Enbridge Northern Gateway Project
JRP Hearing Notes

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Dr. Josef Cherniawsky	Mr. John Clarke	Mr. Kim Conway
Dr. Heather Dettman	Mr. Chris Doyle	Mr. Wayne Dutchak
Mr. Michael Dwyer	Mr. Michael Engelsjord	Mr. Charles Hansen
Mr. Grant Hogg	Dr. Bruce Hollebone	Dr. Ali Khelifa
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Mr. François Marier	Mr. Phil Murdock	Capt. Glenn Ormiston
Mr. Donald Roussel	Mr. Paul Topping	Mr. Rob Turner
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22441

Orimulsion and dilbit

Mr. McCormick asked Dr. Bruce Hollebone of Environment Canada if "Orimulsion is a heavy bitumen [emulsified with] water with a surfactant," and if it "has distinct and different chemical and behavioural characteristics from the diluted bitumen that may be transported as part of the proposed Project." Dr. Hollebone agreed: "the physical characteristics of them are very different." 22441

Mr. McCormick asked "If in situ burning is applied as a spill response measure to Orimulsion or diluted bitumen, the resulting residues would have distinct and physical properties?" Dr. Hollebone replied that the answer is not clear because, "we don't have any burning studies on dilbit." 22452

Mr. McCormick asked if Dr. Hollebone's lab had "conducted any comparative analysis between Orimulsion and diluted bitumen." Dr. Hollebone said "No, … the two studies

that we've made to date on the diluted bitumen products specifically which are entered into evidence have not been explicitly compared back to the Orimulsion product. The paper that you asked about yesterday [Volume 170, paragraph 22372] does compare some of the source bitumen with the Orimulsion product." 22465

Agreements with response organizations

Mr. McCormick asked "Given the size of the tankers and the transfer rate at the Kitimat Terminal, am I correct in my understanding that both Northern Gateway (NGP) and the tanker owners would be required to have an agreement with a Transport Canada certified response organization for the provision of a spill response in the event of a pollution incident and that that would require the capacity to handle 10,000 tonnes." Mr. Donald Roussel of Transport Canada replied that this is correct. Mr. McCormick asked if NGP and the tanker owner could enter into agreements with different response organizations (ROs)." Mr. Roussel said that the tanker owner must use one, a "response organization that is accredited in a specific area." He said that other ROs can be certified, including "an arm of [the Proponent's] organization that would be a RO. In the area of Bay of Fundy … Irving Oil … have developed their own type of capacity, got it recognized for the purpose of their services. They also have cascading arrangements with other organizations to augment their capacity." 22471

Mr. McCormick asked if creation of a new RO would result in the replacement of Western Canadian Marine Response Corp. (WCMRC). Mr. Roussel said that would not happen, that WCMRC "has got the entire coast of BC," and that one RO could be designated at one terminal and at "the terminal next door" may be a ship using the services of WCMRC. 22486

Assessing a response organization, and its history of deficiencies

Mr. McCormick asked what factors would Transport Canada consider in reviewing a response organization. Mr. Erik Kidd replied, "it's a three-year certification period which involves having the RO submit its plans and demonstrating their capability over that three years and numerous inspections that are involved with that." 22499

Mr. McCormick: "If an entity proposing to … establish a RO has a history of deficient spill response, clean-up and management, would Transport Canada take that into consideration?" Mr. Kidd: "Yes, we would." Mr. McCormick asked about Enbridge, "We have seen evidence through these proceedings in relation to the NTSB report and its spill response, clean-up and management for the Kalamazoo spill and, in many cases, authorities in the United States determined that those responses were inadequate or deficient. Would Transport Canada take that history into consideration?" Mr. Kidd said, "It's a common practice to do that, and not necessarily particular to a certain incident. … Transport Canada takes that all into consideration." 22513

Fees for ROs and spill response operations

Mr. McCormick asked about auditing of financial activities of an RO. Mr. Kidd said the RO fee and fee structure is developed between the RO and its user committee. Transport Canada does not audit the fee structure. The fees to maintain the response capability are based on a bulk hull cargo fee and a membership fee. Mr. François Marier explained that

fees for response operations are "claimable costs that can be then funnelled back to the ship owner and his insurer." This is in accordance with an international convention to which 130 countries are party. Because this insurance is limited liability, there are domestic and international funds that would provide excess compensation. 22526

Mr. McCormick asked, "Does Transport Canada complete any independent assessment of whether those costs [incurred in a spill response] are reasonable?" Mr. Marier answered that there are criteria in the aforementioned convention and in the Marine Liability Act, and a claims manual put out by the International Oil Pollution Compensation Fund. It is not Transport Canada's role to oversee payment of compensation, and it may itself be a claimant. 22555

Mr. McCormick asked a similar question about fees charged by ROs "while on call or standing and wait." Mr. Roussel said ROs are private companies, and need to generate sufficient revenues to ensure that they can operate as "cost neutral." Because fees are based on tonnage of cargo carried, fees vary "depending on where the system is in place and the volume of cargo." As examples he noted 10 cents a tonne in the Come By Chance area to 30 or 40 cents a tonne on the Great Lakes. "It's a private sector dialogue." Mr. McCormick expressed concern that NGP might set fees "which could be higher or lower that would serve the interests of Northern Gateway Project but, potentially, in a manner which is adverse to either the shippers or other interests." Mr. Roussel said that with similar situations in the Bay of Fundy with the Irving Group and Point Tupper with a VLCC terminal, they had not noted such "adverse elements." 22564

Mr. McCormick asked if Transport Canada had "participated in any pre-assessment and assessment consultation activities with the Haisla Nation relating to the NGP" and if they had "become aware of any Aboriginal issues related to the mandate of the Joint Review Panel." Mr. Roussel said, "We have not sat specifically with the Haisla Nation but we're committed to being part of the whole of government approach when it comes to First Nations engagements." He said they were aware of Aboriginal issues related to the JRP. 22585

Mr. McCormick asked about efforts made by Transport Canada "to incorporate that information into their evidence and bring it to the attention of the JRP." Mr. Roussel spoke about providing information or clarity in its submissions but added that "We do not … consider this to be the full consultation in our duty to consult where we're relying on this process here to help us finalizing those discussions." 22590

No provisions exist to make NGP's promises enforceable.

