



June 4, 2013

The Honourable Christy Clark, Premier  
Province of British Columbia  
Via email: [premier@gov.bc.ca](mailto:premier@gov.bc.ca)

Dear Premier Clark,

On behalf of BC Nature (the Federation of BC Naturalists), I am writing to express our thanks and appreciation for the Province's rejection of the proposed Northern Gateway Pipeline (NGP) in its Final Argument submitted to the Joint Review Panel on May 31.

BC Nature and its national counterpart, Nature Canada, are joint intervenors in the Joint Review Panel hearings on the proposed NGP. As naturalists and citizen scientists, our interest in the hearings stems from our recognition of the importance of protecting BC's rich ecological systems and biodiversity, and the communities dependent on them, which are threatened by the NGP project because of the nature of the terrain along the pipeline and tanker route, as well as the climate in northern BC. In our opinion, the risks that the project poses to these values are insurmountable, and our position therefore is that the Northern Gateway Pipeline project should not proceed.

The Written Final Argument of BC Nature and Nature Canada is attached in .pdf format if this is of interest to you or your staff.

Sincerely

John Neville, President  
Federation of BC Naturalists (BC Nature)

The Honourable Terry Lake, BC Minister of the Environment – [env.minister@gov.bc.ca](mailto:env.minister@gov.bc.ca)  
The Honourable Rich Coleman, BC Minister of Energy, Mines and Natural Gas [emh.minister@gov.bc](mailto:emh.minister@gov.bc)  
The Honourable Steve Thomson, Minister of Forests, Lands & Natural Resource Operations  
[flnr.minister@gov.bc](mailto:flnr.minister@gov.bc)

**Enbridge Northern Gateway Pipeline Joint Review Panel  
NEB File No. OF-Fac-Oil-N304-2010-01-01  
Hearing Order OH-4-2011**

**WRITTEN FINAL ARGUMENT**

**of the joint intervenors**

**BC NATURE AND NATURE CANADA**

**May 31<sup>st</sup>, 2013**

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## Part I – Introduction

1. In this matter, Northern Gateway Pipelines Limited Partnership (“Proponent”) has submitted an application for Certificates of Public Convenience and Necessity (“Application”) in respect of the Enbridge Northern Gateway Project (“Project”). The mandate of the Joint Review Panel (“JRP”) is to decide what recommendation, if any, to make to the federal Minister Natural Resources Canada based upon its findings of fact and conclusions reached in accordance with the *National Energy Board Act* (“NEB Act”),<sup>1</sup> the *Canadian Environmental Assessment Act, 2012* (“CEAA, 2012”),<sup>2</sup> and Hearing Order OH-4-2011 (“Hearing Order”)<sup>3</sup> including the Terms of Reference for this Project.
2. For almost two years, the joint intervenors BC Nature and Nature Canada have been actively involved in the Enbridge Northern Gateway Joint Review Panel hearing process (“Hearing”). BC Nature is a province-wide federation of naturalists and naturalists’ clubs, with approximately 4,500 members. Its interest is the maintenance of the integrity of the British Columbia’s wide range of ecosystems and rich biodiversity, and in related public education. Nature Canada is the national voice of naturalists in Canada. Its mission is to protect and conserve wildlife and habitats in Canada by engaging people and advocating on behalf of nature. Nature Canada is also a co-partner in Canada of Birdlife International. As part of this partnership, Nature Canada implements the Important Bird Area (IBA) program in Canada. BC Nature coordinates the IBA program in British Columbia.<sup>4</sup>
3. For the following reasons, BC Nature and Nature Canada respectfully submit that the JRP should conclude that the Application is incomplete, and therefore decline to forward a recommendation to the federal Minister of Natural Resources Canada. In the alternative, we submit that the JRP must recommend to the Minister of Natural Resources Canada that the Application be dismissed. Due to the various substantive and procedural deficiencies with the Application set out in our written argument that follows, we submit that these are the only courses of action open to the JRP. It follows, therefore, that we make no submissions as to potential conditions that the JRP might impose on the Project. In our submission, there are no conditions that capable of remedying the flaws inherent in this Application.
4. This submission will be divided into the following parts. In Part II, we lay down the legal framework and appropriate tests that we submit the JRP should apply in carrying out its statutory duty. In Part III, we expose the substantive deficiencies in the Application. We discuss these deficiencies within the contexts of the various witness panels. In Part IV, we describe the procedural deficiencies in this joint review process that have impeded the ability of the JRP to obtain all necessary information and to test the evidence. Finally, in Part V, we provide our conclusion and relief sought.

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<sup>1</sup> *National Energy Board Act*, R.S.C., 1985, c. N-7, as amended

<sup>2</sup> *Canadian Environmental Assessment Act*, S.C. 2012, c. 19, s. 52, as amended

<sup>3</sup> A31-1 - Hearing Order OH-4-2011 A1Z0K9

<sup>4</sup> D12-1-1 - BC Nature and Nature Canada - Intervention A2A4V0

## Part II – Legal Framework

### A) Relevant Statutes

5. The two governing statutes for the JRP are the *NEB Act* and the *CEAA, 2012*. The Proponent seeks certificates of public convenience and necessity pursuant to s. 52 of the *NEB Act*. That provision states:

52. (1) If the Board is of the opinion that an application for a certificate in respect of a pipeline is complete, it shall prepare and submit to the Minister, and make public, a report setting out

  - (a) its recommendation as to whether or not the certificate should be issued for all or any portion of the pipeline, taking into account whether the pipeline is and will be required by the present and future public convenience and necessity, and the reasons for that recommendation;...

...

(3) If the application relates to a designated project within the meaning of section 2 of the *Canadian Environmental Assessment Act, 2012*, the report must also set out the Board's environmental assessment prepared under that Act in respect of that project. (emphasis added)
6. The *NEB Act* requires that, as a condition precedent, the JRP finds the Application complete before making a recommendation as to whether or not to issue a certificate of public convenience and necessity, and before setting out the JRP's environmental assessment.
7. Section 4(1) of the *CEAA, 2012* states that the purposes of that Act are:
  - (a) to protect the components of the environment that are within the legislative authority of Parliament from significant adverse environmental effects caused by a designated project;
  - (b) to ensure that designated projects that require the exercise of a power or performance of a duty or function by a federal authority under any Act of Parliament other than this Act to be carried out, are considered in a careful and precautionary manner to avoid significant adverse environmental effects;

...

  - (h) to encourage federal authorities to take actions that promote sustainable development in order to achieve or maintain a healthy environment and a healthy economy; and
  - (i) to encourage the study of the cumulative effects of physical activities in a region and the consideration of those study results in environmental assessments. (emphasis added)
8. The determination of significance under *CEAA, 2012* is made with regards to residual Project effects after taking into account mitigation:

52. (1) For the purposes of sections 27, 36, 47 and 51, the decision maker referred to in those sections must decide if, taking into account the implementation of any mitigation measures that the decision maker considers appropriate, the designated project

  - (a) is likely to cause significant adverse environmental effects ... (emphasis added)

9. Section 2(1) of the *CEAA, 2012* defines “sustainable development” as “development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.” We submit that this definition should be interpreted in a manner that is consistent with the concepts of “present and future public convenience and necessity” as set out in s. 52 of the *NEB Act*. Both Acts contemplate the need to consider the costs and benefits of the Application now and into the future.
10. With respect to the connection between sustainable development and the precautionary principle, the Supreme Court of Canada has adopted the definition from the *Bergen Ministerial Declaration on Sustainable Development* (1990):<sup>5</sup>

In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

#### B) Other Relevant Documents

11. The Terms of Reference attached to the Hearing Order prescribes the set of factors that the JRP should consider. Part III of the Terms of Reference indicates that, in consideration of those factors, the JRP shall have regard to:<sup>6</sup>
  - The National Energy Board’s Filing Manual dated 2004 as amended from time to time; and
  - The document issued by the Canadian Environmental Assessment Agency, in response to comments received on the draft Joint Review Panel Agreement, entitled “*Scope of the Factors – Northern Gateway Pipeline Project, August, 2009*”.
12. Since the Terms of Reference refers to the Filing Manual “as amended from time to time,” BC Nature and Nature Canada take the position that the current version available on the website of the NEB applies.<sup>7</sup> Should this assumption be incorrect we hereby request leave to file additional written argument after the May 31<sup>st</sup>, 2013 deadline.
13. Guide A.2 of the Filing Manual and the requirements therein regarding environmental and socio-economic assessments of physical facilities apply to this Application. The Filing Manual contains requirements with respect to SARA listed species:<sup>8</sup>
  1. For effects related to wildlife... species at risk or species of special status:
    - ...
    - identify their habitat(s), including any critical habitat(s) identified in a Recovery Strategy or an Action Plan listed on the SARA public registry;

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<sup>5</sup> *114957 Canada Ltée (Spray-Tech, Société d’arrosage) v. Hudson (Ville)*, 2001 SCC 40, [2001] 2 SCR 241, at para. 31

<sup>6</sup> Hearing Order, *supra* note 3, at p. 25

<sup>7</sup> National Energy Board, *Filing Manual Guide A – Facilities Applications, A.2 – Environmental and Socio-Economic Assessment*. Accessed online 16 May 2013: [http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/flngmnl/fmgdA\\_2-eng.html](http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/flngmnl/fmgdA_2-eng.html)

<sup>8</sup> *Id.*, Table A-2

- determine whether the species, its habitat, or the residences of those species could be affected by project activities;
- ...
2. Where the project may result in the destruction of any part of the critical habitat of a wildlife species listed on Schedule 1 of *SARA*, describe:
    - any discussions with Environment Canada on obtaining a permit under section 73 of the *SARA*;
    - all reasonable alternatives to the project that would avoid the effect on the species' critical habitat; and
    - all feasible measures that will be taken to eliminate the effect of the work or activity on the species' critical habitat.

Where residual effects have been predicted, identify whether those residual effects would be likely to act in combination with the effects of other physical works or activities and expand on the matters described above as appropriate.

14. Table A-2 of the Filing Manual also states:<sup>9</sup>

For species at risk with no recovery strategy or action plan, applicants should use the best available information, such as COSEWIC status reports, draft recovery strategies or action plans, existing plans or input from the recovery team and specific advice (or management plans) from any jurisdiction that manages the species. Describe how measures to avoid, fully mitigate or compensate project effects would align with the best available information.

15. The second document cited in the Terms of Reference is the *Scope of Factors – Northern Gateway Pipeline Project, August, 2009* (“*Scope of Factors*”), which states:<sup>10</sup>

As the Filing Manual does not explicitly address the marine components associated with the Project, the [Canadian Environmental Assessment] Agency has prepared this scope of the factors document. The primary purpose of this document is to provide additional guidance to the proponent on the assessment of environmental effects associated with the marine project components. Further, sections of this document provide additional guidance to the proponent regarding other factors to be considered by the Panel and unless otherwise noted, are applicable to all components of the Project, as described in Part I of the Terms of the Reference.

