadweight tonnage that you're talking about it. Currently they are having 200 -- between 250 and 300 calls by vessels between 40,000 and 50,000 DWT. Does that sound like the right numbers to you?
32062. **MR. AL FLOTRE:** Absolutely not.
32063. **MR. TOLLEFSON:** That does not correspond to ---
32064. **MR. AL FLOTRE:** No, no. There'd be the odd vessel that may reach 40,000 deadweight tonne but there certainly wouldn't be that number between 40,000 and 50,000.

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32065. **MR. MICHAEL COWDELL:** Okay. Exhibit B23-6, Adobe page 11, Table 2-1, actually talks about the largest vessel calling at Kitimat and the largest vessel on record is 50,000 DWT, just for clarity.
32066. **MR. TOLLEFSON:** Can we then agree that while you've looked at Kitimat Port, you've not done the same detail of analysis with respect of the Port of Prince Rupert; is that right?
32067. **MR. MICHAEL COWDELL:** I'm not sure what you're asking. Prince Rupert traffic was taken into account in TERMPOL 3.2.
32068. **MR. TOLLEFSON:** All right. So can you help us to understand what the baseline number was for Prince Rupert, the Port of Prince Rupert in terms of calls on an annual basis?
- (A short pause/Courte pause)
32069. **MR. AUDUN BRANDSAETER:** With the proposed tanker routes we didn't look specifically to the traffic into Prince Rupert as we are not going into Prince Rupert.
32070. But the areas of the routes bear traffic to and from Prince Rupert might cross the tanker routes from Kitimat, they're still relatively wide and open areas so they have therefore estimated a scaling factor of the order of .2 taking account both of the traffic to Prince Rupert and also all the traffic in that area.
32071. We haven't -- with regard to the QRA, we didn't go further into the details of the traffic to and from Prince Rupert.
32072. **MR. TOLLEFSON:** Thank you.
32073. **MR. MICHAEL COWDELL:** And just to put it in perspective, I mean, when we looked -- we did look at Prince Rupert and the project traffic at the current levels was only -- the increase from Northern Gateway is only 3 percent of the overall reporting traffic in the Prince Rupert MCTS area.
32074. And again, like we talked about, even if the other projects came to fruition it's still a very small increase in the total traffic reporting to Prince Rupert MCTS.

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32075. **MR. TOLLEFSON:** I'd like to move to the next topic which is return periods. If we could go to -- and that's dealt with at Adobe 106, please, in that same QRA. And I think -- yes, exactly. That's where we want to be.
32076. Mr. Brandsaeter, the formula that appears there -- and maybe we could zoom in a little bit on the formula -- this is the equation that is used to calculate a spill return period; is that correct?
32077. **MR. AUDUN BRANDSAETER:** Yes, that is the formula used.
32078. **MR. CHRIS TOLLEFSON:** And can you please briefly walk us through the equation?
32079. **MR. AUDUN BRANDSAETER:** The frequency is the inverse of the return period. And I search the part of the formula inside the brackets is the calculation of the frequency. And there you have the frequency of accident types in a segment. You multiply that -- sorry. I should mention that that is per nautical mile, in that segment.
32080. You multiply that by the distance sailed within that same segment for each passing and then you multiply it by the number of sailings in the segment.
32081. And then -- then also as it states here, D is the conditional probability of a release of cargo given an accident in that segment.
32082. **MR. TOLLEFSON:** Thank you.
32083. Yesterday in your testimony you agreed with the findings of Psarros and others that in the Lloyd's Registry the degree of underreporting with respect to incidents could be in the neighbourhood of 70 percent.
32084. And you, at the same time, indicated that while that wasn't explicitly taken into account that it was taken into account in your view through overestimating the conditional probabilities; you remember that evidence?
32085. **MR. AUDUN BRANDSAETER:** Both that we use conditional probabilities estimated based on the total number of spills that has been recorded rather than the frequency of events or incidents.
32086. And in addition, as we discussed this morning, we also know that

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there's a significant conservatism related to the fact that we use an average frequency over the time period all the way from 1990 through to 2006, whereas the turn line is very clearly pointing downwards.

32087. So as such, I agree that numbers in the database is most certainly underreported but still I don't agree that the numbers we use here and then we take these factors into account gives us a too low number.

32088. **MR. TOLLEFSON:** Thank you.

32089. I want to just be absolutely clear on how you are interpreting -- well how -- I guess I want to be clear on what your evidence is and perhaps it would be helpful to put up the transcript from yesterday. Volume 155, paragraph 31437, please?

32090. So at the latter part of that paragraph you say that:

“...conditional probabilities of spills would then correct automatically for the difference in the underreporting between spills and incident frequencies.”

32091. Sir, I just need to understand exactly how do you correct for underreporting of up to 70 percent? How do you -- how do you fix that defect in the data through conditional probabilities?

--- (A short pause/Courte pause)

32092. **MR. AUDUN BRANDSAETER:** If the date on this -- have more reliable reporting of spill -- spills than incidents, which we believe they have, and all work we have done indicates that that is the case, even though they may also be underreported to some extent. Then we take the ratio between the spills and -- spills reported and incidents reported and use that as the conditional probability of a spill given an incident.

32093. Then when we multiply those together we will be in line with the spills that has been reported rather than the incidents, so we will have -- the effect on the reporting from the spills will still be there, but effect on reporting of the incident, which is definitely higher, that will no longer come into account.

32094. **MR. TOLLEFSON:** So when you say ---

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32095. **MR. KEITH MICHEL:** Maybe -- you know, I could help by reiterating what we discussed this morning.
32096. Again, I believe that the under-reporting of incidents may be off by a factor of two. They may be half of what the actual number of incidents are. But we believe the underreporting of spills is closer to 25 percent. And so this now brings the underreporting influence down to 25 percent or so.
32097. And as was explained, that then was applied against the 1990 to 2006 data, which we think overestimates the probability of the spill by a factor of three.
32098. **MR. TOLLEFSON:** Sir, none of the articles that we looked at for Lloyd's Registry indicated that reporting was at the 75 percent level if you're talking about a 25 percent error. So maybe I'm misunderstanding your evidence or what you just said, sir.
32099. But yesterday, pretty much all of the research indicates that the outer limit for reporting was 30 percent in the Lloyd's Register. Are you saying that those articles are wrong?
32100. **MR. KEITH MICHEL:** Those articles referred to the probability of an incident. That incident could be a wide range of incidents. It could be a minor grounding that scraped a hull and caused some damage to the hull. It could have been a grounding that penetrated the hull.
32101. If it was a double-hulled tanker, it could have been a very severe condition where a grounding penetrated the -- both the inner and outer hulls. In fact, that hasn't happened since 1990, but it could have been that.
32102. So the -- there's a wide range of accidents that are included in the Lloyd's Register database, and those are underreported. I think the more accurate of the two papers that we looked at yesterday is the one that compares the Lloyd's Register to the seven flag state or national rather than just Norway because that's -- it is an international database. And that one suggests that it's about a 50 percent underreporting.
32103. And yet -- so it's the best database, and it says that it's available for looking at accidents world-wide, but it probably underreports by about 50 percent.

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32104. As I explained earlier, we are quite certain that oil spills are not underreported to that degree. And I've compared the various databases. They're quite consistent. ITOPF, especially when you deal with medium and large spills, they specifically said they -- it's quite reliable, the spill data. The -- and that's been collected since 1970. The other database that's widely noted is the Anderson/LaBelle database.
32105. When the National Academies did its Oil in the Sea study, I was -- it's a proprietary database, but they gave me a copy of it. And at the time, I went through every single spill in that database. And that database collects spills of crude oil over 1,000 barrels in size.
32106. I went through every one of those, compared it to the international databases, both Lloyd's Register and the -- and national ones, especially the U.S. and Canada. I was able to get very good data from both those places.
32107. In Cheryl Anderson's database, I was only able to find two spills that were not included, so that I'm very certain the databases that are large spills or spills of significant size are very reliably developed. And therefore, I think my estimate of underreporting for oil spills of 25 percent is quite conservative. In fact, I'm quite certain that the actual underreporting by volume is much less than that.
32108. **MR. TOLLEFSON:** I'm still trying to figure out what it means when you say, Mr. Brandsaeter, that there will be an automatic correction by virtue of essentially over-estimating conditional probability. If we could just run through that one more time.
32109. **MR. AUDUN BRANDSAETER:** It's simply the method that you take the number of oil spills, record it, divide it by the number of incidents recorded. Then you compensate for that difference in underreporting.
32110. **MR. TOLLEFSON:** And to be more -- can you give a bit more of a specific answer to that, like how do you decide how to compensate accordingly? How does the math work?
32111. **MR. KEITH MICHEL:** Maybe I can try to help. It's exactly as was explained here. You have a number -- number of spills and you divide that by the number of accidents, and you have a conditional probability.

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32112. **MR. TOLLEFSON:** Yeah.
32113. **MR. KEITH MICHEL:** If you multiply that by the number of accidents, then you have the number of spills, which is the number of spills in the database. So now your baseline is the number of spills.
32114. So again, the QRA went back to accident level so it could have the most data possible and know the percentages of accidents that are related to groundings, to collisions, et cetera, but when it determined the probability of a spill, that's based on the spill data, the number of spills in the database.
32115. **MR. TOLLEFSON:** We did talk earlier about confidence intervals as being one way to test the reliability of conclusions of data.
32116. You agree with me that in this QRA, Mr. Brandsaeter, you chose not to use confidence intervals. That's -- is that correct?
32117. **MR. MICHAEL COWDELL:** I think we may have already answered this question earlier when we -- when Mr. Brandsaeter and Mr. Michel answered and we talked about the sensitivity analysis.
32118. **MR. TOLLEFSON:** Yeah. Well, let's -- I just want to be clear on the record that there's no confidence intervals in this entire document that I -- that I can't find. That was a deliberate choice. You didn't use confidence intervals.
32119. **MR. AUDUN BRANDSAETER:** That is correct. There's no confidence intervals calculated and we used the sensitivity analysis to assess these aspects.
- (A short pause/Courte pause)
32120. **MR. TOLLEFSON:** Excuse me. Could we go to B83-4, Adobe 80, please?
32121. I believe I'm looking for Footnote 89, please.
32122. **MR. CROWTHER:** Madam Chair, I presume that Mr. Tollefson understands that this document has not been designated to this Panel.
32123. **MR. TOLLEFSON:** I'm using it for a very, very limited purpose and

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I thank my friend for reminding us of that.

32124. I simply wanted to -- there's a formula there that I was hoping to put to a witness and get the witness to agree that that is the correct way to express a probability of an event over a fixed period of time.