Mr. McCormick put up Environment Canada's response to Haisla IR 1.45a [Exhibit E9-21-12, Adobe 82]. He said, "[This] states that NGP proposes to go beyond the regulatory requirements of the Canada Shipping Planning Act by preparing for a worst case spill from a tanker both at the terminal and once underway. How would Environment Canada and Transport Canada hold NGP to the promises … where those promises exceed the regulatory requirements?" Mr. Roussel said they have already replied, in IR 2 [Exhibit E9-34-2, Adobe 3]: "*these risk reduction measures are voluntary, and as such, no provisions in Canada marine shipping legislation are in place that would make them*

mandatory or enforceable." 22607 Later in the day, Mr. Roussel offered a correction to this, specifically that "Transport Canada understands that it is up to the JRP to make recommendations if it sees fit with respect to the voluntary commitment and not that we are relying on the JRP to make them mandatory." 23447

Mr. McCormick asked whether the witness panel has "conducted an assessment of Enbridge's corporate history of spills and adherence to standard operating procedures [etc.]" Mr Roussel replied, "We have not done that, and what will be presented to us as a response organization, we'll take it as face value at the moment of the evaluation." He added, "But we do rely … on this process … to make many of those voluntary recommendations mandatory in the permit. We rely significantly on the Joint Review Panel recommendations related to the permitting structure under the NEB." 22623

Regional Advisory Councils (RACs)

Mr. McCormick asked if "the Transport Canada certification process … for response organizations … incorporates the opportunity for public stakeholder or First Nations involvement." Mr. Roussel said, "Not directly." He explained that Part 8 of the Canada Shipping Act describes Regional Advisory Councils (RACs) of which there are four in Canada. Members of RACs could be First Nations people or First Nations could bring concerns to RAC members to be brought to the attention of the ministers. Mr. McCormick asked to see these RAC Terms of Reference. 22634

Mr. McCormick asked "whether or not any of the First Nations which may be affected by the Project are currently represented on the RAC which is responsible for this particular area." Mr. Kidd replied, "At this point in time, the RAC membership is fulsome and it does include an Aboriginal person." Mr. McCormick again: "Is that person a representative of one of the First Nations which may be affected by the Project?" Mr. Roussel: "Not at this time." 22639

Some discussion took place about opportunities for public and First Nations engagement with both the local RAC and with the RO. 22653

Response standards and exercises

In its reply to JRP questions to NGP "based upon the recommendations of the government authorities," in question 22 Transport Canada had commented on the Proponent's "oil spill preparedness and response plans, and related response scenarios and exercises." [Exhibit B83-2, Adobe 14]. Mr. McCormick asked, "What standards will Transport Canada apply to evaluate those exercises?" Mr. Kidd said that, "Within the regulatory structure, there's a requirement for oil handling facilities to exercise over a three-year period, and in that three-year period, there -- the exercise requirements are notification procedures, operational competencies as well as management structure [and] the training requirements." 22669

Mr. McCormick: "Will Transport Canada require a full functional field exercise?" Mr. Kidd: "There will be a full operational exercise … within a continuous three-year period … we don't just do one; it's a continuous exercise program … exercising on water with the proponent and with the fuel provider as well and the Canadian Coast Guard and other

agencies that have jurisdiction under that oil spill response." "One of the requirements under the regulatory structure for oil handling facilities at the terminal is the discharge that enters into the marine environment contained and controlled within one hour, beginning clean-up within six hours." 22683

Mr. McCormick asked if similar exercises will be conducted with the response organizations. Mr. Kidd said there are mandatory exercises. 22692

Northern Gateway meetings with Environment Canada

Mr. McCormick quoted from a previous hearing day, the NGP statement that, "*…we've met with Environment Canada several times to talk about technical issues.*" [Volume 134, paragraph 1920]. He asked how many times had the two parties met. After attempting to determine the context for the statement, Dr. Caroline Caza replied, "I think what I would say here is Environment Canada has not met with Enbridge on the specific issue of emergency spill response planning." She said there have been "several meetings between Environment Canada and Enbridge on two issues," those being baseline monitoring and fate and effects and spill modeling. The most recent meeting was on "technical details around the wildlife." 22696

Mr. McCormick asked if clean-up endpoints could differ for different materials. Dr. Hollebone said the question has been asked with NGP and the recommendation that NGP consider an Environment Canada document. 22713

Mr. McCormick asked if Environment Canada has any plans on creating more specific guides … directed at diluted bitumen and condensate. He referred to Exhibits E9-19-24 and E9-19-28, "which are … more general in terms of response." Dr. Carl Brown said that in 1999 they had also prepared a guide on Orimulsion. Mr. McCormick asked whether, "If a spill were to happen today, the reference materials to be used to guide NGP in selecting appropriate endpoints would not be specific to any of the products that will be shipped." Dr. Brown said, "The guidelines that we have currently available are not specific to any type of oil. They talk more about the process for selecting endpoints. They talk about different types of shoreline environments without being specific to the type of oil." 22717

Mr. McCormick asked if "the future research which has been discussed will it be completed, finished and available by the beginning of operations for the Project?" Dr. Brown replied about research work which is being done, without being specific as to when it will be completed. 22730

Mr. McCormick asked, "Has Transport Canada developed any specific response plans to respond to the possibility that product from the Project will sink or submerge?" Mr. Kidd said, "No." "The prediction models that we have are based on conventional oils." 22736

Examination by Mr. Barry Robinson for the Coalition 22751

(ForestEthics Advocacy, Living Oceans Society, Raincoast Conservation Foundation.)

Marine Communication Traffic Services (MCTS)

Mr. Robinson asked for confirmation that "there are five MCTS stations on B.C.'s West Coast, … located at Vancouver, Victoria, Prince Rupert, Comox and Tofino," and that "services for the Kitimat area are provided out of the Prince Rupert office." Mr. Shane Walters of the Canadian Coast Guard (CCG) so confirmed." 22755

Mr. Robinson asked where coverage is provided from if there were a failure at the MCTS station in Prince Rupert. Mr. Walters said that those business continuity plans are being developed "right now," and that there is similar equipment in Tofino MCTS. Mr. Robinson posed a scenario in which "the MCTS centre in Prince Rupert had to be evacuated, would all communication with vessel traffic then be handled out of Tofino?" Mr. Walters said it would not, and that he doesn't know what would happen, and that he doesn't believe that there would be no service covering the Kitimat area.

Mr. Walters accepted an undertaking [Exhibit E9-71-2] to provide the answer (which includes the information that CCG *"would immediately implement the station's business continuity plan"* including notices to shipping, advising and requesting coverage backup of neighbouring stations in Canada and US, deployment of vessels and vehicles to provide MCTS services, increase in air and vessel patrols where necessary. 22772

Closing Tofino, Vancouver, Comox MCTS

Mr. Robinson asked if "all five MCTS centres on the west coast are equipped with automatic identification systems or AIS," and if there is redundancy in the AIS system enabling tracking from any of the five locations. Mr. Walters said, "That is correct." Asked about MCTS centres being closed, Mr. Walters said that, "The Tofino centre will close in the spring of 2014 and the Vancouver and the Comox centres will close in the spring of 2015." "[The closures] will not affect AIS coverage." 22777

Mr. Robinson put up a report concerned with "optimum staffing of MCTS centres," and asked why the report was done. [Exhibit E9-19-2] Mr. Walters said it was to determine "whether or not overtime was allocated correctly and whether … it was required in certain areas when there was less traffic, but the same amount of people required day and night. Page 6 of the exhibit discussed staffing workloads, which led Mr. Robinson into a discussion about workloads and safety thresholds once the Tofino, Vancouver and Comox centres were closed and staff were reassigned or released. Mr. Walters was unsure, because although he knew what the staffing levels would be, there are still too many unknowns. 22805