16. The *Scope of Factors* prescribes the requirements on the Application for various issues. Requirements that are relevant to this written argument, and which will be referred to later in this written argument, include:

- a. Echoing the *CEAA, 2012*, the *Scope of Factors* requires that the principles of sustainable development and precautionary approach shall be incorporated into the Application;<sup>11</sup>

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<sup>9</sup> *Id.* (emphasis added)

<sup>10</sup> Canadian Environmental Assessment Agency, *Scope of Factors – Northern Gateway Pipeline Project, August, 2009*. Accessed online 16 May 2013: <http://www.ceaa-acee.gc.ca/050/documents/44033/44033E.pdf>, at p. 1 (emphasis added)

<sup>11</sup> *Scope of Factors*, *supra* note 10, at p. 2 (emphasis added)

- b. On the Valued Ecological Component (“VEC”) approach, the Proponent shall consider species at risk and species of special status;<sup>12</sup>
- c. On temporal boundaries of the marine assessment, the Proponent shall consider the “design life of engineered structures”;<sup>13</sup>
- d. Regarding baseline information, the Proponent “must provide a sufficient description of the local setting to allow the Panel, other regulators, the public, and others to clearly understand the rationale for environmental assessment decisions”;<sup>14</sup>
- e. Again on baseline information, the Proponent “should include calculations of margins of error and other relevant statistical information, such as confidence intervals and possible sources of error”;<sup>15</sup>
- f. On the marine environment, the Proponent ought to provide a “description of marine habitat use and species presence, including population status, life cycle, sensitive periods, habitat requirements for each life stage, abundance (local and regional), distribution and use of habitat type, and for anadromous species, the seasonal range, migration patterns, and sensitivity to disturbance”;<sup>16</sup>
- g. Regarding potential accidents and malfunctions, “[p]articular attention should be focused on sensitive components of the environment that could be affected in the event of an accident or malfunction, and that could potentially make the consequences worse (e.g., proximity of communities, natural sites of particular values)”;<sup>17</sup>
- h. Furthermore, for the marine project components, the Proponent “will assess the potential for minor and major accidental releases of oil or condensate. As appropriate, the [P]roponent shall also provide an analysis of the potential environmental effects of such releases on the marine and terrestrial environment and on human health within the spatial boundaries described in Section 5.3 of this document”;<sup>18</sup>
- i. With regards to the effects of the environment on the Project, the Proponent “will take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events ... could adversely affect all project components”;<sup>19</sup> and finally,
- j. On the determination of significance of residual effects, the Proponent “will identify the criteria used to assign significance ratings to any predicted adverse effects”.<sup>20</sup>

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<sup>12</sup> *Id.*, at p. 5 (emphasis added)

<sup>13</sup> *Id.*, at p. 6 (emphasis added)

<sup>14</sup> *Id.*, at p. 7 (emphasis added)

<sup>15</sup> *Id.* (emphasis added)

<sup>16</sup> *Id.*, at p. 8 (emphasis added)

<sup>17</sup> *Id.*, at p. 13 (emphasis added)

<sup>18</sup> *Id.* (emphasis added)

<sup>19</sup> *Id.*, at p. 14 (emphasis added)

<sup>20</sup> *Id.*, at p. 16 (emphasis added)

### C) Burden of Proof

17. In a proceeding in respect of an application for a certificate of public convenience and necessity, the National Energy Board (“NEB”), and by extension this JRP, exercises a quasi-judicial function that must be discharged in accordance with rules of natural justice.<sup>21</sup> While the full range of the evidentiary and procedural rules that would apply in a judicial setting at common law do not necessarily apply to this Hearing, BC Nature and Nature Canada submit that this JRP must proceed in a manner that is mindful and respectful of common law principles when making determinations as to what evidentiary and procedural rules will govern this Hearing. Moreover, we submit that there are certain bedrock principles of the common law that this JRP must, in any event, accept and apply. One such principle, inherent in an adversarial proceeding such as this, is the burden of proof.
18. The rules regarding the burden of proof are fundamental to our system of law. Professor Wigmore states:<sup>22</sup>

The apportionment of the task of adducing evidence is one of the most characteristic features of the Anglo-American system. It is placed wholly upon the *parties* to the litigation; it is not required or expected of the *judge*. In this respect the emphasis is in contrast to the Continental system... This Anglo-American feature shows itself, in other aspects, in its frequent relegation of the judge to the position of an umpire, in its abstinence from rules for preferred kinds of witnesses, and in its reliance upon cross-examination by the opponent.
19. In a judicial or quasi-judicial setting such as this, the prerequisite grounds and issues upon which proponent must persuade an adjudicator to rule in its favour are determined by substantive law.<sup>23</sup> Here, the scope of issues that the Proponent must convince the JRP in favour of the Application is laid out in the *NEB Act, CEAA, 2012*, and the Hearing Order as canvassed above.
20. The burden of proof for any and all requirements of this Application, including those specified above, rests squarely upon the shoulders of the Proponent.<sup>24</sup> This assertion is supported by the *Scope of Factors*:<sup>25</sup>

While it is ultimately the responsibility of the proponent to make its case before the Panel, the Filing Manual has been developed by the Board to provide direction regarding the information that would typically be expected to be addressed in a filing.

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<sup>21</sup> *Committee for Justice & Liberty v. Canada (National Energy Board)* (“Committee”) (1976), [1978] 1 S.C.R. 369, 1976 CanLII 2, at p. 385

<sup>22</sup> J.H. Wigmore, *A Treatise on the Anglo-American System of Evidence*, 3rd ed. (Boston: Little, Brown and Company, 1940), Vol. IX, § 2483, at pp. 266-267 (emphasis in original)

<sup>23</sup> *Id.*, at pp. 272-273.

<sup>24</sup> J. Sopinka, S.N. Lederman & A.W. Bryant, *The Law of Evidence in Canada*. (Vancouver: Butterworths, 1992), at p. 57 states: “...the term legal burden of proof means that a party has an obligation to prove or disprove a fact or issue to the criminal or civil standard. The failure to convince the trier of fact to the appropriate standard means that party will lose on that issue.” J.B. Thayer, *A Preliminary Treatise on Evidence at the Common Law*, reprint of 1898 ed. (New York: Augustus M. Kelley, 1969), at p. 355 states: “The peculiar duty of him who has the risk of any given proposition on which the parties are at issue – who will lose the case if he does not make this proposition out, when all has been said and done.”

<sup>25</sup> *Scope of Factors*, *supra* note 10, at p. 1

21. The *Scope of Factors* clearly contemplates that it is the duty of the Proponent to discharge its burden of proof in order to convince the JRP to recommend approval of the Project. At the outset, the JRP must determine whether or not the Proponent properly included the issues recommended or mandated, as the case may be, in the Filing Manual, the *Scope of Factors*, and the Hearing Order. Only when the JRP is convinced by the Proponent's evidence that the Application is complete can the JRP decide whether or not the Proponent has succeeded in proving that the Project satisfies present and future public convenience and necessity, is unlikely to cause significant adverse environmental effects, and properly incorporates the principles of sustainable development and the precautionary approach.
22. For the reasons below, the Proponent has not discharged its burden of proof that the Application is complete, nor has the Proponent shown that the Project satisfies present and future public convenience and necessity, is unlikely to cause significant adverse environmental effects, and properly incorporates the principles of sustainable development and the precautionary approach.

### **Part III – Substantive Deficiencies**

23. In this Part, we describe the substantial deficiencies of the Application which render it incomplete. This Part is divided into five sections. Section A describes deficiencies in the Proponent's terrestrial environmental assessment, particularly in regards to woodland caribou. Section B examines deficiencies in the Proponent's marine environmental assessment, particularly in regards to marine birds. Section C explains deficiencies in the Proponent's assessment of the consequences of oil and condensate spills to marine bird populations. Section D reveals the deficiencies in the Proponent's evidence regarding the probability of spills from marine transportation. Lastly Section E contains a tabular summary of the Application's substantive deficiencies.

#### A) Terrestrial Environmental Assessment (Woodland Caribou)

24. One of the terrestrial wildlife species affected by the Project is woodland caribou (*Rangifer tarandus caribou*). In the Application, woodland caribou is divided into three ecotypes, which are groupings of caribou herds based on their seasonal migration patterns and habitat use: Boreal, Northern, and Mountain.<sup>26</sup> The Project Development Area ("PDA") overlaps the ranges of five caribou herds. In Alberta, the PDA intersects the ranges of two herds: the Boreal ecotype Little Smoky herd, and the Northern ecotype Narraway herd.<sup>27</sup> The PDA intersects three Northern ecotype herds in British Columbia: Narraway (the range of which straddles the provincial border), Quintette, and Telkwa.<sup>28</sup> Lastly, the PDA bisects the range of the Mountain ecotype Hart Ranges herd in BC.<sup>29</sup> The pipeline right of way ("ROW") also cuts through the winter habitat range of the Bearhole-Redwillow herd.<sup>30</sup> It should be

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<sup>26</sup> B3-7 - Vol 6A P2 - Pipelines and Tank Terminal ESA (Part 2 of 6) - A1T0F7, at p. 9-105

<sup>27</sup> *Id.*, Table 9-38 at p. 9-104

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

<sup>30</sup> D12-23-3 - BC Nature Canada - A Review of Seip Jones (2012) and its Implications for the Northern Gateway Pipeline Project - A3D3L1, at pp. 5-6

noted that in the Application, the Proponent considers the Bearhole-Redwillow to be part of the Narraway herd.<sup>31</sup>

25. The Proponent acknowledges that several of these woodland caribou herds are facing serious threats to their population viability.<sup>32</sup> Federally, woodland caribou is listed as threatened under Schedule 1 of the *Species at Risk Act* (“SARA”).<sup>33</sup> In British Columbia, the Telkwa, Narraway, and Quintette herds are Blue-listed, while the Hart Ranges herd is Red-listed.<sup>34</sup> The Little Smoky and Narraway herds are listed as threatened in Alberta.<sup>35</sup>
26. On November 3<sup>rd</sup>, 2012, speaking on behalf of the entire Northern Gateway Pipeline & Terminal Environmental & Socio-Economic Assessment witness panel (“Terrestrial ESA Panel”), the Proponent’s Director of Environment Mr. Paul Anderson agreed that the woodland caribou is an “iconic species” of national importance to Canada and to Canadians.<sup>36</sup> The importance of this species, he agreed, factored into the determination of the significance of Project effects on this species, and as such the Proponent tried to rely on scientific information for identifying effects thresholds.<sup>37</sup>
27. In spite of Mr. Anderson’s testimony, BC Nature and Nature Canada remain greatly concerned about the effect of the Project on woodland caribou. In fact, the Proponent’s terrestrial environmental and socio-economic assessment (“ESA”) is incomplete and deficient in its assessment of the potential impacts of the Project on this SARA listed species. The terrestrial ESA is inadequate in the following respects:
  - i. Failure to provide adequate baseline information regarding caribou core habitats and migration routes;
  - ii. Failure to account for impact on the Bearhole-Redwillow herd;
  - iii. Failure to properly consider significance in the context of a SARA listed species;
  - iv. Failure to assess impact on caribou summer habitat;
  - v. Failure to use the “Sorensen approach” for assessing impact on caribou; and,
  - vi. Failure to provide any basis whatsoever for using a 1.8km/km<sup>2</sup> linear feature density threshold.