32125. And Mr. Brandsaeter certainly could answer that question.

32126. And we -- and that's the full -- that's the full length of the time that we'll be in this document.

32127. **MR. CROWTHER:** If it's helpful to you, Madam Chair, I don't have an objection if that's the simple question that Mr. Tollefson seeks to ask.

32128. **THE CHAIRPERSON:** Let's proceed.

32129. **MR. TOLLEFSON:** So ---

32130. **MR. CROWTHER:** But perhaps, for the benefit of the witnesses, Mr. Tollefson could restate his question.

32131. **MR. TOLLEFSON:** Yes.

32132. Mr. Brandsaeter, do you see the formula there in Footnote 89?

32133. **MR. CROWTHER:** Is it possible to scroll up to where that comes from just so we have the entire context? Okay, great.

32134. **MR. MICHAEL COWDELL:** Madam Chair, could we consider coming back to this after lunch?

32135. It would give us a chance to read it because we haven't reviewed this document in preparation for these hearings.

32136. **THE CHAIRPERSON:** Let's break now for lunch, Mr. Tollefson, if that meets with your schedule, and we'll come back with the answer to the question.

32137. I believe that Mr. Tollefson was bringing our attention to the -- to just the Footnote. That's the only aspect that ---

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32138. **MR. TOLLEFSON:** Right.
32139. **THE CHAIRPERSON:** --- the question is based on and that's the answer that the Panel would like to receive just on the Footnote.
32140. Mr. Tollefson, can you give us an update, for scheduling purposes, as to where you're at?
32141. You knew I'd ask the question, right?
32142. **MR. TOLLEFSON:** I'm very mindful of it. I'm counting. If I could just take a quick moment here.
32143. I really want to finish today. What time were you intending that we would return; at 1:15?
32144. **THE CHAIRPERSON:** At 1:15, yes.
32145. **MR. TOLLEFSON:** And so were we sitting until 3:30 or 4 o'clock?
32146. Had you decided that?
32147. **THE CHAIRPERSON:** Our normal sitting hours are until 3:30.
32148. **MR. TOLLEFSON:** Okay.
32149. I'll do my level best to try to be finished by 3:30 and, if it gets to 3:30 and we're close, perhaps we could revisit that.
32150. **THE CHAIRPERSON:** Thank you for the update. We just need it for planning purposes ---
32151. **MR. TOLLEFSON:** Yeah.
32152. **THE CHAIRPERSON:** --- so that other parties know when they'll be up to ask questions.
32153. **MR. TOLLEFSON:** Very good, thanks.

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32154. **THE CHAIRPERSON:** So we'll break for lunch and be back at 1:15, please. Thank you.

--- Upon recessing at 12:14 p.m./L'audience est suspendue à 12h14

--- Upon resuming at 1:14 p.m./L'audience est reprise à 13h14

32155. **THE CHAIRPERSON:** Good afternoon. We're ready to get under way again.

32156. Just before we go back to you, Mr. Tollefson, with questions, the Panel is in receipt of a motion from the Michel First Nation stating that they have further questions arising from Northern Gateway's corrections to the transcript for Saturday, 16th of March, 2013, that were made yesterday morning.

32157. The Process Advisory Team has been advised by Michel First Nation that they expect to take less than an hour for these questions. The Panel notes that Northern Gateway has indicated Mr. Carruthers is available to answer any questions arising from these corrections.

32158. Ms. Estep, do you have anything further to add?

32159. **MS. ESTEP:** Thank you, Madam Chair.

32160. Just to be clear, our understanding is that any re-examination would be limited to the corrections only. But on that basis, we have nothing further to add.

32161. **THE CHAIRPERSON:** Thank you. That is the Panel's direction.

32162. The Panel grants Michel First Nation's motion and Panel counsel will communicate the ruling to the Michel First Nation and the Process Advisory Team will assist in scheduling these questions as further follow-up. Thank you.

32163. Are there any preliminary matters that parties wish to raise?

32164. Mr. Tollefson, back to you to continue your questions, please.

JOHN CARRUTHERS: Resumed

JERRY ASPLAND: Resumed

JENS BAY: Resumed

AUDUN BRANDSAETER: Resumed

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DAVID FISSEL: Resumed

AL FLOTRE: Resumed

KEITH MICHEL: Resumed

STEVEN SCALZO: Resumed

THOMAS WOOD: Resumed

MICHAEL COWDELL: Resumed

HENRIK KOFOED-HANSEN: Resumed

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

(Continued/Suite)

32165. **MR. TOLLEFSON:** So, Madam Gilbert, I think it would be useful to put the equation we were looking at before lunch back up, B83-4, Adobe 80. And it's the Footnote that we're -- the formula in the Footnote is the only reason we're here, actually.

32166. So over the lunch period, you've had a look at the formula and would you agree that this formula allows you to convert to express probability in terms of an event over a fixed period of time?

32167. This is the equation that you would use.

32168. **MR. ANDUN BRANDSAETER:** The formula shown in the Footnote gives you the possibility to calculate the probability over a fixed period of time given a fixed annual probability on a given period of time.

32169. **MR. TOLLEFSON:** So it would allow for you or anyone to take a return period, and if you know the length of the project in question, you could use that formula to convert that into a probability over the life of the project; correct?

32170. **MR. ANDUN BRANDSAETER:** Assuming that the annual probability stays fixed and you know the period -- total project period or total project lifetime, yes, you could do that.

32171. **MR. TOLLEFSON:** And that would generate a percentage number, 50 percent, 75, some kind of number less than 100, presumably, that would represent the probability of something happening, a particular event happening within a fixed period of time, say, the life of the project, in this case, 50 years.

32172. Am I right in explaining it that way or putting it that way?

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32173. **MR. KEITH MICHEL:** Well, maybe it's best to put it in context to some of the numbers that we've been talking about.
32174. Again, say you had an average of one spill every 250 years, so a 250-year return period, you can express that spill in a number of different ways. You could express it as a four-tenth of one percent probability of a spill in a given year. That says exactly the same thing.
32175. And those two expressions are the way that risk people normally look at it because it's easy to utilize those numbers to add probabilities and manipulate them as needed. But you could also calculate a spill over a proposed lifetime, assuming that it's constant over that lifetime.
32176. And again, if we take that one in 250-year return period, applying the Poisson distribution that this formula does, you get about a 16 percent probability of a spill over that 50-year life.
32177. And you can look at it in different ways. Myself, I have a hard time thinking of probabilities over 50 years because I don't know, as I said this morning, what's going to happen over those 50 years.
32178. Over the last 33 years the number of spills from tankers is reduced by an order of magnitude, a factor of 10. And yet we've said in the QRA we've conservatively estimated that number and then we've applied a -- if you apply a Poisson distribution, you're assuming it's constant over the life of the project. So it can be done. It's one way to express numbers, and -- but you have to be very careful when you express it in that way over a long period of time.
32179. **MR. TOLLEFSON:** My learned associate here just did the calculation and he came up with 18, but I think I heard you say 16. Is that right?
32180. **MR. KEITH MICHEL:** Well that was my estimate. We could both check our numbers, but it's probably 16 or 18.
32181. **MR. TOLLEFSON:** Okay. But we don't have to resolve that here. But I guess my question is from a layperson -- I appreciate you're a specialist, you're experts, but from a layperson's point of view, is it not more easy -- and perhaps it's hard for you to put yourself in a layperson's shoes. But does it not make more sense, is it not more intuitive to express the risk here in terms of a

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probability over a fixed period of time instead of a return period?

32182. **MR. MICHAEL COWDELL:** I think it's important to note that the QRA was completed as a requirement of Transport Canada's TERMPOL review process, which is outlined in their filed evidence.

32183. The purpose of the QRA was not to complete it for a layperson to read per se. It's quite typical in other risk assessments, marine risk assessments, accepted world-wide and by Transport Canada, for the risk of a spill to be conveyed in a return period or an annual probability.

32184. **MR. KEITH MICHEL:** And as I said previously, if I was going to extend it over 50 years I wouldn't assume that the probabilities are constant over that period of time.

32185. **MR. TOLLEFSON:** We'll leave further discussion of that to another day.

32186. I'd like to, if I can ---

32187. **MR. MICHAEL COWDELL:** I just want to add too that this subject was canvassed quite extensively in the IR response back to the Panel on the use of Poisson distributions and how it -- and applying it to the marine QRA. And just if you can just take one moment, I just want to confirm the -- which IR response that was and which exhibit that was, just for the record, and if you can just give me one second.

--- (A short pause/Courte pause)

32188. **MR. MICHAEL COWDELL:** That was response to JRP IR 11.3, and it's Exhibit B101-2, and it was on Adobe page 8 and 10.

32189. And as Mr. Michel said, I mean, the decrease in spill frequencies is quite substantial. I mean, from the 1970s through the 2000s, just 3.7 percent of the oil spilled world-wide was in the 2000s, over that period. So I think we've talked about that quite a bit already in our response.

32190. **MR. TOLLEFSON:** Very good. I'm happy to move on then.

32191. I want to talk a little bit about mitigation if I could. Would you agree

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that to determine the effectiveness of mitigation techniques on return periods, that you must commence, you must begin with a dataset that involves incidents where no mitigation techniques have been employed? Would you agree with that?

--- (A short pause/Courte pause)

32192. **MR. AUDUN BRANDSAETER:** It's correct that you need at least a base case, whether that is a base case without any mitigation or if it's mitigation that is, for instance, commonly used or something that has been decided to be part of a project, at this selection you can do. But of course then you have to compare or add in the mitigation measures that you want to analyze the effect of. You need one case without and one with those mitigation measures.

32193. When -- for instance, based on a QRA like the one we have here, mitigation measures have been in place for quite some time commonly used on all vessels. Those are, of course, already included in the base case. That's why we have not done sensitivity analysis or introduced additional mitigation measures systems like this because they are partly also in the database that we used from 1990 to 2006, already included, several vessels already had it.

32194. If we had assumed that that was a new type of equipment that wasn't used before then of course we would have overestimated the effect of it and as such we didn't try to do that. So the only mitigation measures we did calculate for was the introduction of tugs, as well as the closed loading system in the terminal, because that are systems that are not widely used.

32195. **MR. TOLLEFSON:** The prevalence of the use of escort tugs, sir, that has increased significantly over the last decade or so. Would you not agree with that?

32196. **MR. MICHAEL COWDELL:** Perhaps Mr. Scalzo would like to comment on that one.

32197. **MR. STEVEN SCALZO:** Yes, tractor tugs have been utilized at many terminal and areas of tanker transit over the last 15 years, even somewhat prior to that, as a primary tool in mitigation or a tool in prevention and also preparedness.

32198. **MR. KEITH MICHEL:** The use of those tugs, though, has really increased only in the last decade, as you say, and the database that the QRA is

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based on is 1990 to 2006, and that provided our probabilities, and escort tugs were not widely used during that period of time.