TERMPOL recommended new call-in points and aids to navigation

Mr. Robinson said the TERMPOL route analysis study identified a need to establish four new call-in points for MCTS and if the Coast Guard is committed to establishing those points if NGP proceeds. [Exhibit E9-6-13] Mr. Walters replied, "We have not committed to doing that yet." 22831

The Coast Guard TERMPOL study recommended 35 or 36 aids to navigation [Exhibit E9-6-13, Adobe 57] costing $2.5 to $3 million. Transport Canada's TERMPOL report [Exhibit E11-3-2, Adobe 23] says, "*Installing the new navigational aids to service*

Kitimat would cost an estimated $11.9 million, plus $500,000 on an annual, ongoing basis." Mr. Robinson asked if someone could explain the discrepancy. Mr. Kevin Carrigan from the Coast Guard said these are both estimates, though the larger one is more recent. Asked who would pay for the aids, Mr. Carrigan said no discussions have taken place with Enbridge about who will pay, that the "Coast Guard Levels of Service and Service Standards" state what type of aids the Coast Guard will provide, and that it may end up that the Coast Guard will provide some and private interests could provide others. The Coast Guard must approve all aids. 22837

Mr. Robinson asked if the Coast Guard would need to add capacity if the project were to proceed. Mr. Carrigan said "No, we don't anticipate the requirement to add resources other than the ongoing maintenance costs that are presented in this document. [Exhibit E11-3-2] Mr. Robinson asked about the Coast Guard's operational reliability target of 99% for navigation aids over a three-year period. Mr. Carrigan explained that means "it's functioning properly and on position 99% of the time." He added that the average performance "over the last 15 years or since 1995 is 99.77%." 22861

Coast Guard liability if aids are not functioning

Mr. Robinson quoted from evidence that, with respect to liability for damages caused by a spill from their ship, "*The Shipowner is entitled to a limited number of defences*" one of which is that the incident was "*wholly* [caused] *by the negligence or other wrongful act of any Government or other authority responsible for the maintenance of lights or other navigational aids in the exercise of that function.*" [E9-21-12, Adobe 111] He asked if the Coast Guard could be liable for cost of cleanup or damages of a spill.

Mr. Marier said that language is taken directly from two international conventions that Canada is party to. It refers to a defence a shipowner can argue "in order to not be liable for a spill," but it does not refer to "the liability of the government authority that is responsible for the maintenance and the installation of navigational aids." Mr. Robinson said, "I appreciate the distinction there that it gives a defence but doesn't necessarily say that a party could then seek compensation from the Canadian Coast Guard, although I might expect that's the route it would go." He asked if "the same defence would apply to privately installed navigational aids?" Mr. Marier replied that the language in the evidence is "*any Government or other authority*" from which he concludes, "yes." 22869

Mr. Robinson said that in its application, NGP indicated that additional radar coverage would be required along routes. He asked, if there has been any discussion with NGP as to who would pay for the installation and operation of those facilities, and the actual performance measurement. Mr. Carrigan said there has been no discussion with Enbridge, and that they would undertake to obtain the performance measure, (which is 99.7% as reported in Exhibit E9-71-3.) 22896

Port state control inspections, and older tanker inspection

Mr. Robinson asked if port state control inspections do not routinely include a physical inspection of the cargo tanks unless there is a cause for concern. Mr. Roussel replied that there must be prima facie evidence that there is something wrong with the ship, or a series of complaints from the crew. 22905

Mr. Robinson examined the quote that "tankers more than 12 years old are targeted for a more detailed or expanded inspection." [Exhibit E11-3-2, Adobe 21] Mr. Robinson asked if this means an automatic more detailed inspection. Mr. Roussel explained that the level of inspection begins with gathering information from various sources, and then "you'll make a decision on how in depth you want to go." "When you want to go into inspections of cargo tanks or ballast tanks … that is fairly complex. You need to get the tanks gas free, you've got to have the proper certification before you do enter it. The operators need time to be able to prepare the vessel." He said that the 12 year target does not necessarily include a physical inspection of the cargo hold. 22914

Ship inspections and the high rate of deficiencies

From the evidence, Mr. Robinson put up the Port State Control Program Annual Report for 2010 [Exhibit E9-20-13, Adobe 7]. He noted that in 2010, of 1082 ships inspected, 442 had deficiencies and 20 were detained. Mr. Roussel said the deficiency rate is "pretty standard" but that many of the deficiencies are "not necessarily life threatening but the goal is to keep the ship tidy." 22925

SHIPS	2010	2009	2008	2007	2006
Inspections	1082	1005	1099	1134	1237
With Deficiencies	442	401	426	434	513
Detained	20	26	31	43	27

Table 1: Comparison of ships inspected, ships with deficiencies, and ships detained in Canada over the past five years [E9-20-13]

Mr. Robinson also examined the matter of detaining ships later in the questioning, using Exhibit E9-6-15. This begins at para 23089.

Mr. Robinson turned to Figure 4: "Deficiencies by Category" [Adobe 15] and noted that three highest incident categories were "fire safety measures," "life-saving appliances," and "safety of navigation." Mr. Roussel described the types of defects that would be examples in those categories, backed up by Mr. Rob Turner of Transport Canada on navigation issues. Mr. Turner noted, in the context of the high rate of ships with deficiencies, that they intentionally target vessels on which they expect to find deficiencies. 22935

Mr. Robinson referred next to Figure 1: "Inspections by Type" [Adobe 8]. He noted that Initial inspections amounted to nearly half (48.5%) of the total. Mr. Roussel said these involved a physical tour and a document review. More Detailed inspections (28.6%) were on ships 12 years and older. He asked about the Canadian Tanker Inspection (9.7%), which Mr. Roussel said were foreign tankers receiving an inspection in Canada. He said they "aim at doing 100%" of foreign vessels, and they are looking at expanding the inspection requirements, and mentioned the SARA regime as an example. Expansions of this sort require consultations and incorporation in the regulatory regime. 22966

Mr. Robinson said that Transport Canada's evidence indicated a target of inspection of all foreign vessels on their first visit to Canada and once a year thereafter. Mr. Roussel accepted an undertaking [U84] to obtain the performance measures for Canadian tanker

inspections. 22979 Mr. Turner reported later in the day that in 2012, of 710 tanker arrivals, 540, or 76.1%, were inspected. 23452

Ballast water control management regulations

Mr. Robinson asked if "the proposed new regulations would require fitted ballast water treatment systems." Mr. Paul Topping from Transport Canada said, "Currently in place, there are four options … of how ballast water may be managed, and the primary option is ballast water exchange. With the convention that is expected to come into force … the shift is to … fitting ballast water treatment systems. … At this point, we don't have formal proposed regulations, but we have released a discussion paper." He said that treatment systems would have to be fitted to meet the Convention deadline of 2016. Mr. Robinson asked if there would be grandfathering. Mr. Topping said "it is now 2013 and there's some 50,000 ships in the world and that there's a very small percentage of those ships that actually have functioning ballast water treatment systems fitted and installed," though the goal is to have all ships fitted by 2016. 23001

