Enbridge Northern Gateway Project
JRP Hearing Notes

Day 41– November 27, 2012 – Prince George – Vol 109

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Introduction of Haisla Nation Panel 4 by Ms. Jennifer Griffith 5370

Ms. Griffith introduced Haisla Nation Panel 4, Dr. Ellen Rathje and Dr. Praveen Malhotra. Dr. Rathje was qualified as an expert in the area of geo-technical engineering.

Her resume is Exhibit D80-27-17 and her direct evidence is Exhibit D80-87-2.

Dr. Malhotra was qualified as an expert in the area of seismic risk. His resume is Exhibit D80-27-15 and his direct evidence is Exhibit D80-87-3.

Examination by Ms. Kathleen Shannon for Northern Gateway Pipelines

5402

Ms. Shannon commented that Dr. Rathje has done a number of studies characterizing seismic hazards, predicting earthquakes and predicting ground motion, but does not appear to have any experience in risk mitigation for pipeline projects or in designing pipelines. Dr. Rathje said that is mainly correct, but she does not predict earthquakes, she predicts the effects of earthquakes.

Referring to Dr. Rathje's evidence, "Geohazard Issues for the Enbridge Northern Gateway Project" (Exhibit D80-27-16), Ms. Shannon said, "you describe some issues or concerns you have regarding potential geohazards in the area of the pipeline and how to assess and mitigate those risks." "Some of those recommendations will need to be addressed by Northern Gateway Pipelines (NGP) during detailed engineering but I believe a number have already been addressed… And that's what I'd like to ask you about today. 5416

Understanding geohazards with updated maps

Dr. Rathje had recommended maps at 1:25,000 scale for geohazard analysis, though in the discussion it emerged that her concern was more that information which is gathered must be communicated by maps, and that Northern Gateway was not getting its information onto maps completely or promptly. Ms. Shannon took her to the semi-quantitative risk assessment (SQRA) (Exhibit B75-2) where many factors are identified which went into the failure likelihood assessment. Dr. Rathje said, "This shows that a lot of information was taken into account. The key is then presenting the results of that analysis in a visual form, such as maps, so that we can fully understand the density of hazards along the … pipeline route." She noted that the sensitive marine clays near Iron Mountain are not indicated. 5425

Dr. Rathje recommended assessing geohazards in a five km corridor. Ms. Shannon noted that in the SQRA, AMEC said it was not limiting itself to a certain km width. Dr. Rathje replied, "I was very pleased to read that." 5461

Need proposed mitigations for geohazard across the entire system

Noting that Dr. Rathje had discussed the need for identification of and specific information for mitigation measures, Ms. Shannon mentioned the Kitimat River Valley study (Exhibit B83-8) and said that it includes proposed mitigations. Dr. Rathje said "In those six cases, yes, they looked at detailed mitigation concepts." What would be useful would be … examples of the mitigation measures for all of the types of geohazards across the pipeline route. 5476

Dr. Rathje had asked for a schedule for in-line inspections (ILI). Ms. Shannon pointed her to NGP's commitment table (Exhibit B165-3) where the company has committed to

ILI before putting the pipeline into service and the frequency of ILIs across the system by a minimum of 50 percent over the current standards. Dr. Rathje asks what is the rate of those inspections. Ms. Shannon doesn't know. 5506

Appropriate return period

Dr. Rathje had written, "The return period for the design earthquake ground motions has not been specified. The … seismic design cannot be determined without … an appropriate return period. … Building codes are based on … 2,475 years." Ms. Rathje was unwilling to say what it should be, but said, "Critical facilities that have significant environmental or societal impact, often you may go beyond 2,475." Ms. Shannon quoted from Exhibit B137-2: "Further evaluation of these mechanisms will be completed in detailed engineering, including potential for ground instability failures induced by seismic ground motion, corresponding to a 2475 year occurrence interval." She said, "This confirms Northern Gateway will design the pipeline to a mean return period of 2,475 years for seismic ground motion as you suggested." 5526