*i) Failure to provide adequate baseline information*

28. For a SARA listed species, the Filing Manual requires the Proponent to identify its habitat and determine whether the species and its habitat could be affected by Project effects (*supra* para. 13). In the case of woodland caribou, the Proponent ought to have provided the JRP with information on core habitat and migration routes for all five caribou herds. The Proponent failed to do so.
29. In response to Environment Canada’s Information Request (“IR”) 1.76(d) and 2.63(b), the Proponent placed into evidence a series of maps showing “an overlay of the proposed

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<sup>31</sup> Transcript Vol. 100, Nov. 3, 2012, A3D0E9, at paras. 24956 & 24958

<sup>32</sup> *Id.*, at para. 24960

<sup>33</sup> *Species at Risk Act*, S.C. 2002, c. 29, as amended

<sup>34</sup> B3-7, *supra* note 26, Table 9-38 at p. 9-104

<sup>35</sup> *Id.*

<sup>36</sup> Transcript Vol. 100, *supra* note 31, at para. 24983

<sup>37</sup> *Id.*, at paras. 25002-25003

pipeline route and associated infrastructure with caribou core and high value habitat, caribou herd range boundaries, ungulate winter ranges, and wildlife habitat areas.”<sup>38</sup> The Proponent submitted a total of 72 maps in three PDF files.<sup>39</sup> Of those, 19 maps show caribou range and habitat. For the Little Smoky, Narraway, and Telkwa herds, these maps do not depict any core summer or winter habitat, nor do they show any high quality summer or winter habitat. For the Hart Ranges herd, these maps do not depict any core summer or winter habitat.

30. During BC Nature and Nature Canada’s cross-examination of the Terrestrial ESA Panel, Stantec Senior Wildlife Biologist Ms. Colleen Bryden agreed that anywhere within the “undefined caribou habitat” depicted within those maps could be caribou habitat, but core habitat has not been identified.<sup>40</sup> Without information on the location of caribou core habitat, the Proponent fails to provide adequate baseline information to ascertain the extent to which the Project will impact caribou habitat availability.
31. Another important aspect of woodland caribou life history is their migration. Elements of the Narraway, Quintette, Hart Ranges, and Telkwa herds migrate annually.<sup>41</sup> It is “likely” that at certain times of the year migrating caribou will have to cross the pipeline ROW.<sup>42</sup> Ms. Bryden conceded that it is “important to... understand caribou movements across the landscape and at what times of the year they may be at greater risk -- mortality risk -- than at other times.”<sup>43</sup> However, neither the terrestrial ESA nor any of the maps submitted by the Proponent provides the JRP with information on caribou migratory routes. The Proponent’s Application states that there are “likely locally important movement corridors even for the non-migratory herds, but information is limited and circumstantial.”<sup>44</sup> Even so, the Proponent fails to conduct any study to determine where caribou migration routes may intersect the proposed ROW. While Mr. Anderson suggested that “it certainly is our experience and the experience of the resource managers, that the caribou do cross rights-of-way,”<sup>45</sup> the Proponent has failed to offer any evidence to substantiate that claim. For these reasons, the Application with respect to caribou migration routes is incomplete.

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<sup>38</sup> B59-1 - Letter to JRP re Northern Gateway Application Update - Caribou Herd Range and Habitat, Ungulate [*sic*] Winter Range and Wildlife Habitat Areas - A2L8C1, at p. 1

<sup>39</sup> B59-3 - Maps 1-24 of 65 - Caribou Herd Range and Habitat, Ungulate Winter Range and Wildlife Habitat Areas - A2L8C3; B59-4 - Maps 25-45 of 65 - Caribou Herd Range and Habitat, Ungulate Winter Range and Wildlife Habitat Areas - A2L8C4; B59-5 - Maps 46-65 of 65 - Caribou Herd Range and Habitat, Ungulate Winter Range and Wildlife Habitat Areas - A2L8C5

<sup>40</sup> Transcript Vol. 101, Nov. 5, 2012, A3D0Q9, at para. 25165

<sup>41</sup> B3-7, *supra* note 26, at p. 9-206

<sup>42</sup> Transcript Vol. 101, *supra* note 40, at para. 25368

<sup>43</sup> *Id.*, at para. 25719

<sup>44</sup> B3-7, *supra* note 26, at p. 9-206

<sup>45</sup> Transcript Vol. 101, *supra* note 40, at para. 25804

ii) Failure to account for impact on the Bearhole-Redwillow herd

32. On November 14<sup>th</sup>, 2012, BC Nature and Nature Canada filed as late evidence two documents:
- Seip, D. R. & Jones, E. S. (2012). *Population Status of Caribou Herds in the Central Mountain Designatable Unit within British Columbia, 2012*. Recovery Initiatives for Caribou of British Columbia;<sup>46</sup> and,
  - *A Review of Seip & Jones (2012) and its Implications for the Northern Gateway Pipeline Project* by Brian Churchill, who is an expert witness for BC Nature/Nature Canada.<sup>47</sup>
33. Dr. Dale Seip and Ms. Elena Price (née Jones) indicated in their 2012 report cited above that the population of the Bearhole-Redwillow herd is in drastic decline. Population model used by Seip & Jones estimated that the number of animals in that herd decreased from 80 individuals in 2008 to 21 in 2012.<sup>48</sup> A decline from 80 to 21 individuals over four years equals an annual percentage decline of 72%.<sup>49</sup> The proposed pipeline ROW bisects the range of the Bearhole-Redwillow.<sup>50</sup> Given the small size of the Bearhole-Redwillow range, the “functional habitat loss resulting from avoidance of the pipeline will potentially be significant.”<sup>51</sup> The Proponent fails to provide any baseline information or impact assessment for the imperiled Bearhole-Redwillow herd. Further discussion of functional habitat loss will be provided in the section below regarding the “Sorensen approach” (*infra* paras. 48-55).
34. While Seip & Jones (2012) predicted that the number of individuals in the Bearhole-Redwillow herd was 21 in 2012, the number of individuals counted was actually 22.<sup>52</sup> During the cross-examination of Mr. Brian Churchill by counsel for the Proponent on November 22<sup>nd</sup>, 2012, counsel implied that the discrepancy in Seip & Jones (2012) between the modelled number and the actual number of animals in 2012 meant that the model was wrong.<sup>53</sup> As Mr. Churchill explained, models contain error.<sup>54</sup> The one animal difference between the modelled population and actual observation shows considerable agreement between modelled and actual populations.
35. The Proponent used research done by Seip and Jones in the past in support of the Application. In 2008, Seip and Jones published a report for the BC Ministry of Environment entitled “Seasonal habitat use and selection by woodland caribou herds in the South Peace region, central British Columbia.”<sup>55</sup> The Proponent used the data upon which

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<sup>46</sup> D12-23-4 - BC Nature Nature Canada - Seip, D. R. - Jones, E.S. (2012) - A3D3L2

<sup>47</sup> D12-23-3 - BC Nature Nature Canada - A Review of Seip Jones (2012) and its Implications for the Northern Gateway Pipeline Project - A3D3L1

<sup>48</sup> D12-23-4, *supra* note 46, Table 5 at p. 17

<sup>49</sup> D12-23-4, *supra* note 46, at p. 3

<sup>50</sup> D12-23-3, *supra* note 47, Figure 1 at p. 4

<sup>51</sup> *Id.*, at p. 6

<sup>52</sup> D12-23-4, *supra* note 46, Table 4 at p. 16

<sup>53</sup> Transcript Vol. 106, Nov. 22, 2012, A3D5T3, at para. 1129

<sup>54</sup> *Id.*, at para. 1131

<sup>55</sup> D12-24-2 - BC Nature Nature Canada - ElenaPrice(Jones) Affidavit Nov172012 - A3D4J8, at para. 4

the 2008 report was based and incorporated the same data into the terrestrial ESA and to maps that the Proponent produced in response to an IR from Environment Canada.<sup>56</sup>

36. The Proponent's failure to present an adequate assessment of the Project's impact on the Bearhole-Redwillow herd is a failure to properly consider the impact of the Project on a species at risk and a failure to consider the "best available information" as required by the Filing Manual (*supra* paras. 12-14).

iii) Failure to properly consider significance in the context of a SARA listed species

37. In the Application, the Proponent identifies:<sup>57</sup>  
An effect is significant when a resource undergoes an unacceptable change or reaches an unacceptable level... [A]n effect is considered not significant when the Project is not expected to result in an effect on the long-term viability of a wildlife population... It is considered significant when there is a moderate to high probability that the Project may result in an effect on the long-term viability of that same population.
38. BC Nature and Nature Canada submit that the Proponent's approach to determining significance is not an appropriate way to measure significance of Project effects on SARA listed species. This is especially true for woodland caribou, for which a recovery strategy defining the proper management of caribou critical habitat has recently been released by the federal government pursuant to its obligations under the SARA.
39. On October 5<sup>th</sup>, 2012, Environment Canada published onto the SARA public registry the *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada* ("Boreal Caribou Recovery Strategy") pursuant to s. 37 of the SARA.<sup>58</sup> The Boreal Caribou Recovery Strategy contains, *inter alia*, descriptions of critical habitat and recovery objectives. Of note, Boreal caribou requires large tracts of continuous, undisturbed habitat.<sup>59</sup> Habitat connectivity is essential to the viability of Boreal caribou populations because their primary anti-predator survival strategy is to spatially separate themselves from predators by maintaining low population densities across a large landscape.<sup>60</sup>
40. The Boreal Caribou Recovery Strategy identifies "critical habitat to achieve the population and distribution objectives for the recovery and survival of boreal caribou."<sup>61</sup> Included within the identified critical habitat is the range of the Little Smoky herd.<sup>62</sup>
41. One of the objectives of the Boreal Caribou Recovery Strategy is to stabilize and achieve self-sustaining status for the "Not Self-Sustaining" local populations.<sup>63</sup> Where a local

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<sup>56</sup> *Id.*, at paras. 5-6

<sup>57</sup> B3-6 - Vol 6A P2 - Pipelines and Tank Terminal ESA (Part 1 of 6) - A1T0F6, p. 9-38

<sup>58</sup> E6-2-2 - Environment Canada - Recovery Strategy for the Woodland Caribou Boreal Population - A3C9X9

<sup>59</sup> *Id.*, at p. 9

<sup>60</sup> *Id.*, at pp. 10-11

<sup>61</sup> *Id.*, at p. vii

<sup>62</sup> *Id.*, at Appendix F

<sup>63</sup> *Id.*, at p. 20

population has a small and declining population size, recovering the population to a minimum of 100 animals will be necessary.<sup>64</sup> Also, for local populations with less than 65% undisturbed habitat, efforts to restore disturbed habitat to a minimum of 65% undisturbed habitat will be needed.<sup>65</sup>

42. The Boreal Caribou Recovery Strategy identifies the Little Smoky herd as a “Not Self-Sustaining” population, with an estimated population size of 78 and a declining population trend. It also identifies that only 5% of its habitat is undisturbed. These characteristics are consistent with a recovery strategy that will recover the Little Smoky population to a minimum of 100 animals and restore its habitat to a minimum of 65% undisturbed habitat.<sup>66</sup> As such, for the SARA listed woodland caribou, and in particular for the Little Smoky herd, the appropriate management strategy is to halt and reverse destruction of their critical habitat. Any further disturbance of their habitat is contrary to both the letter and spirit of the Recovery Strategy, and should be considered a significant adverse environmental effect within the meaning of the *CEAA, 2012*.
43. We submit that the Proponent’s definition of significance is inconsistent with the intent of the Boreal Caribou Recovery Strategy. An effect that does not impact the “long term viability” of a population is not synonymous with an effect that does not create further disturbance of critical habitat. In this regard, the Proponent fails to properly consider the significance of Project effects on woodland caribou.
44. The Proponent has committed to a one-to-one restoration of caribou habitat in BC and a four-to-one restoration for Little Smoky.<sup>67</sup> However, this after-the-fact offset does not negate the fact that this Project will require further destruction of critical habitat in the Little Smoky range. In addition, the Proponent has yet to provide evidence on the location or manner of critical habitat restoration, or any evidence as to the predicted efficacy of the restoration. The failure to properly consider significance in the context of a SARA listed species is a failure to satisfy the requirement of the Filing Manual to “determine whether the species, its habitat, or the residences of those species could be affected by project activities” (*supra* paras. 12-13). Accordingly, the Application in this respect is incomplete.