32199. **MR. TOLLEFSON:** Well, during that period of time -- maybe Mr. Scalzo can address this. During that period of time, in many U.S. ports and waters it was a legal requirement to have an escort tug. Would you not agree with that, sir?
32200. **MR. STEVEN SCALZO:** Yes, in some ports that's the case; back in the mid to late 1970s, by State rule in the State of Washington for tanker transits from Buoy R off Port Angeles, Washington to any waters inland of that.
32201. And then, subsequent to that, both the application of federal regulation to requirements for tractor tug utilization in Prince William Sound and, again, to Puget Sound and then, subsequent to that, a State requirement in California.
32202. Those are the principle areas of regulations affecting the use of escort tugs as a tool in mitigation.
32203. **MR. TOLLEFSON:** So in California, just to be more specific, that requirement applies in San Francisco, in Los Angeles and at Long Beach.
32204. Is that correct?
32205. **MR. STEVEN SCALZO:** Yes.
32206. In California, the primary requirements are for those three areas.
32207. **MR. JERRY ASPLAND:** I'd just like to add, though, that at any port in the State of California that has tankers going in and out of it, it is a State law to have an escort tug, which is determined by a formula as to the size and how many.
32208. **MR. TOLLEFSON:** And, Captain Aspland, are you familiar with the prevalence of use of tugs in other American jurisdictions?
32209. **MR. JERRY ASPLAND:** Yes, somewhat.
32210. Along the West Coast, it's very, very prevalent. I don't think -- but someone can correct me -- but I don't think it's necessary in Oregon but we do have them in Valdez. They are not in Cook Inlet. The State of Washington has

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- them all through the Puget Sound and all California ports and probably -- this is a little bit of an estimate now -- around the world, somewhere around 35 to 40 ports of oil terminals and I'm going to say there's a couple thousand oil terminals around the world.
32211. So it is a new prevalent prevention application of tug technology that we didn't have before and Mr. Scalzo is an expert and a beginner and a pioneer in this particular type of operation.
32212. **MR. STEVEN SCALZO:** I would add to what Captain Aspland said, there are some areas both within the United States and internationally that have voluntarily agreed to the use of escort tugs, again, as a key step in mitigation and in prevention and in preparedness.
32213. **MR. TOLLEFSON:** In that voluntary category, are there numbers that we could put to the prevalence of use of escort tugs on a voluntary footing, globally?
32214. **MR. STEVEN SCALZO:** Yeah, I don't have that at hand but I would say that it's the exception not to have a voluntary system at major port facilities worldwide.
32215. **MR. TOLLEFSON:** Our research indicates there's a voluntary -- voluntary requirements in Norway and in Sweden, in Finland, in Scotland, in England.
32216. And, Mr. Scalzo, are you aware of other jurisdictions that have these voluntary programs in effect as well?
32217. **MR. AL FLOTRE:** If I could just speak to that, we have a voluntary operation in Canada.
32218. The Port of Vancouver regulates that, through the harbour itself and out the First Narrows Bridge or Lions Gate Bridge, they have to have two escort tugs. But the escort down at East Point, travelling to the pilot station, is a voluntary agreement between the pilots and the oil shippers. And the pressure to put that in place was from the oil shippers because they realize the value of the escort tug.
32219. So that is an example of a volunteer escort tug program that's been in

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effect since 1991.

32220. **MR. STEVEN SCALZO:** And let me just add to that, the voluntary programs vary greatly in terms of the requirements and how you would, you know, define what is a tug and escort and the type of tug, the mission of that tug and its requirements.

32221. So I would differentiate between what is required from a regulatory point of view, which tends to be fairly clear in the requirements and in terms of voluntary requirements and what that means for any particular port.

32222. **MR. MICHAEL COWDELL:** I think just -- if we can just go back a moment to what Mr. Michel was talking about a moment ago, the data that the QRA is based on is from a period when tug escorts were not as prevalent worldwide and the mitigation measures that have been applied in the QRA are over a fairly lengthy stretch of near shore waters. That's not typical worldwide.

32223. Yes, tug escorts are used in port and over shorter transits but not over the length of transit that we're considering.

32224. So I think to suggest that somehow tug escorts were somehow built into the base instant frequencies and that they were already applied, I don't think that's a valid suggestion to make and I ---

32225. **MR. TOLLEFSON:** But ---

32226. **MR. CROWTHER:** Mr. Tollefson, let the witness finish, please.

32227. **MR. TOLLEFSON:** Yeah, I'm just -- sorry, I thought he was finished.

32228. **MR. AUDUN BRANDSAETER:** What I wanted to add was that when we estimate the base frequency for grounding or regulation and, in particular, grounding when it comes to the use of escort tugs, the frequency is established on the basis of the number of accidents recorded, which we can agree that there is a certain uncertainty related to.

32229. But it's divided by the number of nautical miles sailed in the areas where grounding is a significant risk.

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32230. Of course, in those areas where the grounding risk is reduced due to the use of tugs, there haven't happened any or at least very few groundings but we don't even take those nautical miles into account when we establish the frequencies. So we'd rather err on the conservative side by assuming those nautical miles sailed without tugs to represent the total exposure for all groundings.
32231. Thank you.
32232. **MR. TOLLEFSON:** So I just have a -- really, a very brief question to wrap this part up which is that, in the QRA, I don't see anywhere where use of escort tugs in comparator data from Lloyd's -- either as a lawful -- as a legal requirement or on a voluntary basis --
32233. I don't see where you've made an adjustment to take into account, to subtract the prevalence of escort tugs from your analysis of mitigation effectiveness.
32234. Am I missing something?
32235. **MR. AUDUN BRANDSAETER:** I think that was just what I tried to explain a minute ago.
32236. **MR. TOLLEFSON:** So I'm not missing anything, there is no adjustment made of the kind I just asked you about?
32237. **MR. CROWTHER:** Mr. Tollefson, with respect, that's not a correct nor fair characterization of the evidence that Mr. Brandsaeter gave.
32238. **MR. TOLLEFSON:** Well, I'm just trying to find out what the answer is and he's referring me back to a previous answer which came before we had a complete discussion of the topic with the rest of the Panel.
32239. So I mean it's -- I'm trying to be completely fair here so that the record reflects what the witness wants it to reflect.
32240. **MR. AUDUN BRANDSAETER:** I'm sorry, it wasn't as much maybe as a minute, just a few seconds. It was the last statement that I had where I said we do not refer the groundings to all nautical miles sailed because there are several nautical miles in open sea waters where there are no shallow straits so

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those would be also irrelevant to consider with regard to groundings.

32241. So in the QRA we have stated that the distances or the fraction of the distance sailed by deep sea vessels, approximately 10 percent with regard to power grounding and 15 percent with regard to drift grounding, are the distances sailed where they are exposed to grounding.

32242. These are numbers that we have also confirmed through numerous analyses that we have done for a total, where we have a very good overview over the total number of nautical miles sailed in different distances from shore. We have identified approximately 8,000 routes they sail every year and we have done this continuously since the mid-nineties so we have fairly good control of how much -- of how large fraction of all nautical miles sailed where a grounding could occur.

32243. And, of course, as I said maybe a couple of minutes ago now, those areas where they use tugs are not in this regard relevant because first of all, if they have -- if there have been any groundings in those areas that would just add to the groundings that we assume in the other areas. So our base frequency would rather be too high than too low with regard to groundings without tug escort.

32244. **MR. TOLLEFSON:** Thank you.

32245. I'd like to talk now about sensitivity analysis. And I'd like to call on Mr. Brandsaeter again, if I could, to just offer us a definition of and a rationale for doing the sensitivity analysis.

--- (A short pause/Courte pause)

32246. **MR. AUDUN BRANDSAETER:** As we have stated in the QRA, we know that there are several qualitative assessment that has been done as basis for the QRA. And we wanted to check the influence of those assessments and therefore we did a sensitivity analysis. So to check out further possibilities not exactly aligned with the first assumptions we had made.

32247. **MR. MICHAEL COWDELL:** Just for the record, if we could bring up B23-34, Adobe page 111. The -- if we can just scroll down there.

32248. That's I think what Mr. Brandsaeter was just talking about, was this particular part of the QRA.

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32249. **MR. TOLLEFSON:** Very good. Thank you.

32250. And so following from that you identified four inputs into the model that you considered were worthy of -- needed to have a sensitivity analysis done and those were, just for the record, scaling factor for grounding, scaling factor for traffic density, number of tanker calls to Kitimat, and you also did one for the length of route segments numbers five and eight. Am I stating that correctly?

32251. **MR. MICHAEL COWDELL:** I think if we scroll down we can see the different sensitivity analyses that were carried out.

32252. **MR. TOLLEFSON:** Did I misstate anything? I'm just trying to be economical with time here.

32253. **MR. AUDUN BRANDSAETER:** I think you have cited ---

32254. **MR. TOLLEFSON:** Thank you.

32255. **MR. AUDUN BRANDSAETER:** --- correctly, yes.

32256. **MR. TOLLEFSON:** Now, are those the only four inputs that today you say justified and continue to merit a sensitivity analysis? Are there no others that it would be worthwhile to do a sensitivity analysis for?

32257. **MR. AUDUN BRANDSAETER:** These were the issues that we found most important, and as such most interesting to see the effect of evaluating the sensitivity, yes.

32258. **MR. TOLLEFSON:** What about the effectiveness of mitigation? We were just talking about that and that -- you'd agree with me that mitigation, especially the tug, that has a very dramatic effect on the return period. So wouldn't it have been prudent to do a sensitivity analysis of the effectiveness of that mitigation technique?

--- (A short pause/Courte pause)

32259. **MR. AUDUN BRANDSAETER:** It could certainly have been done as it could have been done for several other aspects. However, the numbers that we have used have been used widely also in previous analyses we have done and I

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think Mr. Scalzo is the correct man to support further on the effectiveness of tug support.

32260. **MR. TOLLEFSON:** All I'm really interested in is your opinion about the sensitivity analysis. And so from what you've said, you'd agree that it would have yielded some potentially useful information for this JRP? Doing a sensitivity analysis on mitigation effectiveness -- that could have yielded some information that was useful?

32261. **MR. STEVEN SCALZO:** Let me just address the issue you brought up about ---

32262. **MR. TOLLEFSON:** Yeah.

32263. **MR. STEVEN SCALZO:** --- escort tugs. And we talked about the application of escort tugs in some voluntary and some regulatory applications but they are, again, the overall exception to world-wide tanker terminals. There are thousands and thousands of tanker terminals throughout the world and there are only a few world-wide that use, in mitigation, escort tugs.