Ms. Shannon noted that Dr. Malhotra's experience is in the insurance industry assessing and mitigating seismic risk. She asked, "You didn't have any foundational experience in structural design of seismic risk?" His answer was not clear, though he did agree that he had no experience with buried transmission pipelines. 5554

Design to code vs designing beyond the code

Ms. Shannon said, "My impression is that your view is that code-based seismic design is not transparent enough and probabilistic seismic design is the better design approach. Dr. Malhotra said, "Code-based design is just a minimum requirement. [Others] often times go well beyond the code." Ms. Shannon: "So, … a probabilistic seismic design is better than a code-based design?" Dr. Malhotra: "Well, that is true, yeah." 5586

Dr. Malhotra's evidence is "Limitations of Code-Based Seismic Design" (Exhibit D80-27-14). Ms. Shannon lead into a discussion about the use of "mean return period" (MRP) in code-based design. If the starting MRP is 2475 years, that would result in a 1.2% chance of the maximum earthquake being exceeded in 30 years. Dr. Malhotra said that ASCE 7 suggests then applying a two-thirds factor, reducing the MRP to 1400 years, which would result in a 2% chance of exceedance in 30 years. Ms. Shannon noted that NGP has agreed not to scale its MRP in this way so it is using the MRP of 2475 years.

Dr. Malhotra said, "Yeah. … But in a code-based world there are many factors which are applied. … There is another factor in the code which is called the R-factor, and that factor, you'll be surprised, it is three or four and when you reduce by that factor, now you are completely in the uncertain territory -- you know, you don't know what risk you are taking. The code-based design does not say that there'll be no damage … during the earthquake. It says that the damage will be there, but they don't quantify it for you." 5620

Dr. Malhotra said that even if all the steps are transparent, you get something built to the code. But "that is the only thing you can say. … It meets the code." If somebody asks, what risk am I taking, you don't know. 5631

Ms. Shannon: "When you apply a probabilistic seismic design, … you choose a risk level and design for that risk level?" Dr. Malhotra: "That is right." You choose a risk level that makes sense to all the stakeholders, and then you design to meet that particular risk level. "And you still meet the codes, because codes are the minimum legal requirements, but many times you may have to go above and beyond that to satisfy the risk target." 5639

Ms. Shannon asked whether, if you design to code, and design ground motions are not exceeded, does the code ensure that there will not be a leak? Dr. Malhotra replied that with the two-thirds factor and/or the R-factors, there will be some damage to the tank but code does not tell you if the damage will result in a leak. 5650

Where consequences are high, design beyond the code

Dr. Malhotra: "When you have a large project with …very high consequences of a failure, then it is expected that you should go beyond the code and assess the risk, quantify the risk." 5666

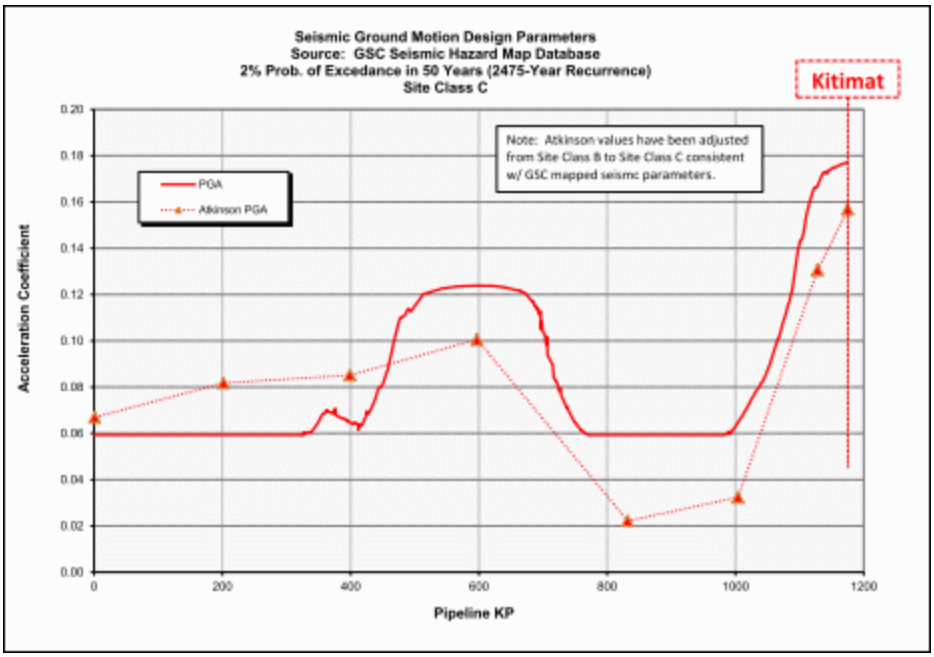
Pipeline risk probabilities increase with length