*iv) Failure to assess impact on caribou summer habitat*

45. Ms. Bryden agreed that caribou require habitat throughout the year and that it is equally important “to understand where caribou spend summer and winter and what important habitats are associated with those seasons.”<sup>68</sup> Yet, the terrestrial ESA fails to assess the Project’s impact on caribou summer habitat.

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<sup>64</sup> *Id.*, at p. 22

<sup>65</sup> *Id.*, at p. 23

<sup>66</sup> *Id.*, at Appendix F

<sup>67</sup> Transcript Vol. 101, *supra* note 40, at para. 25657

<sup>68</sup> *Id.*, at paras. 25714 & 25719

46. According to Ms. Bryden, summer is a time of high caribou mortality risk from predation by wolves, particularly for the Quintette, Narraway, and Hart Ranges herds.<sup>69</sup> This claim is substantiated by scientific research into caribou mortality.<sup>70</sup> The Boreal Caribou Recovery Strategy states that, during the summer calving season:<sup>71</sup>

... pregnant cows travel to isolated, relatively predator-free areas where nutritious forage is available, such as islands in lakes, peat lands or muskegs, lakeshores and forests. Unavailable, inadequate or degraded habitat affects the reproductive success of females as well as the survival of calves, and can result in population decline.

47. The Filing Manual requires that the Proponent identify the habitat of a SARA listed species, and to use best available information where no recovery strategy or action plan is available (*supra* paras. 12-14). The Application remains incomplete insofar as the Proponent has, to this point, only provided information on winter feeding habitat, and has completely failed to provide any information on summer habitat. Without this information, the Proponent fails to demonstrate whether and to what extent does the Project disturb the availability of summer habitat for pregnant cows and calves.

v) Failure to use the “Sorensen approach” for assessing impact on caribou

48. The “Sorensen approach” for assessing impact on caribou was developed by Sorensen *et al.* (2008).<sup>72</sup> The Sorensen approach predicts caribou population growth or decline as a function of the percentage of a herd’s range that is either 250m from an anthropogenic disturbance or was burnt in the past 50 years.<sup>73</sup> Since caribou rely on terrestrial and arboreal lichen for food,<sup>74</sup> forest fire causes direct loss of feeding habitat. On the other hand, the 250m buffer attempts to capture the functional loss of habitat, as “woodland caribou avoid a variety of human disturbances including roads, seismic lines, timber harvesting activities, and noise associated with seismic explorations and industrial development around well sites.”<sup>75</sup>
49. In contrast with the curt treatment of the Sorensen approach in the Proponent’s terrestrial ESA, this approach to assessing impact on caribou has gained wide adoption by the scientific community and wildlife managers, as highlighted in the cross-examination of the Terrestrial ESA Panel by BC Nature and Nature Canada.<sup>76</sup> The Boreal Caribou Recovery Strategy also employs a Sorensen-inspired approach, which examined the percentage of a herd’s range that is either 500m from an anthropogenic disturbance or was burnt in the past

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<sup>69</sup> *Id.*, at paras. 25721 & 25740

<sup>70</sup> D12-8-5 - BC Nature and Nature Canada - Exhibit 3 - Evidence Prepared by B. Churchill for BCN and NC - A2K4E6, at para. 18

<sup>71</sup> E6-2-2, *supra* note 58, at p. 10

<sup>72</sup> T. Sorensen, P.D. McLoughlin, D. Hervieux, E. Dzus, J. Nolan, B. Wynes & S. Boutin, *Determining sustainable levels of cumulative effects for boreal caribou*. (72 Journal of Wildlife Management 900-905, 2008). As cited in B3-7, *supra* note 26, at p. 9-259

<sup>73</sup> B3-7, *supra* note 26, at p. 9-259

<sup>74</sup> *Id.*, at p. 105

<sup>75</sup> B41-4 - Response to Federal Government IR No. 1 - A2E8J0, at p. 160

<sup>76</sup> Transcript Vol. 101, *supra* note 40, at paras. 26025, 26046, 26104-26114

40 years.<sup>77</sup> The Boreal Caribou Recovery Strategy found that caribou populations are likely self-sustaining when their habitat is at least 65% undisturbed.<sup>78</sup>

50. The JRP itself sought more information from the Proponent on the impact of Project effects on caribou populations in the IR process, making specific reference to the Sorensen approach.<sup>79</sup> In response, the Proponent conceded that the recommended 61% disturbance threshold advocated by Sorensen *et al.* (2008) would be exceeded for the Little Smoky herd.<sup>80</sup> For the other four herds however, the Proponent claimed that the 61% threshold would “unlikely” be exceeded, but provided no data or calculation to substantiate that claim.<sup>81</sup> When BC Nature and Nature Canada requested during cross-examination that the Proponent provide this information, the Senior Principal of Stantec’s Environmental Services Mr. Jeffrey Green demurred, responding that “we have answered the question.”<sup>82</sup> We submit, however, that neither the Proponent’s response to the JRP’s IR nor Mr. Green’s response during our cross-examination of him provides a full and adequate answer.
51. While the Proponent did not use the Sorensen approach in the terrestrial ESA, the Proponent did calculate functional habitat loss from sensory disturbance for caribou winter feeding habitat. There are three main deficiencies in the Proponent’s calculation. Firstly, as canvassed above, assessing only winter habitat provides an incomplete picture since summer habitat availability is important to caribou reproductive success and calf survival (*supra* paras. 45-47).
52. Secondly, while the Sorensen approach uses a 250m buffer and the Boreal Caribou Recovery Strategy uses a 500m buffer, the Proponent opted to use a 100m buffer for sensory disturbance during the operation phase of the Project.<sup>83</sup> This fact was not made evident in the Application. The Proponent produced a table within its Application that depicts functional loss of habitat due to sensory disturbance during the construction phase.<sup>84</sup> In the discussion of that table, the Application clearly states that a sensory buffer of 500m on either side of the Project Development Area (“PDA”) was used.<sup>85</sup> The Application also contains a table that depicts functional loss of habitat due to sensory disturbance during the operation phase.<sup>86</sup> The functional loss depicted during operations is less than that during construction. Neither the table nor the discussion within the Application explicitly indicates that the smaller functional loss was due to a smaller sensory buffer having been applied. This information was not disclosed in the Application, and only came to light through cross-examination by BC Nature and Nature Canada.<sup>87</sup>

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<sup>77</sup> E6-2-2, *supra* note 58, Figure E-1 at p. 65

<sup>78</sup> *Id.*

<sup>79</sup> A44-1 - Letter and Information Request no. 3 to Northern Gateway A2A9D3, at p. 23

<sup>80</sup> B32-2 - Northern Gateway Response to JRP IR No. 3 A2C5T3, at p. 67

<sup>81</sup> *Id.*

<sup>82</sup> Transcript Vol. 101, *supra* note 40, at para. 25700

<sup>83</sup> *Id.*, at paras. 25519-25520

<sup>84</sup> B3-7, *supra* note 26, Tables 9-56 at p. 9-149

<sup>85</sup> *Id.*, at p. 9-149

<sup>86</sup> *Id.*, Table 9-57 at p. 9-150

<sup>87</sup> Transcript Vol. 101, *supra* note 40, at paras. 25519-25520

53. Thirdly, the Proponent calculated functional habitat loss only for the part of caribou range that intersects the Project Effects Assessment Area (“PEAA”).<sup>88</sup> Neither the PEAA nor the Regional Effects Assessment Area (“REAA”) is an ecologically meaningful unit for assessing the viability of caribou population. Mr. Green stated that he was not aware of any “scientific basis” for the 30km-wide REAA.<sup>89</sup> The use of this 30km-wide REAA is inconsistent with Mr. Anderson’s assertion that the Proponent relied on scientific information for identifying thresholds in this Application.<sup>90</sup>
54. Given the wide use of the Sorensen approach within the scientific community and within the Boreal Caribou Recovery Strategy, as well as the fact that the JRP specifically referenced the Sorensen article in its IR No. 3, BC Nature and Nature Canada applied to have the article by Sorensen *et al.* (2008) admitted into evidence during cross-examination.<sup>91</sup> The Proponent objected.<sup>92</sup> Ultimately, BC Nature and Nature Canada’s motion to have this article put into evidence was denied.<sup>93</sup> We submit that, in light of the salience of the Sorensen *et al.* (2008) article to this Hearing, it is regrettable that the Proponent did not agree to its admission into the record by consent.
55. In the circumstances, BC Nature and Nature Canada submit that the Proponent’s apparent resistance to employing the Sorensen approach for assessing Project impact on caribou means that this Application has effectively failed to properly “determine whether the species, its habitat, or the residence of those species could be affected by project activities,” and failed to “use the best available information” as required by the Filing Manual (*supra* paras. 12-14).

vi) Failure to provide any basis for using a 1.8km/km<sup>2</sup> linear feature density threshold

56. In its Application, the Proponent states that:<sup>94</sup>  
 ... for Project and Future Cases, linear feature densities are below the 1.8km/km<sup>2</sup> threshold. As a result, the overall cumulative effect and the project contribution to the cumulative effect of mortality risk are predicted to be not significant.
57. This 1.8km/km<sup>2</sup> threshold is based on the Proponent’s assertion that “Francis *et al.* (2002) suggest a corridor density threshold of 1.8km/km<sup>2</sup> for caribou.”<sup>95</sup> The Proponent’s citation refers to a presentation made sometime in 2002. At the time of the filing of the terrestrial ESA, the citation was as follows:<sup>96</sup>  
 Francis, S., R. Anderson and S. Dyer. 2002. *Development of a threshold approach for assessing industrial impacts on woodland caribou in Yukon*. Presentation provided at

<sup>88</sup> B3-7, *supra* note 26, Tables 9-56 & 9-57 at pp. 9-149 & 9-151

<sup>89</sup> Transcript Vol. 101, *supra* note 40, at para. 25115

<sup>90</sup> Transcript Vol. 100, *supra* note 31, at para. 25003

<sup>91</sup> Transcript Vol. 101, *supra* note 40, at para. 25620

<sup>92</sup> *Id.*, at paras. 25637-25643

<sup>93</sup> Transcript Vol. 102, Nov. 6, 2012, A3D1E0, at paras. 26430-26436

<sup>94</sup> B3-7, *supra* note 26, at p. 9-226

<sup>95</sup> *Id.*, at p. 9-225

<sup>96</sup> *Id.*, p. 9-269

the Assessment and Management of Cumulative Effects Workshop, Whitehorse, YT. March 25-26, 2002.