32264. Now, some of those terminals are the more recent and newer terminals and terminals like what is being proposed by this project. And the application of tractor tugs in this case in a tool of mitigation are specific -- are very specific to the route transit and the matching of the tugs. And the tug's capabilities to the transit route, size and type of tankers was specific to this area.

32265. **MR. TOLLEFSON:** Thank you for that.

32266. **MR. MICHAEL COWDELL:** I think we got to -- just going back to the sensitivity analysis, there's a variety of sensitivity analysis that could have been undertaken here. I think it's fairly obvious that we could have played with a -- not played, that's not the right word -- but changed a variety of scaling factors.

32267. And -- but I think we need to go back and look at the purpose for doing this quantitative risk assessment. The purpose was for the TERMPOL review committee and to identify the hazards to Northern Gateway tanker transits and to look at mitigations that could be applied and that -- that would be effective.

32268. And I think while -- while changing the scaling factors and -- and would -- would change the results and have a proportional effect on -- on the

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- results the return periods, I -- I do not believe that the conclusions that the Project came to in terms of the risk mitigations that should be applied would -- would change.
32269. So in other words, the -- the -- while the results may be sensitive to changes in scaling factors, I do not believe that the conclusions from the risk assessment are -- are sensitive to those changes.
32270. **MR. AUDUN BRANDSAETER:** No, and, as such, I could just add that the typical situation where we would have done a sensitivity analysis of the use of escort tugs was if it was uncertain whether or not effect was so good that the Project would have spent effort to include -- introduce them.
32271. So if there was a discussion whether or not to require escort tug then it would be interesting to see: Well, how large is the effect, in fact, and how is the benefit compared to the cost as the project has decided to introduce them?
32272. I think that additional information from doing a sensitivity, specifically on escort tugs, would be quite limited.
32273. **MR. TOLLEFSON:** But would you not agree with me that you're projecting very significant reductions in the frequency of incidents by using escort and tethered tugs?
32274. And so to test whether your projections, which are in the magnitude of 80 to 90 percent, to test whether those are realistic, wouldn't it have been helpful to provide this JRP with a sensitivity analysis of mitigation effectiveness?
32275. Ultimately, I appreciate that some of you have opinions on these things but it's they who have to make the decision.
32276. **MR. MICHAEL COWDELL:** I think -- Mr. Scalzo can talk to the effectiveness.
32277. I think we do believe the -- they will be as effective as we -- as -- as the QRA says.
32278. **MR. TOLLEFSON:** Well, I want to move on ---
32279. **MS. STEVEN SCALZO:** I'd like to just ---

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32280. **MR. TOLLEFSON:** Okay. Sure.

32281. **MS. STEVEN SCALZO:** --- pick up on that comment.

32282. You know, over the course of recent years, there have been some studies done and probably between six or eight -- maybe a few more -- that have looked at the effectiveness of escort tugs for use with tanker transits and the result of those studies have shown mitigation or reduction in risk anywhere from 68 to 98 percent; and that depends, again, on the area and the location and the application of the tugs.

32283. So most recently, tugs like these tugs proposed for this Project have had significant impact to improve -- to improve the safety and I think that -- I think that, as you look at some of the areas that we talked about earlier, those that are by recent regulation or those that are operating in this area, this region of the West Coast -- Pacific Northwest, there have been no -- there have been no incidents of tanker accidents resulting in any spills.

32284. And I think that speaks well to the system that's in place. I think it speaks well to the application of the studies that were done to show the benefit of escort tugs and mitigation. And I think it supports the kind of the percentages, if you will, of reduced risk mitigation that is in place from those studies.

32285. **MR. TOLLEFSON:** I wonder, Mr. Brandsaeter, you've heard Mr. Scalzo say that his knowledge, his research suggests that, at the lower end, mitigation effectiveness is 68 percent.

32286. Doesn't that suggest to you that a sensitivity analysis might have been useful here?

32287. **THE CHAIRPERSON:** I'd invite Mr. Brandsaeter to add anything additional to what he's already provided on the record in response to the question.

32288. **MR. AUDUN BRANDSAETER:** As I just recently said, I think, if the purpose was to evaluate whether or not to apply the tugs, it could have given additional information.

32289. Trying to apply upper and lower bounds for the effectiveness of the -- of the tugs in the risk assessment as such I think would rather be confusing than

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explanatory.

32290. But as you said -- as we said earlier, yes, it could have been done but that would probably not be done by a sensitivity analysis to the QRA, that would need to be a very detailed tug escort study.

32291. We have done several of those, for instance, for the Norwegian Maritime Authority and that was also partly a basis for -- for the numbers that we used and that we have confidence in.

32292. **MR. KEITH MICHEL:** I think you also have to be careful of applying a -- a wide range of probabilities, as Mr. Scalzo just mentioned, to a particular project.

32293. For instance, escort tugs are very effective in mitigating drift groundings, slightly less effective in power grounding and quite a bit less effective in collisions.

32294. So if the one project that Mr. Scalzo was reporting concerning had a -- where drift grounding was not a major issue and collision was the primary concern, those tugs would be less effective. So again, you have to look at it on a project-by-project basis.

32295. And I'd just like to re-emphasize what was said at -- this type of study is a very conservative study but it really isn't meant to specifically say what the probability of a spill is, it's meant to assess mitigation measures. And, in this manner, it's very effective and the determination was to use what is a very expensive solution which is two escort tugs for laden tankers, one tethered.

32296. If you -- a good example of another study where sensitivity analysis was done of both the probabilities of -- of the escort tug being effective as well as the cost, the true cost benefit was a 1999 study for the U.S. Coast Guard on the Strait of Juan de Fuca. In that case, it was found that the tugs were not justified based on the cost benefit expectations of the Coast Guard and, therefore, a sensitivity analysis was done to see if the high-end numbers were justified. That's where you would carry it out.

32297. And as we said, in this case, the Northern Gateway made the decision that they would go with the tug escorts and it wasn't necessary to pursue it further.

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32298. **MR. TOLLEFSON:** I want to move on from tugs in view of time.

32299. **MR. STEVEN SCALZO:** I'd like to -- I guess I just -- oh, I'm sorry.

32300. **MR. TOLLEFSON:** No. It's ---

32301. **MR. STEVEN SCALZO:** I didn't mean to talk over you. I'm sorry.
I'm not real quick. I'm not very fast on this button.

--- (Laughter/Rires)

32302. **MR. STEVEN SCALZO:** But I just want to further what Mr. Michel
said that it is important to look at these on a case-by-case or individual route --
area and route -- route basis as -- as to the extent of mitigation and it does vary by
the type of risk and the type of location.

32303. And so, what he said is -- is very important as you -- as you do these
analyses.

32304. **MR. TOLLEFSON:** Thank you so much.

32305. So what I want to stay somewhat focussed on is this question of
sensitivity analyses and what inputs into the model, potentially, could have had a
sensitivity analysis done bearing in mind that there were no confidence intervals
done in this and that these -- that these sensitivity analyses are in some senses
from what I understand Mr. Michel to say a substitute for those.

32306. So in relation to under-reporting of incident frequencies, Mr.
Brandsaeter, could -- could it -- could a sensitivity analysis about the under-
reporting of incident frequencies have been done here?

32307. Yeah. You didn't do --

32308. **MR. AUDUN BRANDSAETER:** Could you please repeat?

32309. **MR. TOLLEFSON:** You didn't do a sensitivity analysis of under-
reporting of incident frequencies but you could have done that.

--- (A short pause/Courte pause)

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32310. **MR. AUDUN BRANDSAETER:** Yes, we could have done the sensitivity analysis on base frequency as well. The results are proportional to the frequencies in that respect.
32311. Though, keep in mind the fact that we explained earlier today related to the use of frequencies of spill rather than frequencies of incidents. Though it should be noted that the conclusions drawn from that analysis is fairly robust. It wouldn't have changed the conclusions in the report whether we had added another 25 percent to the frequency. As Mr. Michel indicated, that he expected maybe was related to the underreporting of spills.
32312. **MR. TOLLEFSON:** And just to kind of fill out the picture a little bit, we could go through all the inputs, we could do a sensitivity analysis of the conditional probabilities, we could have done it of the foundering -- you didn't do a sensitivity analysis of foundering. There's a lot of inputs here that could have been run through a sensitivity analysis; would you agree with that?
32313. **MR. MICHAEL COWDELL:** I'm not sure we understand the question there. Is there -- can you be a little bit more specific with that?
32314. **MR. TOLLEFSON:** Well, in general, you agree that for any input into this model you could run a sensitivity analysis to confirm the reliability of the data?
32315. **MR. MICHAEL COWDELL:** I think we already answered that question. We could have done a sensitivity analysis on a variety of factors. We picked the ones that we felt were of interest.
32316. **MR. TOLLEFSON:** All right.
32317. **MR. MICHAEL COWDELL:** The -- but again, we've talked about some of the conservatism in the QRA already, and the fact that we don't believe that the conclusions that we came to, based on the QRA, would change with the changes in the sensitivity analysis.
32318. And I don't know if Mr. Michel has anything to add to that.
32319. **MR. KEITH MICHEL:** Only that it's less interesting to do sensitivity analysis when it proportionately changes the entire result. For

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- instance, you know, we -- if the spill data is underreported by 25 percent it would have reduced, effectively, the return period by 25 percent. The fact that we were conservative because we used 1990 to 2006 data were conservative by a factor of 300 percent, it would have changed the return period by a factor of three. It would have ---
32320. **MR. TOLLEFSON:** Right.
32321. **MR. KEITH MICHEL:** --- gone from 250 years to 750 years.
32322. **MR. TOLLEFSON:** So ---
32323. **MR. KEITH MICHEL:** And so you do sensitivity analysis to add value ---
32324. **MR. TOLLEFSON:** Right.
32325. **MR. KEITH MICHEL:** --- when there's uncertainty that might change your conclusions.
32326. **MR. TOLLEFSON:** But if you accept to a Psarros et al, which claims that the upper end of reporting in Lloyd's Registry is 30 percent -- and I understand you don't accept that number, but if you did accept that number, would you say that a sensitivity analysis should be done?
32327. **MR. KEITH MICHEL:** Well, I go back to everything we've done and said today. First of all, no I don't accept it, but it's not relevant because the QRA is based on the probability of spills. And so the real question is what's the underreporting of spill data.
32328. And as we've said many, many times today, we believe it's -- you know, I believe it's no more than 25 percent, and it would -- any change would be proportional to that number so you don't need to do a sensitivity analysis.
32329. And, you know, I could repeat myself about the factor of three and 300 percent. We absolutely believe this assessment is very conservative and that it provided the data we needed to make determinations on risk assessment. And based on my experience of having done many of these analyses for different projects, worked with many clients, this particular project has more risk mitigation measures in place than I've ever seen. And ---