Dr. Malhotra stated in his evidence that where a MRP of 2475 years is adopted for any specific point on a pipeline, "the design accelerations for pipelines could have 10 times greater chance of being exceeded in 30 years because pipelines can experience earthquakes anywhere along their length." 5673

Seismic hazard maps

Referring to seismic hazard maps for the 2010 National Building Code of Canada as an aid to questioning (AQ), Ms. Shannon described them as five maps showing acceleration for firm ground conditions based on a probability of occurrence of 2% in 50 years, or a MRP of 2,475 years. They show the highest acceleration at Kitimat, and decreasing, generally, moving east to Alberta. 5689

Dr. Malhotra said that these are site-specific hazard maps, useful for an individual structure, but not good for a distributed structure like a pipeline. "These are just design code maps … and not a true reflection of the risk." Similarly, with Exhibit B140-12, he said, "This is about site-specific hazard, … looking at single points along the pipeline but … not looking at aggregate hazard. That's a different analysis." His comments about the application and limitations of these maps begin in the transcript at paragraph 5705



Ms. Shannon quoted from NGP's reply evidence, Exhibit B83-2, "Seismic design threats to pipelines generally result from ground movement hazards such as landslides, which are dominant causes of failure in mountainous areas. Seismic wave propagation is essentially no threat to the pipeline. The proposed risk assessment would be of very limited value." To this, Dr. Malhotra said, "This question was completely misinterpreted here. I was not talking about wave propagation. … I was talking about aggregate risk. … It seems whoever wrote this response didn't quite understand the question." 5733

Figure 4.3.1 in the SQRA (Exhibit B75-2) shows unmitigated failure frequencies for individual threats which have been combined probabilistically. Ms. Shannon asked if this was an aggregate assessment. Dr. Malhotra said, "I've not even seen aggregation of earthquake risk so I really cannot say whether this is aggregate risk assessment." Ms. Shannon ended her questions following his comments which continue at 5742

4.3.1 Combined unmitigated full-bore rupture frequencies

To combine the full-bore rupture failure frequency along the pipeline route, unmitigated failure frequencies for individual threats are combined probabilistically. The result is a profile of unmitigated failure frequency along the route that is illustrated in Figure 5.

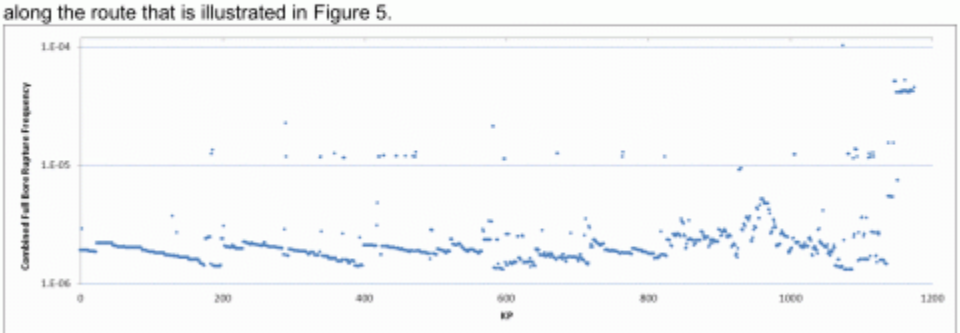


Figure 5: Full-bore rupture unmitigated failure frequency along Route Revision U

Examination by the JRP Chairperson Sheila Leggett 5758

What is required to do aggregate hazard and risk analyses?