58. On July 28<sup>th</sup>, 2011, the JRP asked in IR 3.18(a) for the “rationale for the use of the 1.8km/km<sup>2</sup> linear density threshold as the metric for determination of significant effects on caribou,” and also asked how the Proponent’s assessment would differ had it used the Sorensen approach.<sup>97</sup> The Proponent, in its August 30<sup>th</sup>, 2011 response, reiterated the “Francis *et al.* (2002)” citation as the basis for the 1.8 km/km<sup>2</sup> threshold, and stated that their threshold was adopted by “Salmo & Diversified (2003).”<sup>98</sup> The Proponent rejected the alternative metric suggested by Sorensen *et al.* on the basis that “it was developed for boreal caribou in northern Alberta and only one of the five caribou herds that interact with the Project is the boreal ecotype,”<sup>99</sup> despite the fact that the Proponent had indicated one paragraph above that the 1.8km/km<sup>2</sup> threshold was also “first identified for boreal caribou in the Yukon.”<sup>100</sup> However, the Proponent submitted that Salmo & Diversified (2003) adopted the 1.8 km/km<sup>2</sup> threshold “for northeast BC, a region that includes boreal, northern and mountain caribou.”<sup>101</sup>
59. On November 3<sup>rd</sup>, 2011, Environment Canada noted that it had “reviewed Francis *et al.* (2002) and cannot find a reference to this specific threshold within this source,” and requested “further justification of the 1.8km/km<sup>2</sup> linear development threshold used to assess cumulative impacts to caribou.”<sup>102</sup> The Proponent responded on November 24<sup>th</sup>, 2011 by referring back to their earlier August 30<sup>th</sup>, 2011 response to the JRP, but “agreed to provide additional information on the use of the 1.8km/km<sup>2</sup> threshold based on discussion with the authors for that threshold.”<sup>103</sup> In its written evidence submitted December 22<sup>nd</sup>, 2011, Environment Canada reiterated the fact that it had reviewed Francis *et al.* (2002) but was unable to find the reported threshold, and was still awaiting further justification from the Proponent.<sup>104</sup>
60. Despite having been put on notice by both the JRP and Environment Canada regarding the basis of the 1.8km/km<sup>2</sup> threshold since July 2011, the Proponent maintained the position that the threshold had come from Francis *et al.* (2002) until October 30<sup>th</sup>, 2012, when the Proponent filed an errata. The errata replaced all references to Francis *et al.* (2002) in the terrestrial ESA with a reference to “Salmo and Diversified (2003).”<sup>105</sup> The justification for this change was “clerical error.”<sup>106</sup>
61. The original source that the Proponent cited for the 1.8km/km<sup>2</sup> threshold was a presentation made at a cumulative effects workshop in 2002. BC Nature and Nature Canada acquired

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<sup>97</sup> A44-1, *supra* note 79, at p. 23

<sup>98</sup> B32-2, *supra* note 80, at p. 66

<sup>99</sup> *Id.*, at p. 67 (emphasis added)

<sup>100</sup> *Id.*, at p. 66 (emphasis added)

<sup>101</sup> *Id.*

<sup>102</sup> E9-4-1 - Government of Canada - NGP GOC IR #2 - A2H1Y2, at p. 65

<sup>103</sup> B46-2 - Response to Federal Government IR No. 2 - A2I9D0, at p. 154 (emphasis added)

<sup>104</sup> E9-6-32 - Government of Canada - Volume 7\_Part 2\_Environment Canada Written Evidence - A2K4U1, at p. 50

<sup>105</sup> B155-2 NGP - NGP Errata - A3C8U6, at pp. 23 & 25

<sup>106</sup> *Id.*

the presentation and used it as an aid to questioning during cross-examination of the Terrestrial ESA Panel.<sup>107</sup> After some questioning, Mr. Anderson stated, “On behalf of the [witness] panel, we agree that Francis *et al.* did not include a 1.8 threshold in his document.”<sup>108</sup>

62. With regards to the new reference to Salmo & Diversified (2003), Mr. Anderson at first agreed that Mr. Terry Antoniuk, the principal of Salmo Consulting, obtained the 1.8km/km<sup>2</sup> threshold from Francis *et al.* (2002).<sup>109</sup> However, Mr. Anderson later testified that Salmo & Diversified did not get the 1.8km/km<sup>2</sup> threshold from Francis *et al.* (2002), but that Salmo & Diversified had extrapolated the data from Francis *et al.* in order to obtain the 1.8km/km<sup>2</sup> threshold themselves.<sup>110</sup>
63. That Mr. Antoniuk relied on data provided by Francis *et al.* in recommending the 1.8km/km<sup>2</sup> threshold, Mr. Anderson claimed, was communicated by Mr. Antoniuk to Mr. Anderson.<sup>111</sup> However, Mr. Anderson could not recall when that conversation took place, except for the curious admission that the first conversation between Mr. Anderson and Mr. Antoniuk occurred *after* the ESA was prepared; that is to say, *after* the ESA had already attributed the 1.8km/km<sup>2</sup> threshold to Francis *et al.* (2002).<sup>112</sup> Mr. Anderson agreed that in his conversations with Mr. Antoniuk, the latter did not relate any other source for the threshold than Francis *et al.*<sup>113</sup>
64. Mr. Anderson claimed that the “authors for that threshold” stated to in the Proponent’s November 24<sup>th</sup>, 2011 IR response to Environment Canada actually referred to Mr. Antoniuk,<sup>114</sup> even though at the time of that IR response the Proponent still maintained the position that Francis *et al.* had been the authors of that threshold.
65. The highly tenuous foundation for the 1.8km/km<sup>2</sup> threshold strikes a fatal blow to the evidence provided by the Proponent with regards to Project effects on caribou. The Proponent relies on the assertion that linear feature density would not exceed this threshold for its conclusion that the Project will have no significant effect on caribou mortality risk. While Mr. Anderson testified that the Proponent tried to rely on scientific information to determine effects thresholds,<sup>115</sup> there is simply no scientific basis for this 1.8km/km<sup>2</sup> value.
66. To date, the Proponent has offered only two possible sources for this threshold: Francis *et al.* (2002) and Salmo & Diversified (2003). By the Proponent’s own admission during cross-examination, Francis *et al.* (2002) did not advocate this threshold (*supra* para. 61). As for the alternate source that the Proponent proffered more than a year after the JRP first inquired of the basis for the 1.8km/km<sup>2</sup> in an IR request, the Proponent continues to fail to

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<sup>107</sup> AQ40-H

<sup>108</sup> Transcript Vol. 101, *supra* note 40, at para. 26226

<sup>109</sup> *Id.*, at paras. 26174 & 26176

<sup>110</sup> *Id.*, at paras. 26191-26192

<sup>111</sup> *Id.*, at para. 26244

<sup>112</sup> *Id.*, at paras. 26246-26252

<sup>113</sup> *Id.*, at para. 26256

<sup>114</sup> *Id.*, at para. 26188

<sup>115</sup> Transcript Vol. 100, *supra* note 31, at para. 25003

provide sufficient evidence to allow for the JRP to be convinced of the scientific integrity of this 1.8km/km<sup>2</sup> value.

67. The Filing Manual requires the Proponent to “determine whether the species, its habitat, or the residences of those species could be affected by project activities” and to use the “best available information” (*supra* paras. 12-14). This 1.8km/km<sup>2</sup> threshold does not meet these criteria. Neither is using this threshold in compliance with the precautionary principle. Ms. Bryden testified that 1.8km/km<sup>2</sup> is not the most conservative and that the science has evolved to using different approaches for assessing impact on caribou.<sup>116</sup> As canvassed above (*supra* paras. 48-55), BC Nature and Nature Canada submit that the Sorensen approach is the best available approach for assessing such impacts. Yet the Proponent resisted an attempt by BC Nature and Nature Canada to have the Sorensen *et al.* (2008) article admitted into the evidence in this Hearing. By using a linear feature density threshold that has no scientific basis, and persuading the JRP to exclude the Sorensen article from the evidentiary record, the Proponent has failed to provide sufficient evidence of Project impact on caribou mortality risk, and the Application remains incomplete.

B) Marine Environmental Assessment (Marine Birds)

68. The geographic setting for the Proponent’s marine ESA consists mainly of the Confined Channel Assessment Area (“CCAA”) and the Open Water Area (“OWA”). There is uncontested evidence that the CCAA and the OWA contain tremendous ecological value due to the region’s abundance and diversity of marine avifauna. For example, BC Nature and Nature Canada’s uncontradicted written evidence states that the “OWA encompasses an area of exceptional international conservation importance to a suite of marine birds, as evidenced by 30 [Important Bird Areas] designated for the globally and nationally significant populations of marine birds they support.”<sup>117</sup> Environment Canada in its written evidence also states that “[m]arine birds values along the proposed shipping corridor are high and certain bird species and populations are especially vulnerable to spills.”<sup>118</sup> The Haida Nation states that the “marine waters surrounding Haida Gwaii (Queen Charlotte Islands) support a diverse and abundant bird fauna.”<sup>119</sup> The Kitimat Valley Naturalists indicate that “[s]ignificant numbers of shorebirds and waterfowl utilize the Kitimat River Estuary during both migration periods [and the] Kitimat River Estuary is an important wintering area for numerous species.”<sup>120</sup> According to Raincoast Conservation Foundation (“Raincoast”), “[o]ver 120 species of marine birds have been identified in BC’s coastal waters, and while all return to land to nest, they spend much of their lives at sea.”<sup>121</sup>

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<sup>116</sup> Transcript Vol. 101, *supra* note 40, at paras. 26086-26087

<sup>117</sup> D12-8-2 - BC Nature and Nature Canada - NGP- BCN NC Written Evidence-Dec 21, 2011 - A2K4E3, at para. 132

<sup>118</sup> E9-6-32, *supra* note 104, at para. 13

<sup>119</sup> D42-4-2 - Council of the Haida Nation - Living Marine Legacy fo Gwaii Haanas III - Marine Birds Part 1 - A2K3J5, at p. 1

<sup>120</sup> D112-2-1 - Kitimat Valley Naturalists - Enbridge Review FINAL December 20 2011 - A2K0E9, at paras. 8.2-8.3

<sup>121</sup> D170-2-12 - Raincoast Conservation Foundation - Part 2 - Attachment D - Whats at Stake - A2K3H9, at p. 2

69. The Proponent echoes the views of the intervenors above with regards to the importance of the BC coast to marine bird biodiversity:<sup>122</sup>

In British Columbia, there are an estimated 124 marine bird species, some of which may comprise populations of tens of thousands of breeding, migrant or wintering birds. The British Columbia coast is an important corridor for millions of migrating birds, especially shorebirds and waterfowl. In the general vicinity of Douglas Channel and adjacent sounds and channels, 110 species may occur.