Mr. Robinson asked if an initial port state control inspection includes a cargo tank or ballast tank inspection. Mr. Roussel said it may not, but the document review will show whether one has been done. In the event of a discrepancy, an inspection can be required immediately. "We have not hesitated to do this. Our records show it. The detentions rate is there. It's not very large but it's something that we're used to." Mr. Topping added that a refractometer test provides a "simple screening inspection that they have carried out the ballast water exchange as they've been required to do." 23018

Inspection performance by organization

Mr. Robinson turned to Figure 5: "Ships Inspected, Ships with Deficiencies, and Ships Detained by Recognized Organizations" [Adobe 16]. He noted that 184 ships certified by Det Norske Veritas (DNV) received inspection in Canada, 62 had deficiencies, and 3 were detained. (Compare to the China Classification Society: 23 inspections, 13 with deficiencies, none detained). Mr. Roussel explained that the recognized organization (RO) for certifications are designated by the flag state where the vessel is registered. He said that it is a performance measure to have a better performing certification, and hence a "sales pitch" to vessel owners to "fly with my flag … and "use this RO." 23029

Mr. Robinson asked about the IMO requirement that ships to be delivered on or after 2016 would require cargo tanks coated top and bottom during construction. Mr. Michael Dwyer of Transport Canada said that coating of cargo tanks is already not uncommon, and that "Corrosion … of ships is a natural condition. From new until end of life, it's something that's monitored and addressed, mitigated. … The pervasive opinion is that coating tanks is of value." 23041

Stats on port state inspections in Canada

Mr. Robinson noted from evidence showing the number of port state inspections in the Pacific Region from 2007-2011, that it ranged from a low of 23 in 2011 to a high of 45 in 2010. [E9-21-06, Adobe 5, IR response 3.1(g)]. He asked how many were conducted in 2012. Mr. Roussel said they have been "pretty steady numbers" since there have been no new projects that would cause an increase. 23057

Mr. Robinson asked about the largest oil tanker inspected in the Pacific Region from 2007-2012. Mr. Roussel replied, "They're Aframax … in BC. In the Atlantic, we have VLCCs in the port of St. John, New Brunswick and VLCCs also in Point Tupper in Nova Scotia. That's the two places where we have VLCC inspection." Mr. Robinson asked how long an inspection might take (4-6 hours for a 300,000 tonne bulk carrier, perhaps twice that if cargo tanks are being inspected), and how many personnel in the Pacific Region do inspections (43). 23062

Mr. Roussel said that if the NGP moves forward, Transport Canada intends to locate an office in Kitimat with 4-6 staff to accommodate all project likely to proceed in the Kitimat area. 23084

Detaining vessels with deficiencies

Mr. Robinson asked about the distinction between the statement that "*Vessels […] found to be in serious violation of standards are detained in port until their deficiencies are addressed*," and the statement elsewhere that uses the phrase, "*may be detained.*" [Exhibit E9-6-15, Adobe 12] Mr. Roussel said that the decision is a discretionary one made by the inspector, and that "Deficiencies … that require detentions will be in the form of the certifications of the vessels, the inspections that were supposed to be in place, International Ship Management System (ISM Code) … deficiencies have been found, and any other elements regarding structural or machineries type of deficiencies, you will not let the vessel continue its route. You will require that the flag state get involved and the recognized organizations. You have to have substantive evidence to make the decisions." 23089

Mr. Robinson asked what would happen if a significant structural defect were found in a vessel at the Port of Kitimat, where no repair facilities exist. Mr. Roussel replied that the ship would go "off charter" meaning the owner would have "lost his contract to take that cargo and then … needs to make arrangements to get the vessel repaired." Some repairs can be done while at anchor, some require shore bays where a ship can be taken or towed. "But the physical dry docking of a ship … we don't have those capacities for these types of vessels on the West Coast." 23101

Berthing visibility limits: keeping up with the updates and errata

Mr. Robinson put up a TERMPOL review report [E11-3-2, page 15] and asked the witness panel to review Recommendation 1: "*The proponent should notify the relevant authority if it wishes to alter any of the commitments, operational parameters or characteristics of the project, so the authority can review the safety elements of the changes.*" He asked if it is Transport Canada's position that NGP should implement everything recommended in the TERMPOL studies. Mr. Roussel said it was, unless the proposal that is before them changes. Mr. Robinson said, "The original TERMPOL documents suggested that visibilities less than one nautical mile were problematic for berthing and de-berthing and that their operational limits would be set at something in the one to two nautical mile range." He then put up NGP's Shipping and Navigation Errata [Exhibit B210-2, Adobe 4, #7] in which NGP "suggested that their operational limit for berthing and de-berthing in terms of visibility would drop from one to two nautical miles

to about 500 metres." Mr. Roussel verified that "Transport Canada has not evaluated the safety impacts of this change," and that berthing is under the Pacific Pilotage Authority, "an arm's length Crown corporation under the Department of Transport." 23107

Spill response requirement is less oil than fills a single compartment of a VLCC

Mr. Roussel confirmed that "Transport Canada's Environmental Protection Prevention and Response National Preparedness Plan" and "a response organization such as WCMRC (Western Canadian Marine Response Corporation)" are based on a spill of up to 10,000 metric tonnes [Exhibit E9-21-12, Adobe 66, Response 1.37 c]. Mr. Robinson noted, however, that "a VLCC may have a cargo hold with 20 compartments of 16,000 metric tonnes each." He asked if "the Government of Canada's planned response capability is less than the volume of a single compartment of a VLCC?" Mr. Roussel replied, "That's correct." 23126

Designated ports and public ports

Mr. Robinson put up a Coast Guard submission [Exhibit E9-6-13, Adobe 53, para 30-35] to discuss the meaning of "designated port." Mr. Kidd agreed that the term means a port which is designated under the Canada Shipping Act and, in particular, under the Response Organizations and Oil Handling Facilities Regulation. Mr. Robinson put up the Regulation [Exhibit E9-20-2, Adobe 5] to discuss response times for the four tiers of response. Tiers 1 and 2 (150 tonnes and 1000 tonnes of oil spilled respectively) are defined for designated ports; Tiers 3 and 4 (2500 tonnes and 10,000 tonnes) are defined for primary response areas or for enhanced response areas. Mr Kidd confirmed that Kitimat port, Kitimat Arm and Douglas Channel are not within any of these areas. 23139

Mr. Robinson asked why the Coast Guard recommended that Kitimat "should be treated as if it were a designated port," instead of formally designating the port. [Exhibit E9-6-13, Adobe 54, para 35] Mr. Kidd replied that Kitimat does not meet the condition for designating a port which require that 500,000 tonnes enter the port on a three-year consecutive basis. It would, however, if NGP were to proceed. Mr. Kidd noted other potential delays or impediments to a designation, including the need for a Ministerial order. 23168