The Chairperson asked, "What further work would be required to do … a complete aggregate hazard analysis, as well as an aggregate risk analysis?" Dr. Malhotra replied that pipelines need to be treated differently than tank farms. Assess the hazards and the aggregate hazard if it is seismic. From the aggregate hazard you get the aggregate risk. And then you select your design criteria, what risk makes sense. "Unless you do the risk-based analysis you don't even know whether the project is viable because risk involves cost." 5759

The Chairperson: "Working with what's existing now, the information that's there, what … what additional analysis would you complete in order to deliver what you describe as an aggregated hazard analysis?" Dr. Malhotra: I'm not questioning the geological data and I'm not questioning the information provided by the seismologists. You have to combine the geological information with the seismological information to perform an analysis which is an aggregate hazard analysis, and that I have not seen. That is the first step. 5769

Examination by JRP Member Kenneth Bateman 5772

When should the aggregate hazard analysis be done?

Member Bateman asked if the aggregate hazard analysis should be done during the detailed design phase or before? Dr. Malhotra replied, "I take it as almost necessary to do it first. Any risk assessment has to be done before even the project is undertaken."

Reseating Government of Canada Panel 1

Examination by Ms. Joy Thorkelson for the United Fishermen and Allied Workers' Union 5871

Ms. Thorkelson wanted to know at what level DFO's evidence was reviewed within DFO. It had been prepared by the Ecosystem Management Branch. Mr. Engelsjord said it had been reviewed by the Regional Director General for DFO's Pacific Region. 5929

DFO's mandate with fisheries in the evidence

Ms. Thorkelson noted that DFO's mandate as described on its website gives prominence to the maintenance of sustainable and prosperous fisheries. The mandate as given in the evidence does not give much emphasis to fisheries. Her concern, representing commercial fishers, is that in this proceeding, DFO is not accurately presenting itself. Mr. Shaw objects to her line of discussion and the Chairperson directs her to stay away from argument and to focus on what is in evidence. 5943

Ms. Thorkelson turned to DFO's evidence, Exhibit E9-6-13, and noted that it talks about the policy for the management of fish habitat. Using DFO's Habitat Policy as an AQ, she quoted text from it which ties the policy to habitats which support fisheries activities – commercial, recreational and native. 5999

Her questioning continued to explorethe matter of DFO's mandate with respect to fisheries, and the extent to which that is a concern in its involvement with the Northern Gateway project. She asked, "Did you examine the habitat that only impacted fish stocks that were fished? So if a stock of fish wasn't fished, did you examine that habitat in your submission?" Mr. Engelsjord replied, "We certainly looked at all the information that was provided by Northern Gateway. 6013

Integrated Fisheries Management Plans: waiting for the regulatory decision

Ms. Thorkelson quotes from DFO's submission, "The Habitat Policy emphasises integrated resource planning … taking into account DFO's or the relevant province's Fish Habitat Management Plans and/or Integrated Fisheries Management Plans." She asked, "Did you take into account Fish Habitat Management Plans and/or Integrated Fisheries Management Plans in your submission?" Mr. Fanos replied, "At this stage in the review … they're considered in the review process. But we're waiting for … the actual regulatory decision stage …" When challenged, he corrects himself: "It's not directly referenced in the evidence," and even later, "I don't believe explicitly anywhere in the evidence we've referenced the integrated fisheries management plans." 6054, 6107

Procedure to be listed under SARA

Ms. Thorkelson asked what is the procedure for a stock of salmon to become listed under SARA. Ms. Sandgathe described the COSEWIC committee process and the report it provides to the Minister of Environment. Ms. Thorkelson asked, "Has DFO ever not listed a salmon conservation unit under SARA in spite of COSEWIC recommendations?" Mr. Fanos: Where is that in our evidence? Ms. Sandgathe: "I'm aware of at least one. … the interior Fraser coho. .,, The Minister of Fisheries recommended against it." 6114