Marine birds are important components of the freshwater and marine environments in which they are found and make extensive use of coastal wetlands and nearshore and offshore habitats, including islands, islets and cliffs. In addition to the diversity and abundance of avian life that they represent, they are an indicator of the status of the marine ecosystem for British Columbia. Many of the colonial breeding marine birds do not breed anywhere else in Canada.

70. Despite the recognition by the Proponent of marine birds as an important Valued Environmental Component (“VEC”), the Application is incomplete in many major aspects:
- i. Failure to provide adequate baseline information on the abundance and distribution of marine bird species;
  - ii. Failure to select an appropriate suite of marine bird Key Indicator (“KI”) species;
  - iii. Failure to justify choice of marine bird KIs; and,
  - iv. Failure to properly assess Project impacts on marine birds.

i) Failure to provide adequate baseline information

71. The *Scope of Factors* requires the Proponent to provide a sufficient description of the local setting, marine habitat use, and species presence (*supra* para. 16(d)-(f)). Many parties have already commented on the deficiency of baseline information in the Proponent’s marine ESA and marine bird Technical Data Report (“TDR”), for example: BC Nature and Nature Canada,<sup>123</sup> Kitimat Valley Naturalists,<sup>124</sup> Raincoast,<sup>125</sup> Gitga’at First Nation,<sup>126</sup> Coastal First Nation,<sup>127</sup> and Environment Canada.<sup>128</sup>

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<sup>122</sup> B3-15 - Vol 6B - Marine Terminal ESA (Part 4 of 4) - A1T0G5, at pp. 12-1 to 12-2

<sup>123</sup> D12-8-2, *supra* note 117, at para. 97 states: “The current baseline of bird data for the Application is unacceptable. Some very significant existing datasets are available, which if analysed in the appropriate way would provide a more objective and rigorous bird species effects assessment for the project as a whole. The current information gaps in the Application, identified herein, prevent an adequate assessment of the potential effects of the project on birds.”

<sup>124</sup> D112-2-1, *supra* note 120, at para.14.2 states: “It is apparent to KVN that Enbridge has not undertaken sufficient baseline assessment of the Estuary and associated ecology, thus demonstrating a lack of understanding and valuation.”

<sup>125</sup> D170-2-14 - Raincoast Conservation Foundation - Written submission of Raincoast Conservation Foundation, Part 3, Dec 21, 2011 - A2K3I1, at para. 22 states: “Although the report meets the aims and expectations, as laid out by the authors, the report fails to meet basic scientific rigor for marine birds. The information given in the report, meaning the survey baseline and summarized marine bird records, are completely insufficient for a key need; a quantitative marine bird distribution and abundance/density baseline and a solid grasp of how the project area compares to adjacent waters, in terms of marine bird species use, distribution and abundance. A thorough exploration of the marine birds that inhabit the coast is also lacking. Put together, the report generates a qualitative, difficult to interpret marine bird distribution and relative abundance ‘baseline’ that is followed by a detached and

72. Within the CCAA, the Proponent conducted four types of field surveys to ascertain baseline marine bird abundance and distribution data. Vessel reconnaissance surveys were conducted for few days in each of the four seasons in only two years (2006 and 2009).<sup>129</sup> Fixed-wing surveys were conducted for a mere two days.<sup>130</sup> The Proponent performed terrestrial surveys for only six months, and only from a few stationary points along the Kitimat Arm.<sup>131</sup> Finally, the Proponent used radar surveys to collect baseline information on marbled murrelet on only seven days.<sup>132</sup> As fully discussed by the parties referenced in the above paragraph in each of their written evidence, these surveys do not generate the level of detail required for a proper environmental assessment of a project of this magnitude, particularly given the immense ecological value of the BC coast to migratory birds.
73. Many of those same parties also object to the fact that the Proponent has consistently refused to conduct any baseline survey in the OWA, an area that contains many Important Bird Areas (“IBAs”). Some of these IBAs contain a significant portion of the global population of a bird species. For example, Triangle Island, within the Scott Islands IBA, contains 55% of the world’s population of Cassin’s auklets.<sup>133</sup> While the Proponent has committed to additional three years of surveys prior to the start of operations and three years after the start of operations,<sup>134</sup> these surveys ought to have been completed as part of the Application (*supra* para. 16(d)-(f)). The lack of baseline surveys is a major oversight which renders the Application incomplete.

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incomplete record of marine bird information for the PEAA, CCAA, and adjacent waters. Specific comments are broken into issues of design, use of regional information and species information.”

<sup>126</sup> D71-7-4 - Gitga'at First Nation - Gitga at ENGP Environment Impact Report FINAL - A2K4X0, at p. iv states: “The ENGP JRP Submission fails to present a level of detail in the marine bird baseline that is required to support the environmental assessment of a development project of this nature. The level of survey intensity utilized, while possibly adequate as a means of providing an overview of the avifauna in the Project Area, is inadequate from the standpoint of informing an impact assessment where the potential for extensive avian mortality exists as a result of routine operations or an accident or malfunction associated with the marine transportation of hydrocarbons.”

<sup>127</sup> D35-14-1 - Coastal First Nations - Great Bear Initiative - CFN Evidence - A2K0J7, at pp. 50-51 states: “NGP has failed to provide the baseline information on the Queen Charlotte Sound, Hecate Strait and Dixon Entrance (OWA) needed to determine the environmental effects, or consequences, of an oil spill resulting from an oil tanker incident. Instead, NGP has used a probability methodology to justify not providing the baseline information, thereby eliminating a full consideration of the environmental effects of all possible and potential accidents. NGP has, therefore, perverted the requirement to consider accidents that ‘may’ occur, to one of considering only accidents that are ‘likely’ to occur.”

<sup>128</sup> E9-6-32, *supra* note 104, at para. 123 states: “With respect to breeding bird point counts conducted by the Proponent, Environment Canada is of the view that additional baseline information should be collected.”

<sup>129</sup> B9-15 - Marine Birds TDR Part 1 of 4 A1V5T9, at p. 2-3

<sup>130</sup> *Id.*, at p. 2-4

<sup>131</sup> *Id.*, at p. 2-4 and Figure 2-4

<sup>132</sup> *Id.*, at p. 2-8

<sup>133</sup> Transcript Vol. 111, Dec. 10, 2012, A3E1J3, at para. 8529

<sup>134</sup> *Id.*, at para. 9106

*ii) Failure to select an appropriate suite of marine bird KI species*

74. In conducting the marine portion of its environmental assessment of Project-related effects, the Proponent divides its application into four broad areas:
- Vol. 6B: Marine terminal ESA;
  - Vol. 8B: Marine transportation ESA;
  - Vol. 7C: Risk assessment and management of spills – Kitimat Terminal; and,
  - Vol. 8C: Risk assessment and management of spills – marine transportation.
- The Proponent has also produced TDRs and other documents in support of its marine environmental assessment.
75. In all these areas, the Proponent generally adheres to a four-part scheme.<sup>135</sup> Firstly, the Proponent identifies VECs. Secondly, the Proponent chooses KIs that represent each VEC. Thirdly, the Proponent selects measurable parameters for potential Project-related environmental effects on each VEC or KI. Lastly, the Proponent evaluates the significance of environmental effects based upon the degree of change in measurable parameters.
76. In the Application “VECs are defined as broad components of the biophysical and human environments, which, if altered by the Project, would be of concern to regulators, participating Aboriginal groups, resource managers, scientists and the public.”<sup>136</sup> One of the VECs that the Proponent has identified is “marine birds.”<sup>137</sup>
77. For marine birds, the Proponent has selected two to four bird species as KIs, depending on the section of the application (Table 1).

Table 1

<i>Marine Bird KIs by Relevant Application Volumes and Sections</i>							
	Vol. 6B s. 12	Vol. 6B s. 14	Vol. 7C	Vol. 8B s. 11	Vol. 8B s. 13	Vol. 8C s. 8.8	Vol. 8C s. 11
Surf Scoter	✓	✓	✓	✓		✓	✓
Marbled Murrelet	✓	✓	✓	✓		✓	✓
Bald Eagle	✓	✓	✓			✓	✓
Black Oystercatcher			✓			✓	
Spotted Sandpiper		✓					✓

Vol. 6B s. 12 = Marine terminal ESA  
 Vol. 6B s. 14 = Marine terminal ESA, risk assessment  
 Vol. 7C = Kitimat oil spill  
 Vol. 8B s. 11 = Marine transportation ESA  
 Vol. 8B s. 13 = Marine transportation ESA for OWA  
 Vol. 8C s. 8.8 = Marine transportation oil spill, effect of hydrocarbon in marine environment  
 Vol. 8C s. 11 = Marine transportation oil spill, risk assessment

<sup>135</sup> B3-12 - Vol 6B - Marine Terminal ESA (Part 1 of 4) - A1T0G2, at pp. 4-9 to 4-10.

<sup>136</sup> *Id.*, at p. 4-9

<sup>137</sup> *Id.*, at p. 4-18

78. Surf scoter (*Melanitta perspicillata*), marbled murrelet (*Brachyramphus marmoratus*), and bald eagle (*Haliaeetus leucocephalus*) are the main KIs which the Proponent has selected for marine birds. They feature in Volumes 6B, 7C, and 8C of the application. The Proponent uses a fourth KI – black oystercatcher (*Haematopus bachmani*) – in Vol. 7C and in the part of Vol. 8C which discusses the effect of hydrocarbon in the marine environment. However, in the part of Vol. 8C that provides risk assessment, spotted sandpiper (*Actitis macularius*) replaces black oystercatcher as the fourth KI. In Vol. 8B (Marine Transportation ESA), the Proponent uses only the surf scoter and marbled murrelet. No marine bird KIs were selected for the OWA portion of Vol. 8B.
79. Many parties have voiced concern over the Proponent’s selection of marine bird KIs. For example, BC Nature and Nature Canada,<sup>138,139</sup> Environment Canada,<sup>140,141</sup> Coastal First Nations,<sup>142</sup> and Gitga’at First Nation<sup>143</sup> have all asked the Proponent, through IRs, to provide further justification of its KI selection. In none of its responses does the Proponent provide substantially more justification than it has already given in the Application.
80. The Proponent’s inadequate selection of marine bird KIs has led to an incomplete assessment of potential Project-related impacts on the marine environment. Environment Canada, according to its written evidence, “remains of the view that the key indicators used need to be supplemented to give an appropriate representation of marine bird species in the Confined Channel Assessment Area and Open Water Area.”<sup>144</sup> While the Proponent asserts that “[i]n combination, the ecological requirements of these three KIs overlap extensively with that of marine bird species as a whole,”<sup>145</sup> as will be elaborated below, in many cases this is simply not true. The Proponent has also failed to include many species that ought to be KIs, such as important species at risk contrary to the *Scope of Factors* requirement (*supra* para. 16(b)). Lastly, the Proponent’s justification for a lack of assessment for the OWA is questionable. These will be discussed in turn.
81. The Kitimat Valley Naturalists (“KVN”), in its written evidence, challenged the Proponent’s selection of marine bird KIs. According to the KVN, these KIs “do not adequately reflect the critical role that the Kitimat and surrounding estuarine areas play in sustaining bird populations.”<sup>146</sup> In the most species abundant parts of the estuary, neither marbled murrelet nor surf scoter is found.<sup>147</sup> Neither the life history of marbled murrelet nor bald eagle is “critically linked to estuarine habitat.”<sup>148</sup> The KVN also challenged the use of black oystercatcher for oil spill assessment, because this species “has never been