Mr. Robinson asked if designating Kitimat as a port would put additional requirements on the Coast Guard or Transport Canada. Mr. Roussel appeared say that it would entail more for Transport Canada. Mr. Carrigan said it would not put additional responsibility on the Coast Guard. 23174

Dash-8 and sensing gear

Mr. Robinson asked about the the National Aerial Surveillance Program (NASP). Mr. Roussel said "We have three aircraft." "[The] Dash-7 is used principally on the Great Lakes and the Arctic in the summertime and the two Dash-8s [are stationed on the] East and West Coasts. The plane is for the West Coast is based in Vancouver." Mr. Robinson asked about the remote sensing equipment on the West Coast Dash-8. Dr. Carl Brown said, "The sensor sweep … is an MSS-6000 system from Swedish Space Corporation. It has infrared, ultraviolet, side looking airborne radar, forward looking infrared, normal high definition video cameras and still photographic cameras. And I believe it's got AIS

systems so it can track vessels and has a side link to download that data in real-time." 23179

Mr. Robinson asked if the infrared can detect oil at the surface. Dr. Brown said it could. He explained that "Thermal infrared is the best one and that relies on the difference in the temperature between the oil on the surface and the water." He said that infrared cannot detect oil below the surface. Ultraviolet can also detect oil on the surface because it has a higher reflectivity than water, but the Dash-8's UV cannot detect oil under the surface. The video equipment will show oil depending on "the look angle," and depending on the lens can give "much better, higher resolution" than the naked eye at that altitude. 23186

Mr. Robinson asked about the patrol cycle for the West Coast plane. Mr. Roussel verified that it "is 500 to 600 hours per week, [or] equivalent to about two or three flights per week." Mr. Roussel also agreed that "the flights typically would be of duration of two to three hours." [Note, which does not make arithmetic sense.] He said that typically the plane will not fly to Kitimat from Vancouver and back on a frequent basis, but rather will be relocated to Prince Rupert or Kitimat for periods of time. 23202

Mr. Robinson asked if given the anticipated increases in oil and LNG traffic, "are there any plans to add additional capacity for the NAS program?" Mr. Roussel replied, "Yes, that's the intent." 23212

2010 report on Canada's level of preparedness to deal with oil spills

Mr. Robinson said, "In the fall of 2010, the Commissioner of Environment and Sustainable Development issued a report on Government of Canada's level of preparedness to deal with oil spills from ships and I just wanted to revisit some of the recommendations from that report and the … government departments' responses to [test] where we are at today." He put up Exhibit D122-7-14.which contains a number of recommendations, and reviewed the status of those recommendations with the Government of Canada witnesses. The discussion is particularly detailed and shifts back and forth between exhibits from the evidence. Please read this directly in the transcript, from 23214 to 23338

Topics discussed in this exchange include:

- Recommendation 1.32 [Adobe 39]: Scoping of the risk assessment of oil spills, for which bids are currently being evaluated to do the risk assessments for the three coasts. 23222
- Recommendation 1.41 [Adobe 40]: Review national emergency plans. 23244
- Recommendation 1.42 [Adobe 40]: Establish process to review and update emergency management plans. 23274
- Recommendation 1.45 [Adobe 25]: Coast Guard to develop competency profiles for all environmental response positions. 23314
- Recommendations 1.53-1.55 [Adobe 27]: Age and condition of spill response equipment, acquisition of new barges. 23321

NGP's General Oil Spill Response Plan (GOSRP)

After reviewing the paragraph which spoke about details yet to be completed in NGP's General Oil Spill Response Plan [Exhibit E9-6-15, Para 145], Mr. Robinson asked, "Is Transport Canada required to review and approve the marine oil spill response plan when it's prepared?" Mr. Kidd said these plans are "reviewed for compliance. They're not approved. If a plan isn't in compliance with the regulations, the operation can't proceed." With respect to enforcement, Mr. Kidd said, "There's actions we can take." 23339

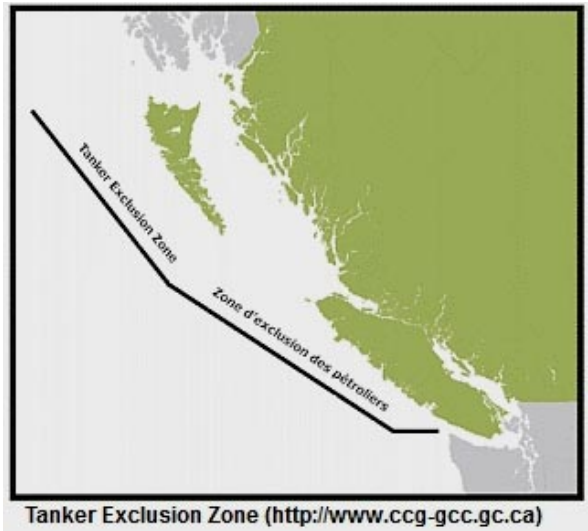
Dispersants could violate the Fisheries Act, use is legally precluded

Mr. Robinson asked if "the use of a dispersant could constitute a violation of section 36(3) of the Fisheries Act." And if so, would an approval to use a dispersant be needed from DFO. Mr. Grant Hogg of Environment Canada said, "Yes, it could," but "there are no regulatory approval mechanisms that would allow the deposit of a deleterious substance into fish-bearing waters absence of regulation. And right now, there is not a regulation that would allow for the use of a dispersant." Mr. Robinson: "So does that, in effect, preclude the use of dispersants?" Mr. Hogg: "Legally, yes." 23358

Tanker Exclusion Zone (TEZ)

Mr. Robinson returned to the Written Submission of Transport Canada [Exhibit E9-6-15, Adobe 20] and quoted, "*More than 300 tankers transit annually along the BC coast while respecting the Tanker Exclusion Zone.*" He asked about the effectiveness of the voluntary zone. "Are there tankers travelling from Alaska to Puget Sound that do not respect the voluntary exclusion zone?" Mr. Turner said they have no information about this. Mr. Robinson also quoted, "*...the Tanker Exclusion Zone was never meant or designed to prohibit all tanker traffic or tankers calling on Canadian ports.*" 23370

He put up a printout from the Coast Guard website, the statement that "*The purpose of the TEZ is to keep laden tankers west of the zone boundary in an effort to protect the shoreline and coastal waters from a potential risk of pollution.*" [AQ93] He asked whether the TEZ was established when there were significantly fewer oil tankers proceeding to Canadian ports than what is envisioned if NGP proceeds. Mr. Walters said there will be more tankers, but there have been "tanker vessels moving in and out of Canadian waters for decades." Mr. Robinson said that those tankers are no larger than Aframax class. Mr. Roussel said "the actual numbers of ships [with NGP] will not even reach … the number of vessels [of all types] that used to go to Kitimat in the past 20 years." 23379



Tanker Exclusion Zone (http://www.ccg-gcc.gc.ca)

Mr. Robinson stated his understanding that the TEZ "was established to be a zone where there was a risk that a disabled tanker could run aground before assistance could reach it." Mr. Turner said that it was "about 75 nautical miles off of Haida Gwaii." Mr.