Mr. Engelsjord said, "If DFO is faced with a regulatory decision whether or not to issue an authorization, then any specifics to do with the stock status of the fish that rely on that habitat would be taken into consideration before that decision was made." 6134

Northern Gateway habitat risk assessment similar to DFO's … or not

From DFO's evidence, Ms. Thorkelson read, "The Proponent has also taken a risk management approach similar to DFO Habitat Risk Management's framework," then she turned to NGP's evidence, Exhibit B3-9, Table 11-12, "Biophysical Parameters for Calculating Watercourse Sensitivity Rating" and asked, "Is this part of the Proponent's risk management approach that is similar to the Department's?" Mr. Engesjord said, "Yes, I believe so." 6139

Ms. Thorkelson asked, "would you give the interior Fraser River Coho, for an example, as 0, under the category of 'Rarity'?" Mr. Engelsjord replied, "That's not really for DFO to answer, this is the Proponent's methodology." 6145

Ms. Thorkelson questions where the similarities are between DFO and NGP approaches, the similarities that DFO's evidence states. Mr. Engelsjord said instead, that "DFO does have its own risk management framework" and will make its own decisions. He said,

"DFO's risk management framework is more general. It's more of a communication device." "It's not a quantitative analysis." 6148

Effects of an oil spill on fisheries

Section 19 of the CEAA requires the EA to ;"take into account the effects and significance of malfunctions or accidents, as well as routine operations." Ms. Thorkelson asked where is DFO's analysis of the effects or significance of a spill on the commercial fishery? Mr. Engelsjord: "DFO hasn't conducted that analysis. … I believe the Proponent has." 6187

From DFO's evidence, Ms. Thorkelson quoted: "In DFO's view, the Proponent has conducted a reasonable risk assessment and provided useful information on the risks that an oil spill [will] pose to fisheries resources in freshwater and marine environments."

Ms. Thorkelson asked if the Proponent had considered the importance of fisheries management objectives. Mr. Engelsjord replied, "I believe they've discussed that." To what extent, you'd have to ask them. Ms. Thorkelson: "would a reasonable risk assessment include fisheries management objectives?" Mr. Engelsjord: "It certainly could. … Remember that DFO's review for this project is seen through the lens of impacts to the fish habitat, the physical fish habitat. The effects on water quality and toxicology that may affect fish that way, that's not part of DFO's review." 6197

Ms. Thorkelson asked "Who else looked at the effects of malfunctions and spills and the significance of those effects on the commercial fishery?" Dr. Caza for Environment Canada said not EC. Mr. Clarke for Natural Resources Canada said not NR Can. 6213

Ms. Thorkelson asked about olfactory impacts from oil etc. in the DFO risk assessment. DFO does not consider them. Dr. Caza said that EC does not consider them. Ms. MacLean said EC participates in the Canadian Council of Ministers of Environment Process which does establish guidelines. Ms. Thorkelson said she is talking about risk, not fines. She asked for an undertaking to report on olfactory impacts, but was denied by the Chairperson. 6245

Ms. Thorkelson turned to the "Practitioners Guide to the Risk Management Framework" for DFO Habitat Management staff, and AQ. She quoted, "It is essential that habitat protection is linked closely with [the] meeting fisheries management objectives in the areas where [the] development is proposed." Mr. Engelsjord said it is DFO's risk management framework. Amidst a series of questions, Mr. Fanos said, "It's a different stage where the fisheries management objectives would explicitly come into this process. 6280

In a set of questions thwarted by Mr. Shaw and the Chairperson, using a paper entitled, "A Framework for the Application of Precaution in Science-Based Decision Making about Risk." - about the precautionary principle - Ms. Thorkelson asked, "Is there sufficiently sound science, in your opinion, to show that a risk of serious or irreversible harm does not exist from either a pipeline spill or for construction or routine operations?" Mr. Engelsjord replied, "Yes, DFO feels that it has for the purpose of the EA and that's in our summary conclusion. We do feel that the impacts or potential impacts to fish habitat

can be managed by the Proponent through application of appropriate mitigation and, if necessary, offsetting measures. 6320

DFO's assertion that it considered accidents and malfunctions

Ms. Thorkelson asked, In what context did you consider accidents and malfunctions?" Mr. Engelsjord replied that it was their recommendation that Northern Gateway should have more block valves to reduce the volume of oil in a spill to less than 2000 m^3. "The Proponent has at least committed to looking into this further." Ms. Thorkelson: "Because the Proponent commits to looking into this further, you think that's a satisfactory risk analysis?" 6364

Northern Gateway's references to commercial fisheries.