<sup>138</sup> D12-2-1 - BC Nature and Nature Canada - Information Request 1 - Aug 25, 2011 A2C4I2, at p. 3

<sup>139</sup> D12-3-1 - BC Nature and Nature Canada - Information Request 2 - Nov 3, 2011 A2H1H1, at p. 3

<sup>140</sup> E9-2-1 - Government of Canada - Letter and Information Request No 1 to Northern Gateway - A2C4I8, at p. 82

<sup>141</sup> E9-4-1, *supra* note 102, at pp. 66 to 67

<sup>142</sup> D35-7-2 - Coastal First Nation - Great Bear Initiative - CFN Information Request #1 A2C2S9, at p. 63

<sup>143</sup> D71-5-1 - Gitga’at First Nation - Information Request #1 A2H1X8, at p. 16

<sup>144</sup> E9-6-32, *supra* note 104, at para. 220

<sup>145</sup> B3-15, *supra* note 122, at p. 12-3

<sup>146</sup> D112-2-1, *supra* note 120, at para. 7.1

<sup>147</sup> *Id.*

<sup>148</sup> *Id.*, at para. 7.4

recorded in the delta of the Kitimat River Estuary and only recently at Coste Rocks.”<sup>149</sup> Contrary to the Proponent’s claim that bald eagle is the only raptor found throughout the region all year,<sup>150</sup> sharp-skinned hawk and merlin are also raptors that are present in the area all year around.<sup>151</sup> Finally, the KVN claims that “[n]one of these three KI species represent[s] dabbling ducks, waders or shorebirds which occur[s] in abundance within the PEAA.”<sup>152</sup>

82. The KIs that the Proponent has selected do not represent certain species at risk such as:
- pink-footed shearwater (*Puffinus creatopus*; SARA Schedule 1, threatened);
  - short-tailed albatross (*Phoebastria albatrus*; SARA Schedule 1, threatened);
  - black-footed albatross (*Phoebastria nigripes*; SARA Schedule 1, special concern);
  - great blue heron (*Ardea herodias fannini*; SARA Schedule 1, special concern); and,
  - ancient murrelet (*Synthliboramphus antiquus*; SARA Schedule 1, special concern).
83. With regards to the great blue heron, the Proponent claims that it “is expected to interact with similar Project effects [with] surf scoter and marbled murrelet.”<sup>153</sup> However, during cross-examination of the Northern Gateway Marine Environmental & Socio-Economic Assessment witness panel (“Marine ESA Panel”) by BC Nature and Nature Canada, Mr. Green agreed that great blue heron is distinct from surf scoter in terms of foraging and other life requisites.<sup>154</sup> An important difference between the KIs and great blue heron is the fact that great blue heron is a wader which experiences both shore-based disturbance and wake effects.<sup>155</sup>
84. Ancient murrelet and rhinoceros auklet (*Cerorhinca monocerata*) are nocturnal species.<sup>156</sup> As Mr. Green indicated during cross-examination, rhinoceros auklet and ancient murrelet can be attracted to light, such as those of a ship at anchor or running lights on a vessel at night.<sup>157</sup> Yet, Mr. Green agreed that none of the KIs is nocturnal.<sup>158</sup> Therefore, none of the KIs can assist in determining the significance of light-induced mortality.
85. A major deficiency in the Proponent’s KI selection is the lack of KIs that represent pelagic species such as black-footed albatross, short-tailed albatross, and pink-footed shearwater. The Proponent claims that the KIs can represent these three species because they share “similar breeding constraints (relative low fecundity) to marbled murrelet” and are “expected to interact with similar Project effects [with] surf scoter and marbled

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<sup>149</sup> *Id.*, at para. 11.1

<sup>150</sup> B3-15, *supra* note 122, at p. 12-3

<sup>151</sup> D112-2-1, *supra* note 120, Table 1 at p. 7

<sup>152</sup> *Id.*

<sup>153</sup> B47-2 - Response to BC Nature - Nature Canada IR No. 2 - A2I9I0, at p. 3

<sup>154</sup> Transcript Vol. 111, *supra* note 133, at para. 8413

<sup>155</sup> D12-8-2, *supra* note 117, at para. 52

<sup>156</sup> Transcript Vol. 111, *supra* note 133, at para. 8393

<sup>157</sup> *Id.*, at paras. 8409 & 8411

<sup>158</sup> *Id.*, at para. 8390

murrelet.”<sup>159</sup> In truth, “not only do these two guilds have very different life history requisites; their habitat use barely overlaps at all.”<sup>160</sup>

86. During the cross-examination of Marine ESA Panel, Mr. Green agreed that the primary habitat of marbled murrelet is nearshore and terrestrial, while the primary habitat of surf scoter is sheltered, fresh waters in marine habitats.<sup>161</sup> In contrast to these two KIs, he also agreed that black-footed albatross, short-tailed albatross, and pink-footed shearwater are pelagic species whose primary habitat is offshore.<sup>162</sup> Mr. Green unequivocally agreed that marble murrelet, surf scoter, and bald eagle are not pelagic species.<sup>163</sup> While he testified that none of the KIs is intended to represent pelagic species because the Proponent was not looking at guilds or ecological clusters but effects pathways,<sup>164</sup> the Application shows that at least some consideration was made for choosing KIs from different ecological guilds. The Application divides marine birds into four groups:<sup>165</sup>

- pelagic seabirds (e.g., alcids and tubenoses);
- waterfowl (e.g., loons and ducks);
- shorebirds (e.g., oystercatchers and sandpipers); and,
- coastal raptors (e.g., eagles and ospreys).

It would seem that the Proponent chose one KI from each guild: marbled murrelet (though, as discussed, this is not a pelagic species), surf scoter, black oystercatcher, and bald eagle respectively.

87. The Application itself is contradictory as to the primary habitat of marbled murrelet. In Vol. 6B, the Proponent describes marbled murrelet as primarily a terrestrial to nearshore species that “travel[s] long distances between forage and nest sites up to 70km inland.”<sup>166</sup> However, in the Proponent’s *Marine Birds: Key Indicators and Potential Effects from Routine Project Activities* document filed as an attachment to an IR response (“Exhibit B46-37”), the Proponent describes marbled murrelet primary habitat as “pelagic to offshore.”<sup>167</sup> During the cross-examination of the Marine ESA Panel, Mr. Green at first denied that the characterization in Exhibit B46-37 is erroneous.<sup>168</sup> However, he eventually conceded that ornithologists would not classify marbled murrelet as a pelagic species.<sup>169</sup>

88. Aside from primary habitat use, black-footed albatross also differs from the selected KIs in their foraging behaviour. Black-footed albatrosses tend to travel in flocks and feed in congregation.<sup>170</sup> According to Mr. Green, species that congregate are “highly susceptible”,

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<sup>159</sup> B47-2, *supra* note 153, at pp. 3-4

<sup>160</sup> D12-8-2, *supra* note 117, at para. 135

<sup>161</sup> Transcript Vol. 111, *supra* note 133, at paras. 8335 & 8351

<sup>162</sup> *Id.*, at para. 8360

<sup>163</sup> *Id.*, at paras. 8378, 8382, & 8384

<sup>164</sup> *Id.*, at para. 8384

<sup>165</sup> B3-39 - Vol 8C - Risk Assessment and Mgmt of Spills - Marine Transportation (Part 3 of 6) - A1T0I9, at pp. 8-38 to 8-39

<sup>166</sup> B3-15, *supra* note 122, at p. 12-12

<sup>167</sup> B46-37 - Attachment Federal Government IR 2.65 - A2I9G5, at p. 2-19

<sup>168</sup> Transcript Vol. 111, *supra* note 133, at para. 8859

<sup>169</sup> *Id.*, at para. 8884

<sup>170</sup> *Id.*, at para. 8371

“vulnerable”, and “sensitive” to small oil spills.<sup>171</sup> None of the KIs shares this vulnerability with black-footed albatross.

89. The lack of KIs that adequately represent pelagic species is related to the Proponent’s failure to do proper environmental assessment of the OWA. The Proponent states in its Application that “marine birds are not assessed... since transiting vessels are not expected to cause any measurable effects on these species groups”.<sup>172</sup> Within the Application, the Proponent gives no further explanation other than the claim that “the vast majority of marine birds... would be able to anticipate the approach of vessels moving at 15 knots and avoid its path.”<sup>173</sup> However, the Proponent elaborates in a response to IR:<sup>174</sup>

First, this reflects the location of the Northern and Southern shipping approaches to the CCAA relative to important habitats for marine birds. Second, this reflects the limited potential for Project vessels to interact with marine birds, and the low likelihood that effects such as sensory disturbance or mortality (i.e., vessel strikes, birds flying into the superstructure of a vessel) would occur. It is expected that the vast majority of marine birds in the OWA would be able to anticipate the approach of a vessel moving at 14-18 knots and avoid its path. While sensory disturbance may occur, the effect is predicted to be brief (i.e., birds would return to normal behaviour once the vessel has passed), and mortality of marine birds as a result of collisions with moving vessels is not expected to be measurable or significant. As a result, effects of routine vessel movements on marine birds in the OWA were not assessed further.

90. During the cross-examination of the Marine ESA Panel, Mr. Green testified on how various Project effects relating to marine transportation, such as wake, sensory disturbance, collision, and oil spills, will be insignificant in the OWA.<sup>175</sup> He stated that none of these effects pathways will be significant in the OWA.<sup>176</sup> However, if the process that the Proponent purports to use is to identify measurable parameters for Project effects on each VEC or KI (*supra* para. 75), neither the Application nor Mr. Green’s testimony sheds light on how the Proponent came to this insignificance conclusion. The Proponent fails to provide evidence on which KI and what measurable threshold was used to determine that Project effects in the OWA will be insignificant. In respect to the OWA, the Proponent has not identified the criteria used to assign significance, as required by the *Scope of Factors* (*supra* para. 16(j)).

91. Additionally, Mr. Green stated that no KIs are needed for pelagic species in the OWA because routine marine transportation operations do not have a significant effect on pelagic birds.<sup>177</sup> The Proponent’s logic, therefore, is circular: the Proponent did not measure any significant effect since no KI was used, and no KI is needed because there is no significant effect.

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<sup>171</sup> *Id.*, at para. 8448

<sup>172</sup> B3-35 - Vol 8B - Marine Transportation ESA (Part 10 of 11) - A1T0I5, at p. 13-12

<sup>173</sup> *Id.*

<sup>174</sup> B41-2 - Response to BC Nature - Nature Canada IR No. 1 - A2E8I8, at pp. 8-9

<sup>175</sup> Transcript Vol. 111, *supra* note 133, at paras. 8416-8422

<sup>176</sup> *Id.*, at para. 8422

<sup>177</sup> *Id.*, at para. 8386

92. The Proponent’s KI selection methodology is wholly inadequate. The number of KIs is too small for a sufficient assessment of a Project of this magnitude. The selected KIs do not share the same habitat, biology, or vulnerability as the other marine bird species that these KIs are supposed to represent. The suite of KIs does not contain an adequate representation of species at risk. Moreover, no rational justification is given for the lack of assessment for the OWA. Thus, the Proponent has failed to properly include from the *Scope of Factors*:
- proper consideration of species at risk (*supra* para. 16(b));
  - proper baseline description of the habitat use, life history, and vulnerability of KIs and other marine birds (*supra* para. 16(d) & (f)); and,
  - proper description of the criteria for determining significance for the OWA (*supra* para. 16(j)).