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32330. **MR. TOLLEFSON:** Can we -- I want to talk about a particular -- maybe this would help us to get to more of a specific picture here.
32331. **THE CHAIRPERSON:** Mr. Tollefson, I just wanted to make sure that Mr. Michel was finished his answer. I think maybe he was just taking a breath.
32332. **MR. KEITH MICHEL:** No, I am complete. Thank you.
32333. **MR. TOLLEFSON:** So ---
32334. **THE CHAIRPERSON:** Okay. Please go ahead with your next question, Mr. Tollefson.
32335. **MR. TOLLEFSON:** Thank you.
32336. So I am curious about the question of tanker mix here, which is -- and I think in that regard I'd like to go to Adobe 116, if I could. And there is a table there at the bottom of the page at 116 that sets out essentially a projection of the mix of tankers that are going to visit the Kitimat Terminal.
32337. And as you can see, they've derived averages for the three different tanker sizes, 50 for VLCC, 120 for Suezmax and 50 for Aframax. And my first question is this; Mr. Brandsaeter, those numbers -- that mix was given to you, you were told to work with that in the RFP for this project; is that right?
32338. **MR. MICHAEL COWDELL:** Can you refer us to where you're picking up on the comment about the RFP?
32339. **MR. TOLLEFSON:** It says in the title -- in the source, RFP 2009.
32340. **MR. MICHAEL COWDELL:** Okay. Thank you.
32341. **MR. TOLLEFSON:** And all I'm trying to confirm is a Proponent gave you that data and you worked with it?
32342. **MR. AUDUN BRANDSAETER:** Ye. The reason for me taking some time before I could answer it was that I was not sure whether it was in the request for proposal or if we had received those data later on through the process.

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32343. But of course the input to the project related to number of tankers, type of tankers, distribution between the different types of tankers. That is information we received from the project, that's nothing DNV has figured out that's for sure.

32344. **MR. TOLLEFSON:** So DNV doesn't know, with any certainty, which tankers are going to visit Kitimat Terminal. But I would put it to the Proponent that they don't know either, unless there's something I'm missing. Where do those numbers come from? If I could put that to Mr. Carruthers perhaps.

32345. **MR. MICHAEL COWDELL:** The information that we see in the table was provided by Northern Gateway to DNV at the time they were completing the risk assessment. It is simply a forecast and it's a forecast that would be subject to change if the project were approved and came to be and dependent on what the markets were at that time.

32346. **MR. TOLLEFSON:** So can you elaborate on that, what kind of changes would influence what -- in a market would influence changes in the tanker mix?

32347. **MR. MICHAEL COWDELL:** It would depend on --- like I just said, on the markets, the length of voyage, the destination, different vessels trade to different areas, and it would be -- it would change based on that information at that time.

32348. **MR. TOLLEFSON:** So it could change by a significant amount?

32349. **MR. MICHAEL COWDELL:** The volume to be carried is fixed. So to say that it would change by a lot I don't believe is correct. It could change. If there was more traffic to Asia, for example, the number of the VLCCs could increase and the total number of tankers calling at Kitimat could actually decrease.

32350. **MR. TOLLEFSON:** The converse is true too. We've done a calculation that I'd like you to check for us. If there are no VLCCs or Suezmax tankers in the mix, if it's just Aframax tankers, the number of tankers that would be needed to call at Kitimat Terminal for each year would be 380. Could you check to see if that's the right number?

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32351. **MR. JOHN CARRUTHERS:** I don't think that would be a realistic scenario at all. The advantages and why we chose Kitimat as a port, is it was capable of handling VLCCs and that's actually an enhancement that the shippers would find quite attractive in terms of the cost advantages of utilization of VLCCs.
32352. We see the market as more of Asia than we would see the western United States and -- but to be conservative we included more vessels. And you had a few -- some degree of the smaller vessels because we don't expect the condensate to use anything other than Suezmax or Aframax so I don't think calculations for Aframax would be relevant for this project.
32353. **MR. TOLLEFSON:** But the numbers can swing upwards if you end up using more Aframax and Suezmax than VLCC tankers that are currently projected; would you agree with that?
32354. **MR. JOHN CARRUTHERS:** The numbers could change but on a practical basis we anticipate, if anything, we'd see greater VLCC use.
32355. **MR. TOLLEFSON:** I would like to go to Adobe 112, please. Now, we've already touched on -- actually I think -- let's see here, yes.
32356. We've touched on the point that I wanted to explore a bit more already and that is this projection of 25 to 50 percent growth which is being deployed here as a sensitivity analysis is that right, Mr. Brandsaeter?
32357. **MR. AUDUN BRANDSAETER:** Yes, that's right. Yes.
32358. **MR. TOLLEFSON:** And in that sensitivity analysis are you including the tankers that we've just been talking about? The tankers that will be deployed to move that product out of Kitimat Terminal in conjunction with this project.
32359. **MR. AUDUN BRANDSAETER:** Not the -- in the sensitivity analysis you see on the page there, no. But in the next section, on the next page, then you will see effect of additional tankers visiting the terminal in Kitimat.
32360. **MR. TOLLEFSON:** So those two sensitivity analysis -- we'll get to the second one in a minute -- those are done independently of each other, you don't integrate into this 25 to 50 percent calculation, Northern Gateway's

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contribution to that increase?

--- (A short pause/Courte pause)

32361. **MR. JOHN CARRUTHERS:** We're having trouble understanding the question, could you just repeat it please?

32362. **MR. TOLLEFSON:** In the sensitivity analysis that you do in terms of increased traffic, you leave aside -- you exclude any numbers associated with servicing the Kitimat Terminal for this project.

32363. You -- in other words this project is not part of that 25 to 50 percent?

--- (A short pause/Courte pause)

32364. **MR. AUDUN BRANDSAETER:** The Northern Gateway Project, I think, was already in the baseline of course before that increase of 20 to 25 percent. The increase of traffic density was related to general increase of other traffic in the area.

32365. So the sensitivity with regard to the Northern Gateway Project traffic is not included in the section we see on the screen now, 7.4.2 "Increased Traffic". That was for the general traffic growth for other ship traffic in the area.

32366. **MR. TOLLEFSON:** Can we potentially take a break now? I'm just trying to organize myself to finish.

32367. **THE CHAIRPERSON:** Let's do that and let's be back for 25 to three, please.

32368. **MR. TOLLEFSON:** Thank you.

--- Upon recessing at 2:16 p.m./L'audience est suspendue à 14h16

--- Upon resuming at 2:31 p.m./L'audience est reprise à 14h31

32369. **THE CHAIRPERSON:** If we could get everyone to take their seats please, we'll be ready to -- we'll be ready to get underway.

32370. Thank you, everyone.

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32371. Mr. Tollefson, please continue.

JOHN CARRUTHERS: Resumed

JERRY ASPLAND: Resumed

JENS BAY: Resumed

AUDUN BRANDSAETER: Resumed

DAVID FISSEL: Resumed

AL FLOTRE: Resumed

KEITH MICHEL: Resumed

STEVEN SCALZO: Resumed

THOMAS WOOD: Resumed

MICHAEL COWDELL: Resumed

HENRIK KOFOED-HANSEN: Resumed

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

32372. **MR. TOLLEFSON:** Thank you.

32373. Mr. Brandsaeter, if you combined the increase in tanker calls that you assume in the sensitivity analysis with the corresponding adjustment in the traffic density scaling factor, would you agree if you put those two things together that that would mean that the decrease in return period would be magnified? Putting those two things together would magnify the impact on the return period.

--- (A short pause/Courte pause)

32374. **MR. AUDUN BRANDSAETER:** It would always be possible to increase several different aspects to increase the total number on traffic to run from Kitimat increased in total traffic otherwise or do other additional activities that could increase risk and, of course, then the total risk would be higher. There's no doubt about that.

32375. However we did analysis of the sensitivity that we thought were most valuable and most interesting to find the results from and we did not combine those two in the same -- that's correct.

32376. **MR. TOLLEFSON:** Just to be clear, so what I was proposing might be interesting, would be to bring the results of the sensitivity analysis for increased tanker calls together with the sensitivity analysis for traffic density

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scaling factor. Bring those two things together and -- and I would predict that that would have a magnified effect on the return period. The return period would drop significantly.

32377. **THE CHAIRPERSON:** Is there a question there, Mr. Tollefson?

32378. **MR. TOLLEFSON:** Thank you.

32379. Do you agree?

32380. **MR. AUDUN BRANDSAETER:** Could you please repeat the question?

32381. **MR. TOLLEFSON:** Okay. Do you agree with this proposition: That if you were to bring together -- aggregate the sensitivity analysis that you've already done for tanker calls, together with the sensitivity analysis that you've already done for traffic density scaling, that those -- that aggregation would lead to a significant diminution -- a significant reduction in the return period?

32382. **MR. AUDUN BRANDSAETER:** Well, as you can see from Table 7.4, if you scroll a little bit down, the reduction in return periods by increasing the general ship traffic -- the general growth to 25 to 50 percent.

32383. And I apologize for -- for referring to 25 percent just before our last break. It was, of course, related to -- to this same 25 to 50 percent increase. It is quite limited. It's -- it is a couple of years reduction in -- in return period by that increase, so that it would be a significant decrease of the return periods even if we combined them, it's unlikely.

32384. And as you can see from the sensitivity where they done as -- as Mr. Carruthers said, it's as likely that the number of vessels would go down that there'll be more VLCCs and less of the smaller size vessel. It could in fact go up if we used less vessels, even if the traffic density was higher.

32385. So no, I certainly don't agree that it would necessarily be an increase in the risk or a reduction in the return periods, even if you combined these two sensitivities.

32386. **MR. MICHAEL COWDELL:** Also, there is a reason sensitivity analyses are done each on their own because it doesn't make sense to combine

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one sensitivity analysis after another taking your worst case assumptions.

32387. In fact, you know, the probability of each of these is they could go up, they could go down. We -- we could see an increase, we could see a decrease. You know, we've talked about again, the likelihood of an accident, the likelihood of a spill. We -- we could, you know, the likelihood is you'll see a reduction.

32388. We talk about increased traffic, the likelihood is we'll see some increase over the period of the project and to apply only one side of that equation, you -- you just get the wrong answer and that's why we look at sensitivity analyses; one -- one item at a time in order to understand the impact of that particular assumption.

32389. **MR. TOLLEFSON:** Well, my point was simply to put the simplest question forward which was putting those two things together and seeing if it would, in your view, lead to a reduction.

32390. I'd be happy for you to do the calculation both ways, to do -- to bring those two analyses together and do both in terms of the potential reduction in return period as well as increase if you're prepared to do it.