Mr. Engelsjord said that NGP references to fisheries appear in Exhibits B40 and B41, the Marine Fisheries Technical Data reports. And Exhibit B3-22, "Risk Assessment and Management of Spills of the Kitimat Terminal." They found no freshwater references.

Ms. Thorkelson put up CEAA's "Cumulative Effects Assessment Practitioners Guide" as an AQ. She quoted from it, "The advancement of CEA practice should include more frequent recognition of social consequences and the connections between those consequences and the environment because environmental effects [also] lead to socio-economic effects" Discussion continues in the transcript at 6481

Habitat compensation

Ms. Thorkelson asked some questions related to habitat compensation, and was told that DFO's consideration of compensation measures is made when it is making a regulatory decision on whether to issue an authorization; and that compensation is not a consideration in the context of a spill. 6502

Examination by Mr. Richard Neufeld for Northern Gateway Pipelines

6541

Mr. Neufeld stated that he wanted to ask about the DFO permitting process and about caribou management.

DFO permitting process & Pacific Trails Pipeline

Mr. Neufeld noted that NGP had filed draft habitat compensation plans for marine and freshwater environments as well as mitigation summary tables in July; and that additional detail was provided directly to DFO in meetings in August. 6542

Mr. Neufeld said he wanted to talk about streamlining, and he mentioned the Pacific Trails Pipeline (PTP), noting that for some segments, particularly in the Kitimat River Valley, that the two projects share virtually contiguous rights-of-way, so they are crossing the same watercourses. Mr. Engelsjord said he doesn't know specifically for PTP which leads Mr. Neufeld to conclude that DFO has not yet considered HADD authorizations for PTP. 6560

Mr. Neufeld asked, “Have you had the opportunity to set specific or site-specific least risk periods in the Kitimat River Valley in respect of that adjacent pipeline proposal?” Mr. Engelsjord again said he is not aware any. 6574

Medium risk proposals & blanket authorizations

Mr. Neufeld mentioned the Practitioner’s Guide to Risk Management Framework, introduced by Ms. Thorkelson earlier as an AQ and noted that the framework distinguishes between low, medium and high risk proposals with respect to fish habitat. He stated that “the practitioner’s guide contemplates that medium risk development proposals are usually routine in nature which lends itself to the application of a streamlined authorization process.” Mr. Engelsjord agreed that blanket authorizations had been used on the Port Mann/Highway 1 project and the Sea to Sky Highway. 6576

Southern Mountains caribou strategy & mitigation techniques

Mr. Neufeld called attention to Table H in the recovery strategy for the Woodland Caribou boreal population (Exhibit E6-2-2). He asked if the mitigation techniques listed here are also likely to be used in the Southern Mountain caribou strategy. Mr. Smith replied that generally these techniques could be applied to Southern Mountain caribou. 6601

Mr. Neufeld obtained Mr. Smith’s agreement on three points: that some of the techniques or strategies would be undertaken by the Proponent, and others by resource managers; that some have longer timeframes like habitat restoration; and others are more immediate measures like linear feature removal. And these were all his questions. 6610

Examination by Mr. Andrew Hudson for the Joint Review Panel 6623

Mr. Hudson asked, “Is DFO satisfied now with the conceptual approach that Northern Gateway is proposing with regard to the compensation strategy?” “If you could issue your authorization tomorrow, you’d rubberstamp it.” Or are there outstanding concerns? Mr. Engelsjord said that the general approach is satisfactory, recognizing that it is still just a conceptual plan and at a later stage the details will be necessary.
6628

Status of DFO’s stream crossing recommendations

Mr. Hudson said that “DFO recommended Northern Gateway employ a trenchless crossing method for all streams crossing [which] have risk categories of medium to high, all stream crossings where there is no least risk period, and where important anadromous fish habitat occurs.”