Robinson said, given the stated purpose of the TEZ, "surely the danger is the same whether the ship is going north-south or east-west. Should there be some kind of response capability based somewhere to address this very concern?" Mr. Turner replied, "This is a risk mitigation measure for these tankers that were not coming to Canada. So it makes sense that as a safety precaution, that you request these tankers stay a safe distance off of the Coast of Canada." Mr. Roussel said these tankers will have "tethered tugs, escort tugs." Mr. Turner said, "We don't regulate standby tugs or rescue tugs. … We haven't done that in Canada. So there is no requirement or regulatory regime for that." 23398

Research and reports on fate and effects of spilled oil

Mr. Robinson asked about a meeting in Halifax in March 2012 which Dr. Hollebone attended. [Exhibit E9-21-04, Adobe 11] He said, "The purpose of the meeting was to map out how future research ("*to better understand the fate, effects and available technology for these [petroleum] products.*"). Was there a research plan of some sort that came out of that meeting?" Dr. Hollebone replied, "no concrete plans … came out of that meeting directly. … That's all we have to say at this stage." 23468

Mr. Robinson put up a document [Exhibit D122-11-15] which describes a project titled "Investigation of Physical and Chemical Causes of Heavy Oil Submergence," funded by the Coastal Response Research Centre (CRRC), itself a project of the National Oceanic and Atmospheric Administration (NOAA) and the University of New Hampshire. Dr. Hollebone was the principal investigator for the project. 23485

Mr. Robinson noted the project objectives, "to examine the causes and effects of density changes in heavy petroleum oils that prompt just-buoyant oils to become overwashed and sink." Dr. Hollebone said, "This project was particularly targeted at refined heavy fuel oil products, such as would be used in marine shipping." Though the document is dated 2008, Dr. Hollebone said the work was completed through 2011 and 2012, the report currently in its final review and will be released in the second half of 2013. 23495

Mr. Robinson put it to Dr. Hollebone: "The question of whether an oil will float or sink or submerge depends very much on a number of things, the properties of the oil; the temperature of the salinity; photo-oxidation; wind, wave and other conditions; presence or absence of particulate matter in the water column." Dr. Hollebone concurred, but declined to answer questions about diluted bitumen and sinking behaviour, referring Mr. Robinson to the evidence. 23511

Comparing NGP and Environment Canada data

Mr. Robinson focussed on Table 1, "Physical Parameter Data Set provided in TERMPOL 3.15 document compared with similar oils measured by Environment Canada." [Exhibit E9-2-1, Adobe 117] – this is data submitted to TERMPOL by NGP related to weathering of oils. Mr. Robinson's questions were to ensure he understood what was contained in the table, and its significance. Of the Environment Canada, Dr. Hollebone said that subsequent to publishing the data, he concluded that "the Wabasca Heavy had already been significantly weathered by the time we got it." With respect to emulsions, Dr. Hollebone explained that there are four classifications: no emulsion – oil and water that separate immediately; mesostable – which will separate after a certain period of time;

stable – a persistent state. The fourth class is "entrained water," which is "not a true emulsion in the sense that it's stabilized by the chemistry of the oil but simply that the viscosity of the oil is so high that the water will become trapped in the oil. This is typical of high viscosity products." Mr. Robinson asked if this oil was at the surface or in the water column. Dr Hollebone replied, "All of these emulsions floated." 23520

Resins and asphaltenes and emulsions

Mr. Robinson asked about the statement, "*For assessing emulsion behaviour and for predicting oil fate, of particular interest for spill modeling and risk assessment are data on the resin and asphaltenes values.*" [Adobe 96, Question 100] He asked why these are of significance. Dr Hollebone said he would explain what they are, then talk about why they might be important. 23565

Dr. Hollebone's explanation and Dr. Heather Dettman's contribution are intensely technical and best read in the transcript from 23569.

Dr. Hollebone said that asphaltenes and resins are "two of the quantities that people look for when they're trying to assess whether an oil may or may not form an emulsion. There are various theories as to why these two sets of compounds play the roles they do." 23591

Mr. Robinson asked if a relationship has been found between asphaltene and "the propensity to submerge as the oil weathers." Dr. Hollebone said "I don't know if anybody's made that direct a link. In fact I wouldn't even say that people have made a direct solid link between asphaltene content and a propensity to form emulsions." 23600

Risk analysis and information gaps

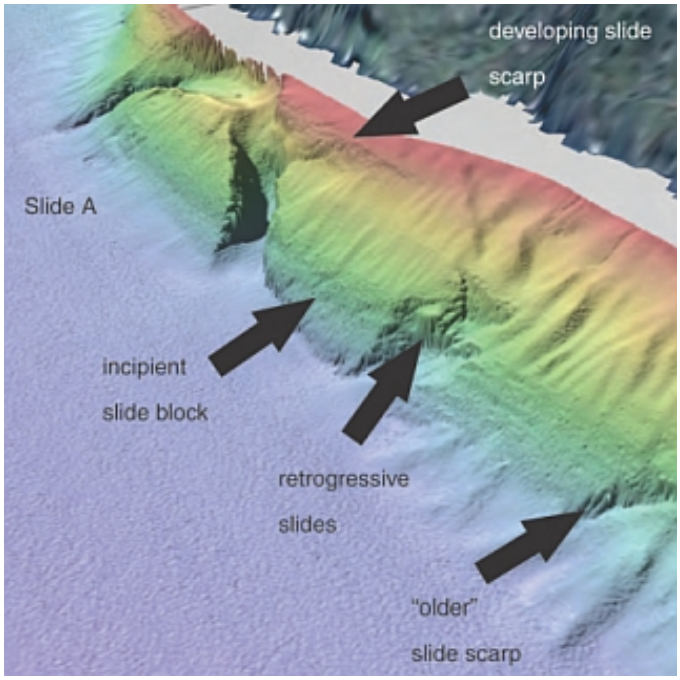
Mr. Robinson asked questions relating to risk and the information that is known and not known about the fate and behaviour of the oils to be carried in NGP. "In terms of assessing risk then, you have … discussed the uncertainties around the fate and behaviour of these oils and the need for further research. Am I correct then that at this point in time we really cannot accurately assess the risk associated with these oils?" Dr. Hollebone replied, "Our evidence specifically relates to consequence and consequence analysis. … The gaps we've identified so far are with relation to that analysis - how would we analyze the consequences of a potential spill?" 23604