32391. **MR. MICHAEL COWDELL:** My point again is it doesn't make sense to bring them together. In this case, it would make little difference because we saw very little change in the return period, but you could come up with another two sensitivity analyses where you make extreme assumptions. You could bring those together, but you're leading yourself down a path where -- where you're not gaining understanding of the problem. You're doing the opposite.

32392. And so I don't recommend that you bring these together. Rather, you -- you do sensitivity analyses and understand their impact and we can see here that this assumption had relatively little impact on return periods.

32393. **MR. TOLLEFSON:** With respect, sir, I think that out of all of the factors that are looked at here, would you not agree that increasing tanker calls at Kitimat Terminal and traffic density are about as closely related factors as you could possibly imagine. Those aren't -- isn't some kind of extreme proposal I'm making. How can you say that's extreme?

32394. **MR. MICHAEL COWDELL:** I'd just answer it again, but I'd be

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answering it the same way. I didn't say it was extreme. I just said it didn't make sense to be combining these factors.

32395. Again, you know, we could do a sensitivity analysis on the fact that we're 300 percent conservative with our time period. That would offset any of these analyses. Does it make sense to add all those up, I don't think so. You take each one and you understand the impact of -- of the range of -- of sensitivity, and -- and that's what's been done here.

32396. **MR. TOLLEFSON:** Well ---

32397. **MR. MICHAEL COWDELL:** There's no question; if you make an assumption that reduces the return period, you make another assumption that reduces the return period, you put the two of them together, the return period is going to be a little lower yet.

32398. But I don't think it adds any value.

32399. **MR. TOLLEFSON:** Well, thank you.

32400. **THE CHAIRPERSON:** Mr. Michel, could I just get you to come a little close to your mic just so we can make sure we can hear you.

32401. Thank you.

32402. **MR. TOLLEFSON:** I think we'll move on, Madam Chair.

32403. I want to look at Adobe 114, please.

32404. Now, here -- this -- this Figure depicts in those -- for those three routes the impact of increasing tankers by 30 and reducing it by 30; so, in other words, looking at the 220 as the middle -- as the middle bar, 250 on the left and 190 on the right.

32405. Am I correct in -- in the characterizing of it that way, Mr. Brandsaeter?

32406. **MR. AUDUN BRANDSAETER:** Yes, sir.

32407. **MR. TOLLEFSON:** Yes.

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32408. And you'll agree with me that -- let's just use the North route, you'll agree with me that the return period for 220 tankers is 69 and the return period for 250 tankers -- the return period is 61 years.

32409. So far are we -- are we on the same page? Do we agree?

--- (A short pause/Courte pause)

32410. **MR. TOLLEFSON:** This shouldn't be controversial.

32411. **MR. AUDUN BRANDSAETER:** Yes, as far as this Figure illustrates the situation, if all traffic went either on these three routes, so it's all 220 -- if you look at the middle one, all 220 tankers going South route via -- in the left part of the picture -- picture -- similar for the South route we are running in the middle and all 220 tankers through the North route to the right.

32412. **MR. TOLLEFSON:** Right.

32413. Now, subject to check -- and this isn't a complicated calculation -- but subject to check, increasing tankers on the North route to 250 amounts to 14 percent increase -- 14 percent increase over 220; likewise, the difference between the return periods, which is 69 minus 61, that is 12 percent.

32414. Subject to check, would you agree with that?

--- (A short pause/Courte pause)

32415. **MR. AUDUN BRANDSAETER:** It sounds as to be a simple calculation so ---

32416. **MR. TOLLEFSON:** Thank you.

32417. **MR. AUDUN BRANDSAETER:** --- if -- if you have calculated right, 250 divided by 220 and 61 divided by 69 that seems to be a simple calculation.

32418. So I expect that that you'll done this right, yes.

32419. **MR. TOLLEFSON:** Very good.

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32420. I just have one other question for Mr. Michel: The views you're expressing about the implausibility or maybe the -- the general undesirability about combining sensitivity analyses, those views were being expressed outside of a scenario-based model.
32421. In scenario-based models, sensitivity analyses are regularly combined. So I wanted to give you an opportunity to clarify.
32422. **MR. KEITH MICHEL:** I think if you were to combine scenarios then you would be assigning probabilities and -- and not combining the worst assumption on each scenario.
32423. **MR. TOLLEFSON:** Talking about a -- a model that is a scenario itself and the sensitivities test various parameters inputs into that and it's completely well-accepted that you would aggregate sensitivity analyses in that situation, sir.
32424. **THE CHAIRPERSON:** Again, is that a question Mr. Tollefson?
32425. **MR. TOLLEFSON:** Do you agree with that?
32426. **MR. KEITH MICHEL:** Well, I'll need you to repeat it.
32427. **MR. TOLLEFSON:** Where you were modelling using a scenario analysis, the variables -- the inputs in that model are frequently, commonly aggregated and there's nothing implausible or improper with combining them in that situation.
32428. Would you agree?
32429. **MR. KEITH MICHEL:** I think the first analysis you do, you do your best estimate on it.
32430. And then, you do a sensitivity analyses to determine how factors affect your answer and whether they'll affect your effort to get the best mitigation measures.
32431. If you felt that combining measures would shed some light on that, you might do that. But I don't think it does because it gets you further and further away from your -- your best estimate and your understanding of the problem.

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32432. **MR. TOLLEFSON:** All right.

32433. Well, the simple -- the simple question, really, at the end of the day, is: Increasing the number of tanker calls to Kitimat is going to increase the traffic density in this region; will it not?

--- (A short pause/Courte pause)

32434. **MR. KEITH MICHEL:** So, you know, really, increasing your -- our -- the Northern Gateway traffic, the number of tankers as nearly a proportionate increase in the -- or influence on the return period, I should say, reduction.

32435. If you increase general traffic it's very different. It has a much smaller effect. It -- it's increasing the density of traffic which increases the likelihood of collision but it has a much smaller impact on the final result.

32436. It's -- it's like comparing apples and oranges. It's two different issues. And in this scenario, we're -- we're looking at increasing the Northern Gateway traffic, the sensitivity to that.

32437. That has a significant impact. It's almost proportional to the change in the number of tankers.

32438. **MR. TOLLEFSON:** And when you add that to the analysis of traffic density, the result will be that the return period will go down further.

32439. **MR. KEITH MICHEL:** Once again, you can add and add and add.

32440. But the best way to do this type of an assessment is to do your best estimate that's most useful in assessing mitigation measures and then to look at sensitivity analyses to determine if any of your assumptions influence your mitigation choice.

32441. **MR. TOLLEFSON:** Madam Gilbert -- thank you.

32442. Madam Gilbert, I would like to go to B32-2, Adobe 7, which is Northern Gateway's response to JRP IR Number 3.

32443. And I think we want to go to the bottom of the page.

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32444. In response to this IR, the Proponent is estimating that, at a 100 percent capacity for dilbit, that the system will move from 525,000 barrels per day up to 850,000 barrels per day. Am I reading that right?

32445. **MR. CROWTHER:** Mr. Tollefson, I don't know exactly where you're going with this question and I stand to be corrected but I don't believe that this response to information request has been assigned to this panel.

32446. **MR. TOLLEFSON:** Thank you.

32447. My question really goes to sensitivity analysis and the -- obviously there is a strong correspondence between production levels and tanker traffic. And I'm interested in canvassing with the witnesses from the point of view of doing a sensitivity analysis, what increasing the production up to what it might be at Phase 4, what impact that would have on tanker traffic and in turn in terms of the sensitivity analysis?

32448. **MR. CROWTHER:** By Phase 4, Mr. Tollefson, do you mean the expansion of the Northern Gateway pipeline capacity?

32449. **MR. TOLLEFSON:** Yes, I do.

32450. **MR. CROWTHER:** And I believe, sir, that you will appreciate that it has been stated many, many, many times on the record of this proceeding, that an increase in the pipeline capacity would require a separate application and regulatory process.

32451. **MR. TOLLEFSON:** Yes and I -- I'm not wanting to go there with this. I'm simply interested in looking at the modelling as to what the impact of moving in that direction -- right now we've looked at a sensitivity analysis that increases or decreases the tanker traffic by a factor of 30.

32452. Our question is directed to broadening that sensitivity analysis out to one that is more realistic in terms of the future of this project.

32453. **THE CHAIRPERSON:** Mr. Tollefson, if you could phrase your questions in a way that make sure that they stay within the bounds of what this particular application is for.

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32454. We're not here to look at any potential expansion ---
32455. **MR. TOLLEFSON:** No.
32456. **THE CHAIRPERSON:** --- and so we have no interest, it's not helpful to this Panel for you to take us in that direction.
32457. **MR. TOLLEFSON:** I understand that.
32458. **THE CHAIRPERSON:** So it's not clear to me where you're headed on this but perhaps you could go straight to your question and we can go from there.
32459. **MR. TOLLEFSON:** Okay, very good. Well, I only really have a couple questions in this area.
32460. And the first question would be that, we have done some calculations and if the production is expanded as is shown in that IR answer, we have calculated that that will mean that there will be 237 oil tankers and 98 condensate tankers visiting the terminal each year. And we would invite feedback as to whether that, first of all, is an accurate calculation?
32461. **MR. CROWTHER:** Madam Chair, I'm in your hands whether this hypothetical situation is of assistance to the Panel.
32462. It is clearly up to you but it bears no relation to the application that's before you, as I think has been made abundantly clear repeatedly on the record.
32463. **THE CHAIRPERSON:** Mr. Tollefson, again as I stated, the Panel needs to understand the context of this particular application that you're seeking to ask these questions.
32464. From the question that you posed it appears to the Panel that you're basing that on a potential future application and that's not in front of the Panel at this point.
32465. **MR. TOLLEFSON:** I do understand that and I've been mindful of that as I thought about framing my question. My concern is that before you, you only have a sensitivity analysis that takes you on either end 30 tankers, plus or minus.