“And Northern Gateway, in their reply evidence, said that it is currently reviewing all of the proposed trenched pipeline watercourse crossings that have been assessed in each of these three categories; identified that there are about 83 of them, and then they committed to have an update on the crossing methods and timings for all of these pipeline water crossings under review prior to the completion of these hearings. Is that correct?” Mr. Engelsjord agreed.

"Northern Gateway went on to state that the crossings fall into one or more of five categories which determine -- which will determine how Northern Gateway progresses with regard to the review." Mr. Hudson: "Can you comment upon that approach and its ability to satisfy DFO?" Mr. Engelsjord: "It was a table they included in their reply evidence. … In a very general sense, we're encouraged where they have … gone back to the drawing board, … and have … found a way to do a trenchless crossing. … There's some other examples where they are still … seeing whether they can come up with trenchless methods." 6643

DFO's awareness of relocation of route at Morice River

Mr. Hudson asked if DFO had been consulted on Route Revision V between KP 996 and KP 1048, which provides additional separation from the Morice River. Mr. Engelsjord said they have not yet seen Revision V, but moving away from fish habitat is encouraging. 6652

Recovery strategy for woodland caribou

Mr. Hudson read from Exhibit E9-6-32: "Environment Canada recommends that the Project, where it crosses the Little Smoky local population range, be located in areas of fire disturbance within the last 40 years and/or in unbuffered anthropogenic footprints in order to reduce the risk of the Project destroying habitat that is proposed as critical habitat in the proposed national recovery strategy." He then quoted Exhibit E6-2-2, the recovery strategy for the Woodland Caribou boreal population, under the heading "Amount of Critical Habitat:" "Existing habitat that would contribute to at least 65% undisturbed over time." He asked, "Does Environment Canada take the position that all existing Little Smoky caribou habitat is to be considered critical habitat?" 6669

Mr. Virc essentially said yes. "In this instance the initial critical habitat is the existing habitat." Mr. Hudson: When you say 'over time,' what is that time period? Mr. Virc said it is very dependent on local conditions and vegetation, but if it is an old growth forest, it could be 50 to 100 years. 6676

Mr. Hudson said that NGP holds that a ratio of 1.8 km of linear disturbance per square km of range is the threshold for significant effects on caribou. Environment Canada states that measuring habitat disturbance be based on range, reflect total area disturbed, not just linear, and account for cumulative effects at the scale of the range. He asked, would EC's recommended ratio of 4:1 habitat restored to habitat destroyed be sufficient to address potential cumulative impacts to woodland caribou from an area perspective rather than just linear? Ms. DeShield replied that the recommendation still applies.. 6690

There is additional discussion about the Bearhole-Redwillow/Quintette and Bearhole-Redwillow/Narraway caribou herd and recommended restoration ratios. 6708

Examination by JRP Member Kenneth Bateman 6721

Financial security to fulfill compensation obligations

Member Bateman said, "I understand … that DFO often holds financial security from a proponent, which could be drawn upon to fulfill the proponent's obligations with respect

to habitat compensation. What form of financial instrument is typical? Is it renewed annually? Mr. Engelsjord said it is a letter of credit, and they generally include an automatic renewal clause. 6722

Member Bateman: "For a project of this magnitude, what would be a typical range for the threshold of that letter of credit?" Mr. Engelsjord: "Where you have large areas of habitat affected, it can be quite considerable, into the millions of dollars and potentially more." Member Bateman asked, "Am I correct then that the letter of credit is only exercised in a circumstance where the Proponent is unable to fulfill its obligation through other financial channels?" Mr. Engelsjord replied, "That's right."