Oil Sands Products Training conference

Mr. Robinson referred to his AQ93-B, the proceedings from a conference entitled "Oil Sands Products Training" sponsored jointly by the Maine Department of Environmental Protection and the United States Environmental Protection Agency, on December 4 & 5, 2012. Dr. Hollebone said, "The purpose of this workshop was to provide training and a discussion for … spill responders … regulators [in] Maine [who] anticipate possible transport of diluted bitumen products in their state." Mr. Robinson summarized from a two-page précis [Adobe 10&11] of Dr. Hollebone's presentation, "Little is known about the impacts or long-term persistence of oil sands products in the environment and more research is needed." Dr. Hollebone said that some of what was given as his presentation was not entirely correct, though he agreed with Mr. Robinson's summary. 23616

Mr. Robinson moved to Adobe 265, notes taken by a participant in Dr. Hollebone's presentation. He asked about the text that says, "Slides not posted, presentation not filmed. Presentation can't be publically shared due to current litigation." Considerable discussion ensued, ending with an undertaking [U-86] that Dr. Hollebone's presentation would be filed with the Panel. [Exhibit E9-70-2]

Submarine slope failures and tsunamis in Kitimat



Mr. Robinson turned to "Submarine Slope Failures and Tsunamis Report" by Mr. Kim Conway and others [Exhibit E9-30-2, Adobe 16] and quoted "A large incipient failure has been tentatively identified immediately adjacent to Slide A." He asked what "incipient" means in this context. Mr. Conway said, this could be "an indication of possible future landslides of the same scale in this area." 23705

Mr. Robinson asked about the 1974 and 1975 slides in Kitimat Arm [Adobe 13]. Mr. Conway described their causes and consequences. The 1974 slide was the result of a number of natural events, whereas the 1975 slide was caused by construction at Moon Bay. "The area that we've outlined in our figure … shows the distribution of that material on the fjord floor. That area is the combined result of both of those slide events. [The slide materials] essentially form an amalgamated mass on the seabed that's about 5 to 7 or 8 metres thick at the thickest. Dr. Gwyn Lintern said, "The tsunami from the first slide I believe was 6.7 metres." 23710

Mr. Robinson asked "Could dredging of material that will be part of the terminal construction be similar to undercutting that occurred in the 1974 slide?" Mr. Conway said, "The situations are quite different," and Dr. Lintern agreed, saying that the dredging for NGP will be 1 to 2 metres. 23724

Examination by Ms. Joy Thorkelson for United Fishermen & Allied Workers Union 23741

Ms. Thorkelson introduced herself as a union representative, not a lawyer, and said, "Our members have put together the following questions and concerns." Her first question, "Are there just the three departments responsible for marine oil spill response: Transport Canada, the Coast Guard and Environment Canada?" Mr. Roussel agreed, and Mr. Murdock said other departments could be involved, "as needed." 23742

Spill response sequence with and without Northern Gateway

Ms. Thorkelson put up Enbridge's spill response diagram [Exhibit B3-37, Adobe 36] then turned to "a written overview about the roles and responsibilities from Enbridge's point of view. (Table 5-1, "Typical Sequence of Initial Response Actions ") [Adobe 39]. She asked, "If there's an oil spill, from the Government of Canada's point of view … what happens? Could you walk us through it? … Then spell out the differences between [the response if NGP is or is not involved.] … If a coal -- say if a carrier broke up that had come into Prince Rupert didn't have all these special things that Enbridge says it's going to do, … what would your relationship be with that spill as compared to a spill if a Enbridge tanker broke up." 23762

Mr. Murdock from the Coast Guard, as well as Mr. Kidd and Mr. Roussel from Transport Canada, contributed to the reply. "The Coast Guard is the lead agency," said Mr. Murdock, "but we don't act alone." With respect to Northern Gateway "overseeing the response, management or response operations, Mr. Kidd said, "That would be directly related to their certification as a response organization (RO)." "We're dealing with a little bit of a crystal ball," said Mr. Roussel. "Until what's proposed by Enbridge is formally in place … we don't have the full picture." 23770

Discussion continues about the organization and command structure for spill response within government. All three agencies – Coast Guard, Transport Canada, and Environment Canada are available 24 x 7. According to Mr. Hogg, Environment Canada is available to provide "weather information, or fate and behaviour, or what have you. [We] would reach into our department to get that information and provide it very quickly back to Coast Guard. … If it was a spill that was quite complex and significant … Coast Guard as the lead agency, could ask Environment Canada to co-chair this mechanism that's been called a REET, a regional environmental emergency team. … It's a gathering of experts." 23799

The buck stops with the Coast Guard

Ms. Thorkelson: "Please don't tell me the buck stops at Mr. Harper. Where does the buck stop?" She is required to rephrase the question "with a little less politics in it." Mr. Murdock replied, "The buck stops with the Canadian Coast Guard. The final decision is always up to the Canadian Coast Guard." 23824

Ms. Thorkelson asked, "Who does the public talk to … who do the fishermen talk to if they think something is going wrong with the response?" Mr. Murdock said that within the "Incident Command System" (ICS) "there would be a place at the table … for stakeholder groups … community groups, fishermen, First Nations, people with local concerns." Ms. Thorkelson asked what experience they've had with communication difficulties "so that things may not have happened in a timely fashion." Mr. Murdock said he could not give an example. 23844

Ms. Thorkelson returned to NGP's spill response evidence [Exhibit B3-37, Adobe 39] and the statement that "*Northern Gateway will oversee the response, management and implementation of the response operations and meet corporate commitments and objectives.*" She asked, "We're not sure what corporate objectives that they would be

meeting. Do you believe that the group who is tied to the Proponent should end up being a response organization because would they be looking after the interests of the public or would they be looking after their own interests?" Mr. Murdock reiterated that the Coast Guard is the lead agency. Mr. Roussel reiterated that "This is part of the voluntary portion of Northern Gateway Project. None of our organizations will lose their power over any private enterprise. … That's got to be very, very clear." Mr. Topping said that national and international laws govern "how to report and who to report to." 23854

Questions relating to the BC government requirements

Ms. Thorkelson noted the BC government's requirements "to consider support for heavy oil pipelines." "B.C. says that the province is technically responsible for all land between the high and low water mark in the intertidal zone as well as the seabed of the Strait of Georgia, Juan de Fuca and Queen Charlotte Sound, Johnstone Strait and the coastal seabed between many major headlines along the outer coast. … Who is responsible for the clean-up of our beaches?" Mr. Murdock replied, "If it's a ship source oil spill, the federal government is responsible through the Canadian Coast Guard … to ensure an adequate clean-up." Mr. Roussel added, 'I don't think you need to worry about the area where it will go; it's where it's from." 23881

Ms. Thorkelson: "Who will pay for the cost of clean-up of the intertidal zone if it exceeds the $1.3 billion spill fund?" Mr. Marier replied, "The regime there is to compensate for all claims that are admissible under the regime, regardless of who incurred those costs or who suffered that damage or that loss." 23889