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32466. In my submission there would be significant assistance, it would really, I think, test the robustness here of the analysis that's being offered for those numbers to be increased on either side so that we could have a better sense of the reliability of what is being put before this Panel. So it's really for the benefit of the JRP and to test the robustness of the analysis.
32467. **THE CHAIRPERSON:** Mr. Tollefson, it sounds like your question relates around the potential expansion of the sensitivity analysis and that's not required to go to any potential expansion situation in order to do that.
32468. So I would suggest that you frame your questions to this panel based on the existing application that's in front of the Panel.
32469. **MR. TOLLEFSON:** I do want to divorce these two things, keep them separate, so I'll simply ask the question.
32470. Assuming that there are 330 tanker visits annually to Kitimat Terminal could you please undertake to calculate for us what the impact of that would be on the return period for the routes described in Figure 7-4? That is my question.
32471. **MR. MICHAEL COWDELL:** Could you just perhaps explain to us so we understand what you're asking, where the number you just referenced comes from or what the basis of that number is?
32472. **MR. TOLLEFSON:** What I've tried to do is to come up with a number that represents a significant increase in traffic so as to revisit whether the impact that we have seen on the return period in Figure 7-4, whether that continues -- that decrease in the return period continues at the same or at a different rate.
32473. **MR. JOHN CARRUTHERS:** We're just having trouble determining where that scenario comes from. Can you point us to that please?
32474. **MR. TOLLEFSON:** I'm positing it as a thought experiment; let's try that number and see where it takes us.
32475. **MR. MICHAEL COWDELL:** But I think in the QRA we've just spent the afternoon talking about what we felt were the realistic sensitivity analysis to carry out on what we feel is a realistic forecast of tanker traffic coming

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to the Kitimat Terminal.

32476. I'm just -- I don't think we understand where 330 would -- is coming from, or where the basis of that number would be.

32477. **MR. KEITH MICHEL:** And Mr. Carruthers very clearly explained that the likely trend is to fewer tankers, you know, as VLCCs are added that we believe that Northern Gateway has made a conservative assumption on the number of tankers to begin with.

32478. So therefore, an estimate, you know, adding 30 tankers is a realistic and high end estimate. And to try to go up to 330, it just doesn't make sense to take on such an unreasonable undertaking.

32479. **MR. TOLLEFSON:** Well, I frankly am interested to see what happens when you add more tankers into your sensitivity analysis. The return period for the northern route goes down by a significant factor simply by adding those 30 tankers. It goes down from 69 to 61 years, unmitigated of course.

32480. And my question is, and I would hope that others would be interested in this as well, what happens to those return periods if you add significantly more tankers.

32481. **MR. MICHAEL COWDELL:** For one thing the numbers that we were looking at that was a relative comparison and not indicative of the actual return periods on the north route because it was using -- assuming the same traffic all the time on each route which was meant to be a comparative exercise.

32482. Again I -- we can only repeat what we've just said, that we came up with what we feel are realistic forecasts and we completed the sensitivity analysis that we thought would be of interest.

32483. **MR. TOLLEFSON:** Am I taking it that you're declining to provide that information to the JRP?

32484. **MR. CROWTHER:** Mr. Tollefson, Mr. Michel indicated that it was an unreasonable undertaking to take on. So yes you can take it that the panel, the witnesses are declining your invitation to provide that undertaking.

32485. **MR. TOLLEFSON:** Thank you.

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32486. Madam Chair, if we could just take a moment to canvass.

--- (A short pause/Courte pause)

32487. **MR. TOLLEFSON:** Madam Chair, Members of the JRP, I want to thank you for listening to us through these four panels. I want to thank the witnesses and all of the staff and my co-counsel and counsel opposite.

32488. Those are our questions.

32489. **THE CHAIRPERSON:** Thank you very much, Mr. Tollefson, for participating in the process and for your questions.

32490. So we'll do a change and we'll call next for the Province of B.C. Let's take a five-minute stretch break just to let the Panel -- the tables change.

--- Upon recessing at 3:07 p.m./L'audience est suspendue à 15h07

--- Upon resuming at 3:12 p.m./L'audience est reprise à 15h12

32491. **THE CHAIRPERSON:** Just as we get under way again, I understand there's a preliminary matter with respect to changes in the order of the parties who will be questioning this witness panel.

32492. Ms. Mathers, have you been the coordinator of all this?

32493. **MS. MATHERS:** I take full responsibility, yes.

32494. **THE CHAIRPERSON:** Okay.

32495. Will you tell us what the outcome is, please?

32496. **MS. MATHERS:** I would like to alert the Panel that both the Coalition and Gitxaala have switched places with Douglas Channel Watch,

32497. So, as I understand, the new order will be: the Province, followed by C.J. Peter Associates, followed by the Coalition and then Gitxaala and then Douglas Channel Watch.

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32498. And then, the rest of the order should remain unchanged at this point.

32499. **THE CHAIRPERSON:** Thank you for advising us of the change, Ms. Mathers.

32500. **MS. MATHERS:** Thank you.

32501. **THE CHAIRPERSON:** Good afternoon.

32502. Mr. Jones, you look like you have the microphone in front of you. So I'm assuming that you're at least going to lead off with the questions?

32503. **MR. JONES:** I will, Madam Chair. Thank you very much.

32504. **THE CHAIRPERSON:** Welcome back.

32505. **MR. JONES:** Thank you.

32506. **THE CHAIRPERSON:** I understand that the current estimate is six hours?

32507. I just like to do a time check with you as you're beginning. Does that continue to be your estimate?

32508. **MR. JONES:** Well, it's somewhere between two and eighteen and so six sounds pretty good.

--- (Laughter/Rires)

32509. **THE CHAIRPERSON:** Thank you for that precision. It helps us in our planning greatly.

32510. **MR. JONES:** We aim to please.

32511. I did take your advice from the last time, Madam Chair, and doubled our estimate, and that's where we came up with six hours. But I think it -- I'm reasonably confident of that. I think that the method of response from this Panel is somewhat different than the previous one, so I think we'll be closer to our estimate.

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JOHN CARRUTHERS: Resumed
JERRY ASPLAND: Resumed
JENS BAY: Resumed
AUDUN BRANDSAETER: Resumed
DAVID FISSEL: Resumed
AL FLOTRE: Resumed
KEITH MICHEL: Resumed
STEVEN SCALZO: Resumed
THOMAS WOOD: Resumed
MICHAEL COWDELL: Resumed
HENRIK KOFOED-HANSEN: Resumed

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

32512. **MR. JONES:** So thank you again, Madam Chair, and Members of the Panel, witnesses. My name is Chris Jones. I'm counsel for the Province of British Columbia.

32513. And with me today is my co-counsel, Elizabeth Graff, and also from the Ministry of Environment is Graham Knox, to my far right.

32514. I will be asking the questions of this Panel, Madam Chair.

32515. So just to start, I would like to take you to Exhibit B38-2, which is the Northern Gateway responses to Coastal First Nation IR 1.6. And, specifically, I'd like to take you to Adobe page 29 of that document, please.

32516. In this Information Response, Northern Gateway is discussing the inspections of tankers that will take place and it also is describing the tanker acceptance program that Northern Gateway is proposing.

32517. Toward the middle of that large paragraph, we see on the top of the page, it's -- Northern Gateway states:

"This information may require a tanker visit by a third party inspector. Depending on the outstanding requirement, the tanker might be boarded by the inspector at the port prior to the Northern Gateway terminal..."

32518. Et cetera.

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32519. Who is the third-party inspector that is being referred to there?

--- (A short pause/Courte pause)

32520. **MR. JERRY ASPLAND:** I'd first like to start to say, before I answer that directly, is that the tanker acceptance program will be for a specific load -- I've got to say this right -- a tanker will be nominated for a specific load of cargo. That tanker will go into the tanker acceptance program. For that specific load, it's either 'yes' or 'no'; so if he can't pass during that vetting.

32521. However, during that vetting, if we found a minor discrepancy, we would tell the owner that you need to have another inspection. That inspector would have to be approved by us and would probably be the Classification Society.

32522. It could be an inspector from the SIRE program. And I don't know -- maybe I better wait for your question before I describe the SIRE program and how all this goes together but I would leave that up to counsel how you want to do this.

32523. **MR. JONES:** I think that's not a bad idea to go there now and I think that will lead into my next line of questioning well, so I appreciate the offer.

32524. **MR. JERRY ASPLAND:** First off, I'd like to say there are different levels of tanker quality. Tanker quality begins with whatever flag it's carrying, and that's called a flag state.

32525. Then it has a classification society. We've a bit talked about the classification society. Norske Veritas is a classification society, there's another one called the American Bureau of Shipping. There's a number of them. The better ones have formed an organization called IACS, International Classification Association, and so there's probably eight in that group.

32526. After you would go through classification and the ship were on the sea and it came into a port, there's the possibility for a port state control inspection. And what that means is whatever port the ship is going into, that particular country could come onboard that ship -- in this case the tanker -- and do its own inspection as to the ship's adherence to all the rules and regulations of its flag country and of the International Maritime Organization.

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32527. I'd just like to say that Canada, at this point in time, has a very, very good -- what we call -- port state control system. It belongs to the EU system and to the Asian -- the Japanese system or Asian system, and they all work together to try to be sure that the tankers that come in meet those regulations.

32528. In recent years, over about the last 10 years, 12 years, major oil companies especially, some terminal companies, have taken on a very, very aggressive vetting system. We call vetting tanker acceptance program. The vetting system is where a ship is nominated. In this case the ship would be given to Northern Gateway, the name of the ship, and then Northern Gateway would go through a series of criteria to be sure the ship met those criteria.

32529. This criterion would be established by Northern Gateway. All ships coming here would know what the criteria to be expected. So once you made the check of the criteria then, in this case, Northern Gateway, could and would ask different questions.

32530. The basis today which could change of most vetting -- I shouldn't say most vetting -- tanker vetting, is what is called the SIRE program.

32531. Excuse me just a minute.

--- (A short pause/Courte pause)

32532. **MR. JERRY ASPLAND:** The SIRE program is known as the ship inspection report program and it is part of the oil companies' international marine forum. And I will at times probably refer to that -- excuse me I can't see and can't read -- as -- I will refer to that is OCIMF.

32533. OCIMF is a very important group of oil companies in terminals in the world. It started in 1970. It has IMO's consultative status, which means they can stand up on the floor of IMO and give direction. They have done a lot of different things toward the increase in safety and tankers.

32534. SIRE came about because the oil companies knew or OCIMF members knew that regulation alone could not control necessarily poor performers. So it -- I was active in OCIMF when the SIRE program came together. It took a long time because of liability issues and things like that but today it is considered probably the best program that there is around.