Examination by the JRP Chairperson Sheila Leggett 6734

The Chairperson asked the caribou experts if it was "your collective expert view that mortality risk associated with clearing rather than habitat loss appears to be the greatest risk factor for caribou populations along linear disturbances?" Ms. Nielsen replied, "Yes, you are correct that the greater risk is from predation -- increased predation from, for instance, wolves when we have those linear disturbances."

"Has this been the case for a historic period, for a number of decades, or is this a change, is this something new? Has this been a common potential outcome of linear disturbances for many years in environmental assessment knowledge?" Ms. Nielsen said, "It has been known for some time and, in particular, we've done studies to look at the level of disturbance and how that relates to the impact on caribou population." 6753

"Unfortunately, it takes some time for the impact to be seen at the population level. …It's what we call a "lag effect", but I would say, over the last five years, we have become very much aware and have been able to document the effects of total disturbance on population trends."

Ms. Nielsen is speaking about boreal caribou. With respect to Southern Mountain caribou, Ms. Reiss adds that the situation is similar, but the literature "indicates that caribou will avoid anthropogenic disturbances not only when the sensory disturbance is happening -- not just because people are on it -- but because they're aware that they may be more susceptible to high predation risk when they approach those disturbances." 6767

Examination by JRP Member Hans Matthews 6774

Member Matthews wanted to follow on Member Bateman's questions and asked if a security which was tied to a compensation plan could be used as compensation in the event of a spill. Mr. Engelsjord said they were not lawyers, but believed that the security could not be used for spill recovery or compensation.

Introduction and Examination of Government of Canada Panel 2 by Ms. Dayna Anderson 2128

Routing; Design & Construction of the Pipeline and Marine Terminal;

Operations, Safety, Accident Prevention & Response

In the interests of brevity, we are not listing the names, resumes, qualification or evidence of the panel members. The names are on page 2 of these notes, above, and the resumes and qualifications are available in the transcript beginning at paragraph 6799.

Examination by Mr. Chris Peter of C.J. Peter Associates Engineering

6889

Mr. Peter's questions are about detailed engineering and scientific matters. Readers with an interest in these matters should follow the discussions directly in the transcript.

Corrosivity of crude oils

Mr. Peter referred to Exhibit E9-6-30, Natural Resources Canada's evidence and quoted, "The hydrocarbons transported in the Northern Gateway pipelines will not contain significant corrosive substances through the setting of tariff limits on potential corrodents (water, sediment, etc.) and by comprehensively monitoring every batch of product entering the system. Enbridge … is the first Canadian pipeline company to undertake the new ASTM G205 crude corrosivity testing protocol." 6890

Mr. Peter put the ASTM G205 protocol up as an AQ and quoted: ""In the absence of water the crude oil is non-corrosive. The presence of sediment and water makes crude oil corrosive." He displayed Table 1 which shows the electrical conductivities of various hydrocarbons (very low) as well as salt and base solutions (very high). 6898

Noting that Enbridge Tariff 282, which would apply to NGP, requires that basic sediment and water (BS&W) would be below 0.5%, Mr. Peter posited that that volume of sediment and water would amount to 417.5 m^3 per day flowing through the pipeline. Dr. Santos said that you have to assume it would be 0.5% and that all of the sediment and water would release out of the solution, which it would not do. 6922

Sweetheart cross-examination

Mr. Peter's unconventional style of questioning triggers frequent reprimands from the Chairperson. In this instance, he argued that "the evidence that was actually filed by Natural Resources Canada … is two and a half pages of which two-thirds is repeating back what Enbridge answered in their Information Request[s]. 6953

"If you review the evidence of Natural Resources Canada, it could be construed as sweetheart cross-examination of Enbridge, where they parrot back what Enbridge has told them." 6964

Mr. Peter put up an AQ entitled "CFD Study of Solids Deposition in Heavy Oil Pipelines." This is a 2012 corrosion article co-authored by Place and Papavinasam, which undertook research into the deposition of water-wetted solid particles. Mr. Peter quoted, ""For heavy oil, it has been found that corrosion also occurs on the pipe floor downstream of over-bends, under deposits of water-wetted solid particles. More in the transcript. 6975