Unified Command

Ms. Thorkelson noted that "B.C. is critical of the command structure for oil spill response. They seem to feel a different structure with the Ministry of Environment taking a lead role would be better than the present Canadian government structure." Mr. Murdock replied that "[BC] uses ICS as well as most municipal governments and so Coast Guard recognized this and … we're moving into the ICS format." Ms. Thorkelson: "How would you describe the ICS as different than what you have presently or what you had prior?" Mr. Murdock: "The system we used previously … one of my colleagues says it was like ICS light. It was not quite as process-oriented and what I mean by "process-oriented" is that it has a place and a very structured approach." Ms. Thorkelson asked who would be at the command level. Mr. Murdock said it would be shared. … Unified Command is the command structure we would adopt. … [But] the Canadian Coast Guard would retain a 51% vote." 23898

Command structure in the UK

Ms. Thorkelson said that with the Exxon Valdez, Alaskans had to but booms around their own hatcheries because the response was so slow. She mentioned "a system that was adopted in the United Kingdom for authority over spill response," and asked for a description of the difference between "the command centre committee kind of structure and what they're doing now in the U.K." Mr. Roussel said it is the "Secretary of State in Maritime Salvage and Incident which, in principle, is one command individual who is designated by the Government and the Government has only two things to say to that individual …"You support me" or "You sack me". He's the ultimate command individual

in case of incidents." Mr. Roussel added, 'It's a very interesting regime, lots of power but very different than what we have at this juncture." 23921

Compensation in the commercial fishery: quota vs non-quota fisheries

Ms. Thorkelson said, "We're concerned about … fishermen's claims that are going to be supported and what kind of evidence do we have to provide as to loss of income." Mr. Marier replied that the information was provided as the International Oil Pollution Compensation Fund "Guidelines for presenting claims in the fisheries, mariculture and fish processing sector." [Exhibit E9-6-22] 23938

Ms. Thorkelson said this has been mostly used on the East Coast in quota fisheries, "whereas two of our major fisheries on this coast are not quota fisheries. … How does a commercial fisherman who can't rely on predictions from the DFO … make a claim on the loss of fish?" Mr. Marier's reply was unspecific and speculative. He said that the Compensation Fund and the main insurers for ship owners – the P&I Clubs – "have decades of experience in dealing with fishery claims. … There's a lot of experience there and there's a lot of experts." If a claim and compensation was not settled satisfactorily, he said that the appeal process is "through the courts." 23947

Examination by Mr. Bernie Roth for Northern Gateway Pipelines 23972

Mr. Roth introduced himself to the witness panel by explaining that his questioning will be focussed on or leading up to two issues. The first is "directed towards spill response, the timing of that and whether it's reasonable that that type of information can be provided in a post-approval context." The second is a report by Dr. Jeffrey Short "regarding the issue of whether or not diluted bitumen submerges, sinks, what it does" filed as evidence by the Gitxaala Nation. [Exhibit D72-80-2] 23972

Environment Canada's responsibility for a spill response system

He asked if "Environment Canada (EC) has the responsibility for operating a 24/7 spill response system." Mr. Hogg agreed. "EC available to provide science to lead agencies in response organizations 24 hours a day, 7 days a week." Mr. Hogg agreed that EC provides scientific and technical advice on oil properties, incident countermeasures, and spill modelling. Mr. Roth asked if EC "has the responsibility of ensuring response and capability is both maintained and tested," quoting from [Exhibit E9-6-32, Adobe 15], then asked, "How does that responsibility relate to the activities associated with the project the JRP is considering?" Mr. Hogg: "We provide the scientific advice." 23984

Mr. Roth asked if EC's response obligations apply only to tankers. Mr. Hogg replied: moving and fixed marine ships and facilities and terrestrial facilities such as pipelines, trucks and trains. 24011

Fate of oil a matter of physics and chemistry

Mr. Roth addressed Dr. Hollebone and mentioned "Oil Spill Science and Technology," a book edited and largely written by Dr. Merv Fingas. Excerpts from Chapters 1 & 3 are two of Mr. Roth's aids to cross examination [AQ94-A, AQ94-B]. Dr. Fingas is an expert on the fate and behaviour of oils. Mr. Roth noted that Dr. Fingas is a physicist, and Dr.

Hollebone is a chemist, and he suggested that the fate and behaviour of oil question may be a matter of physics more than chemistry. Dr. Hollebone said it is a multi-disciplinary study, and that he would not agree with Mr. Roth, that you need to understand both the "physical process models" and the chemistry. 24017

Tanker spills make up less than 5% of all marine oil pollution

From the Chapter 1 excerpt, Mr. Roth quoted: "*The public has the wide misconception that oil spills from tankers are the primary source of oil pollution in the marine environment. … These spills still make up less than about 5% of all oil pollution on the seas. … In fact, … half of the oil spilled in the seas is the runoff of oil and fuel from land-based sources rather than from accidental spills.*" None of the witnesses are able to comment substantively about the statement. Mr. Roth said he more interested in the "less than 5% from tankers" comment, particularly since "for the west coast of Canada, it would actually be no oil introduced." Mr. Marier said, "more than half of the volume of oil spilled from ships did not come from tankers," and this is supported by statistics from the International Tanker Owners Pollution Federation (ITOPF). Mr. Roth said, "That's exactly where I was going." 24055

Most of it is intermediate and heavy fuel oil

Mr. Roth noted that there is a description of intermediate fuel oil (IFO) and bunker fuel in the excerpt from Chapter 3 of Dr. Fingas book [AQ94-B]. IFO is a mixture of heavy residual oil and diesel fuel used primarily as propulsion fuel for ships. Bunker fuel, such as Bunker C, is a heavy residual fuel remaining after the production of gasoline and diesel fuel in refineries is used for heating plants and as a ship fuel. Mr. Phil Murdock from the Coast Guard said that Bunker C is becoming less favourable and modern ships are moving to diesel fuels. Mr. Topping said "after January 1st, 2015 in Canada, the sulphur content in the fuel must be less than .1 percent. This means … that the ships can no longer use the IFO or bunker fuels. They would have to use a distillate fuel." 24076

Tomorrow: thickness of oil, wind, thermal expansion, methodology

Mr. Roth said, "It's a very complex discussion I want to have [tomorrow] on the fate and behaviour of oil in the environment and I want to get into the thermal coefficients of expansion of water versus oil. If I can tell Dr. Hollebone exactly where I want to go, I think we can expedite it otherwise, we might be in a little bit of a quagmire." 24093

Mr. Roth said he wants to know what Dr. Hollebone thinks of Dr. Short's analysis related to thickness of oil and rate of evaporation. According to Mr. Roth, Dr. Short says thickness is important; Dr. Fingas is saying it is irrelevant. 24097

Dr. Short says wind is an important factor in modelling; Dr. Fingas says, "Forget about wind. … Try to model it like Dr. Short did, you can run up errors of 400%." 24092

Mr. Roth is also planning to talk about "relative coefficients of thermal expansion of waters versus oils, which is what Dr. Short gets into." 24101

Mr. Roth's last topic will be Dr. Hollebone's test methodology, again in comparison to Dr. Fingas. 24108