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32535. And the way the SIRE program works is that a ship owner would ask SIRE to join, he would be given all the things to fill out, and a ship report is about 25 pages long. Then the ship owner would have to find one of the members of OCIMF that would sponsor them. No sponsor, no inspection.
32536. That particular member then would okay for an inspector to go onboard and the inspection would take place. Each inspection report is good for two years. One year is active and the second year then goes into a different file drawer, shall we say. It's no longer any good after two years.
32537. The inspectors in this program are nominated by a member. They must have five years tanker experience, two years as command. They take a five-year course in England. They have to pass a test. They have certified auditors. They have to conduct a number of inspections. In other words, they can't go stale, they have to complete, and then every three years they have to renew their inspection certificate and they must be audited once a year.
32538. So, going through all this with you, the vetting department or the vetting group would get the name of the ship. We've already said that the ships had to be part of SIRE if they're going to come to this terminal, which I -- based on my experience, this is the best thing going. I'm biased though.
32539. So the SIRE report would come in, the vetting group would then look at it and then apply that against our criteria, and then ask -- could ask the owner for additional information. It would be okay to ask the owner what is your spill record -- your spill record -- S-P-I-L-L record. He would have to provide that. We could look at that.
32540. There would be certain criteria set up that the ship would have to meet. As an example, today we talked about requiring those ships of 15 to 20 years old that they would have to have a CAP inspection and it would have to meet a one or two class. So these would all be the criteria.
32541. I've seen IRs that ask, well why can't we put the criteria together. We have put some of the criteria together, but I believe we should, as we get closer to the project, look at what other companies are doing in the way of criteria.
32542. I personally have run into one that I was surprised about, and that was this one company will not accept a ship unless it's had a SIRE inspection on it in

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the last six months. I thought whoa. And that's not the toughest; some of them are tougher than that. But I'm just saying that as we go through this we will develop this program in which we would hope -- more than hope, I would say, would prevent substandard operation coming here. So we have all this -- we have classification, we have port state and now we have vetting.

32543. It is estimated in some circles that over the last five to seven years, the most important thing that has occurred in the tanker industry is -- is the should I call the severity of the vetting systems and keeping the undesirables -- I have different names if we were in a different crowd -- but the undesirables out of, basically, the U.S., Canada, Europe, and anybody that belongs to the ports they control, systems. It took a long time. I hope that's helpful as we go through the questions.

32544. **MR. JONES:** No, that was helpful. Thank you very much.

32545. **MR. MICHAEL COWDELL:** Just -- if we could just, sorry, pause for one second. Just because there are some terms that were thrown out there. I just want to make sure for the record that we get the right definitions.

32546. **MR. JONES:** Sure.

--- (A short pause/Courte pause)

32547. **MR. JERRY ASPLAND:** Just so we're sure, IACS stands for International Association of Classification Societies. OCIMF is the Oil Companies International Marine Forum. And when I speak about Port State Control and Canada, there is the Paris MOU and the Tokyo MOU, that they belong to that group of -- of countries and that consortium if you will, and what's key about that, these countries have come together to share information on ships and their condition. That's extremely important. In -- in the old days, that did not take place, sorry.

32548. **MR. JONES:** No apology necessary. While we're playing duelling acronyms, the one that I didn't know was, you said CAP 1 or CAP 2, does that stand for something?

32549. **MR. JERRY ASPLAND:** Oh, I'll have Mr. ---

32550. **MR. KEITH MICHEL:** Yeah, that stands for Condition Assessment

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Program and Condition Assessment Programs are a voluntary program, but it's a rigorous evaluation of ship structure. It involves thickness gauging, it involves structural assessment, calculations, check of machinery.

32551. And best practice is to require a CAP for older vessels, you know, it's been shown that well maintained older vessels behave very well. And the intent of this project is to require a CAP 1 or CAP 2 rating for ships over 15 years of age. A CAP 1 rating is new building quality and a CAP 2 rating is good condition.

32552. **MR. JONES:** Yes, thank you very much.

32553. Maybe we'll just, in the short time we've got, maybe we'll try to get through this -- this clarification of this question.

32554. Madam Registrar, if you could turn to Volume 8A of the application, which is Exhibit B3-24, and I'm on Adobe page 13 of that.

32555. Now, let me just have a look here. So just below -- just below the bullets, that's perfect, toward the bottom of the page there, it states that:

"Northern Gateway may require the ship charterer to contact the tanker owner for clarification, or a request be made for an inspection by Northern Gateway's vetting agency..."

32556. I'll just stop there. And then, I think this may make it quicker. If we could go to the next page, Madam Registrar, and that's -- that's great.

32557. And the -- I think it's the fourth bullet down says:

"The tanker owner must agree to allow Northern Gateway or its agent access to the tanker for inspection."

32558. I think in your -- your answer a moment ago, Captain Aspland, you -- you said that the third-party inspector that I referred to in that information request would be either a SIRE inspector, as you've described it, or a classification society, and then, we've introduced a couple of other possibilities here, Northern Gateway's vetting agency, Northern Gateway itself or its agent.

32559. So could you -- could you help me out with who that -- the follow-on

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inspection that you've described would be undertaken by?

32560. **MR. JERRY ASPLAND:** We -- the idea of the inspector is -- is a given. Who the inspector will be will -- we haven't completely put that together, but they will be of the presence of classification or -- or a SIRE inspector. In other words, they will have those qualities to them.

32561. **MR. JONES:** Okay. So the ---

32562. **MR. JERRY ASPLAND:** I'll just -- there's a group called the International Inspection Service that's located in Seattle, they would be of the quality of the SIRE or the Classification Society, so there would be someone -- I -- so that's a bit of an open question.

32563. **MR. JONES:** Okay, thank you. Thanks.

32564. Could you explain a little bit further for me -- I think it was part of the long answer you gave a few moments ago, but when would -- or at least what is Northern Gateway's current intention as to when it would request that follow on inspection. Let me explain just a moment. In the information request, it said Northern Gateway might require further inspection. We're not sure at this point and by whom.

32565. And could you -- could you describe a bit more detail about when such a further inspection might be required by Northern Gateway?

32566. **MR. JERRY ASPLAND:** I want to go back to what I said before just briefly. I said that every time a tanker, whether it's a round trip to this particular terminal -- let's just say it goes to Washington and all it does is go back and forth, every time that it came it would have to be vet. There's no continual vetting, so it would have to be vetted.

32567. But in those cases, when a ship comes for a specific cargo and I don't want to get into -- I'm talking there's a load to pick up, the ship has been -- the ship has been nominated -- that we will not put an inspector on that ship. We will take the information that we have, basically SIRE or what we may have from classification, and when that ship is vetted, it's either a yes or no.

32568. If though, we give that -- there's no maybes. So then if we find something and say no, we would -- we could, depending on what the no was, we

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could go back to the owner and say, "If you want to come again or if you want to apply again, then we need to do an independent inspection" and that's when that would take place.

32569. However with today, with vetting, and knowing ship owners a bit, I doubt whether that will happen. They are very, very sensitive, number one, to being on the SIRE list because it's extremely important. In many cases, if they're not on that list, their opportunity for employment is very, very limited. So I would not expect that.

32570. And, as I'll repeat again, it appears to me that the vetting process that goes on today with major oil companies is to the highest it can be that the tankers just are not running around here that are not to the highest standard.

32571. **MR. JONES:** Okay.

32572. I think, probably, maybe I'll have one more question, Madam Registrar, and then we'll -- Madam Registrar -- Madam Chair -- sorry -- and then maybe that's an appropriate spot to quit for the day.

32573. You mentioned, Captain Aspland, that you had seen a recent requirement by a terminal operator, I believe it was, to require that tankers calling on that terminal have a SIRE inspection within the last six months.

32574. Was that right?

32575. **MR. JERRY ASPLAND:** Yes, and that's a major oil company.

32576. **MR. JONES:** Okay.

32577. And can you tell me where that was?

32578. **MR. JERRY ASPLAND:** Unfortunately, no.

32579. **MR. JONES:** Unfortunately. Okay.

32580. But you did say that there were ---

32581. **MR. JERRY ASPLAND:** I'll just tell it's major.

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32582. **MR. JONES:** Okay, that reduces it to six or seven, I think, these days.
32583. So -- but you did say, I believe, that there were some that were -- I don't know if I have the right word, but were more stringent than that.
32584. Did I get you right on that?
32585. **MR. JERRY ASPLAND:** Well, I probably should qualify that. I should qualify that, not probably.
32586. What I'm saying is I was surprised at that. In other words, surprised that they had gotten to the level where they're not going to let things in that hadn't had an inspector -- a SIRE inspector -- in six months.
32587. I suspect, as we go through this process, we're going to find some more things like that, that will lift the bar higher. I can't think of any right now but a lot of places do not require the CAP inspection. I mean, that's a very expensive proposition for a ship owner to do that. And you have to remember it's voluntary. I mean, they have a classification society that does it.
32588. So shall I say, when class -- when vetting first started, it was: "Do you have all the right certificates?" and "Have you had the inspection?". It's gone way beyond that now. Now, there are specific requirements.
32589. It is, though, Northern Gateway who will set those requirements. There's not any governmental authority or anybody like that. But will gather all the things and then establish that criteria. But I think there's a lot of criteria right there.
32590. **MR. JONES:** Right.
32591. **MR. JERRY ASPLAND:** And you did point out that the tanker must agree to allow -- that's a pretty common thing to do ---
32592. **MR. JONES:** Sure.
32593. **MR. JERRY ASPLAND:** --- is that they have to allow the representative to come onboard.

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32594. **MR. JONES:** M'hm.
32595. Did ---
32596. **MR. MICHAEL COWDELL:** Sorry, if I could just add to what Captain Aspland was saying a moment ago?
32597. In terms of defining the criteria, one thing that we've -- for the tanker acceptance program, one of the things we've talked about is canvassing other major oil tanker operators and terminals to see what criteria they're using and, you know, given that we would be looking to be using the same tankers they're calling at other terminals with similar best practices around the world, looking to see that, you know, our criteria would be to the similar standards.
32598. We haven't gone through that process in detail and it's something that remains to be done but, you know, the inspection requirement within six months, if that was a common requirement, it could become part of our top criteria, as would other things.
32599. But, you know, I think our -- the objective is to look at other terminals with best practice and try to fall in line with those terminals and tanker operators.
32600. **MR. JONES:** Just, Captain Aspland, I thought I'd heard you say when you mentioned that six month period that there were others that had -- I'm not sure of the word you used but I thought you said, you know, tougher than that or something like that. I don't want to put words in your mouth but I'm just trying to remember what you said.
32601. Could you tell me what those were?
32602. **MR. JERRY ASPLAND:** I don't know all of them, and I've just mentioned two tough ones, the CAP inspection and the SIRE -- the six month SIRE inspection.
32603. I suspect there are others out there that I might be surprised at.
32604. **MR. JONES:** Okay.
32605. **MR. JERRY ASPLAND:** And the other thing I would just point out, if we had a tanker coming to -- when we have a tanker coming to our terminal,

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that thing might have been vetted three times, one by the person whose loading the oil, and one by the person who's going to receive the oil, and no one shares reports.

32606. **MR. JONES:** Thank you.

32607. This is probably a good moment to stop for the day, Madam Chair, and -- if that's okay with you.

32608. **THE CHAIRPERSON:** Thank you, Mr. Jones.

32609. So we'll stop for today and we'll begin again tomorrow morning at 8:30.

32610. Good evening, everyone.

--- Upon adjourning at 3:38 p.m./L'audience est ajournée à 15h38