In respect of KI selection and the use of KIs, the Application remains incomplete.

iii) Failure to justify choice of marine bird KIs

93. On August 25<sup>th</sup>, 2011, Environment Canada requested the “rationale supporting the suite of Key Indicators selected to account for impacts on marine-bird species groups and SARA-listed species in the Project Environmental Assessment Area.”<sup>178</sup> The Proponent responded to this request on October 6<sup>th</sup>, 2011 with a reiteration of criteria for KI selection already set out in its Application, and descriptions of the three chosen KIs – marbled murrelet, surf scoter, and bald eagle.<sup>179</sup>
94. On November 3<sup>rd</sup>, 2011, Environment Canada repeated its previous request in addition to a table of all marine bird species in the CCAA and OWA “and how each species may or may not be represented by the existing Key Indicator species.”<sup>180</sup> In response, the Proponent filed a report entitled *Marine Birds: Key Indicators and Potential Effects from Routine Project Activities* (“Exhibit B46-37”).
95. Exhibit B46-37 is divided into two major sections. The first is a tabular summary of marine bird species and their vulnerabilities to Project effects. The second is a nonmetric multidimensional scaling (“NMS”) ordination analysis that evaluates the association of selected KIs with other marine bird species. Together, Exhibit B46-37 is intended to address Environment Canada’s request on the rationale for the Proponent’s KI selection and on a tabular summary of marine bird vulnerabilities.<sup>181</sup> In both those areas, the Proponent fails.

a) Failure to adequately describe marine bird vulnerabilities to Project effects

96. The *Scope of Factors* requires the Proponent to provide sufficient description of baseline information (*supra* para. 16(d) & (f)). However, the section regarding marine bird species and their vulnerabilities is incomplete and erroneous. In that section, Table 3 contains the tabular summary of marine bird vulnerabilities requested by Environment Canada, while

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<sup>178</sup> E9-2-1, *supra* note 140, at p. 82

<sup>179</sup> B41-4, *supra* note 75, pp. 167-169

<sup>180</sup> E9-4-1, *supra* note 102, at pp. 66-67

<sup>181</sup> B46-37, *supra* note 167, at p. 1-2

Table 1 purports to show *all* the information sources on which Table 3 is based. Mr. Green confirmed this during cross-examination:<sup>182</sup>

8796. **MR. TOLLEFSON:** All of the data that ends up on Table 3 -- which we'll look at later, talking about project effects -- all the data comes from the sources that are listed in Table 1; is that right?

8797. **MR. JEFFREY GREEN:** Yes, that's correct.

97. Table 1 shows 16 sources of information, only three of which relate to effects from routine operations. Other sources relate to life history, behaviour, habitat use, abundance, and distribution.

98. For every marine bird species found in the CCAA and OWA, Table 3 shows their conservation status, abundance, primary habitat use, vulnerabilities to Project effects, and references to sources listed in Table 1. Examining the column on references, it is self-evident that most of the sources relied upon relate to abundance and distribution of marine birds, and none of the three sources relating to effects from routine operations listed in Table 1 features in Table 3. BC Nature and Nature Canada confronted the Proponent on this during cross-examination:<sup>183</sup>

8801. **MR. TOLLEFSON:** ...

8802. Now, there appears to be only three sources that you rely on to document -- in the last column -- "Effects from Routine Operations" -- in the last column on the right, there's only three sources there that you've consulted for that purpose; correct?

--- (A short pause/Courte pause)

8803. **MR. JEFFREY GREEN:** So these are additional references over and above what was used in the environmental assessment. So I probably said -- misled you earlier where you said, were all of -- were these the only references.

...

8822. **MR. TOLLEFSON:** And you can take a moment obviously to answer this question, but nowhere in that column are any of the sources relating to routine project effects, none of those three references are listed in that final column are they?

--- (A short pause/Courte pause)

8823. **MR. JEFFREY GREEN:** So you're correct, the majority of -- or the references shown in the last column are primarily related to the distribution abundance and occurrence habitat use types of things.

8824. I'll stress again, this is an additional document. This arose out of a request by the Canadian Wildlife Service to augment the data in the environmental assessment, and I don't see why one would not assume that it augments the data from the environmental assessment. The environmental assessment had, I'm not sure how many, but I'm going to say tens, possibly hundreds of references, and to go back and repeat them all in a second document would seem rather wasteful.

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<sup>182</sup> Transcript Vol. 111, *supra* note 133, at para. 8796 (emphasis added)

<sup>183</sup> *Id.*, at paras. 8801-8824

99. Mr. Green's testimony in paragraphs 8803 and 8824 contradicts his earlier testimony in paragraph 8797. Nowhere does Exhibit B46-37 suggest that it is a supplement to the environmental assessment, nor does the document say anywhere that the sources cited in Table 1 are complementary to those cited in the main Application. In fact, the Methodology section of Exhibit B46-37 implies that the document is stand-alone and comprehensive:<sup>184</sup>

The summary of marine bird species is based on a review of relevant literature and databases from peer-reviewed journals, publications, technical reports (e.g., COSEWIC status reports), and local and regional data (e.g., Christmas Bird Counts, naturalist observations). Additional resources, such as those recommended by Environment Canada; the Marine Atlas of Pacific Canada and the Pacific North Coast Integrated Management Area (PNCIMA), were used to supplement these data. The type of information collected from these sources is summarized in Table 1 and focused on marine bird life history, behaviour, broad habitat use, distribution, abundance and effects from the routine shipping and terminal operations of similar projects. Literature sources are numbered for ease of presentation and can be referenced by number in Section 2.6 Literature Cited.

100. The Proponent has the burden of proof to show that the evidence that it has presented is based on reliable and credible science. BC Nature and Nature Canada submit that the Proponent has failed to demonstrate that the information being conveyed by Table 3 regarding marine bird species' vulnerabilities to Project effects has any scientific basis. Furthermore, some information conveyed by Table 3 regarding primary habitat use is erroneous (*supra* para. 87 on primary habitat use of marbled murrelet). To that extent, the Proponent fails to provide a proper description of marine habitat use as required by the *Scope of Factors* (*supra* para. 16(f)).
101. Exhibit B46-37 also contains a graphical representation of the Proponent's finding with regards to vulnerabilities to Project effects. The title of this figure is "Figure 5: Percentage of Species within Each Family that May Experience Effects from Routine Operations." The information being conveyed in Figure 5, as it appears in Exhibit B46-37 is nonsensical. For example, according to Table 3, the family Haematopodidae contains only a single species – black oystercatcher. Nevertheless, Figure 5 shows that 80% of species within that family is vulnerable to direct mortality, 80% to wave turbulence, 60% to visual disturbance, 40% to light disturbance, and 20% to noise disturbance.<sup>185</sup> In response, Mr. Green testified that:<sup>186</sup>
8918. **MR. JEFFREY GREEN:** No it's not 80 percent of the numbers of animals. It's a -- what this is trying to say is given different types of effects from the project, it's -- as I understand it this is like a relative rating of the chance of like -- I think two things. First of all, in -- it's the percentage of species that might be at risk from this type of effect and -- but it has nothing to do with the consequence of effect.

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<sup>184</sup> B46-37, *supra* note 167, at p. 2-1 (emphasis added)

<sup>185</sup> *Id.*, Figure 5 at p. 2-23

<sup>186</sup> Transcript Vol. 111, *supra* note 133, at para. 8918

102. Mr. Green could not explain why Figure 5 shows 80% of a family with only one member.<sup>187</sup> Neither could he explain why, given that the family Diomedidae has three species, Figure 5 shows 50% of that family is susceptible to direct mortality.<sup>188</sup>
103. The Proponent tried to correct this error through Undertaking U-61, in which the Proponent provided a replacement table that shows the number of species per taxonomic family potentially susceptible to routine project effects.<sup>189</sup>
104. Prior to the response to Undertaking U-61, the Proponent states in Exhibit B46-37 the following:<sup>190</sup>
- Figure 5 depicts those marine birds that are likely to be at greatest risk to the potential effects from routine Project operations as a percentage of species within the family taxa. For example, 80% of species within Alcidae may experience direct mortality, while 19% may experience effects related to noise. This finding supports the use of Marbled Murrelet, Surf Scoter, Black Oystercatcher and Bald Eagle as KI species.
105. The reference to Figure 5 and the statement regarding direct mortality are erroneous and have been replaced with the table in the response to Undertaking U-61. However, even with this attempted correction, the Proponent’s conclusion as quoted here remains a *non sequitur*. Neither the findings in the original Figure 5 nor the replacement Table 1, through logic, implication, or imagination, “supports the use of Marbled Murrelet, Surf Scoter, Black Oystercatcher and Bald Eagle as KI species.” Even assuming 80% of Alcidae would in fact experience direct mortality, this information provides no support for the proposition that the four KI choices listed there were appropriate. In fact, there is nothing in the Proponent’s response to U-61 that supports the Proponent’s choice of KIs. There is a complete disconnect between the information that the Proponent presents in Exhibit B46-37 and the proposition that the Proponent is trying to prove.
106. Given the fatal errors and deficiencies in the literature review section of Exhibit B46-37, we submit that the Proponent has not complied with Environment Canada’s request to produce a tabular summary of marine bird species within the CCAA and OWA and their vulnerabilities to Project effects that can justify the Proponent’s choice of KIs.

*b) Failure to use NMS ordination to justify choice of KIs*

107. The second part of Exhibit B46-37 attempts to further justify the Proponent’s KI selection through the use of NMS ordination analysis. The ordination analysis purports to “evaluate the association of marine bird KIs with other marine bird species”<sup>191</sup> and was done to answer the question: “does the presence or abundance of Surf Scoter, Marbled Murrelet, or Bald Eagle adequately predict the presence of other species?”<sup>192</sup> BC Nature and Nature

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<sup>187</sup> *Id.*, at para. 8923

<sup>188</sup> *Id.*, at paras. 8931-8933

<sup>189</sup> B180-1 - NGP Response to Undertaking U-61 - A3E3H3, Table 1 at p. 2

<sup>190</sup> B46-37, *supra* note 167, at p. 2-22

<sup>191</sup> *Id.*, at p. 3-1

<sup>192</sup> *Id.*

Canada submit, however, that this NMS ordination analysis contains various fatal errors and deficiencies that completely undermine its reliability and utility for the purposes of this Application.

108. In conducting this ordination analysis, the Proponent performed data-screening techniques on the raw data.<sup>193</sup> Mr. Green explained that the purpose of the screening was to focus the analysis on common species and to remove outliers.<sup>194</sup> However, this screening significantly reduced the number of species that entered the ordination. Table 4 shows that, for the four seasons that the Proponent examined, at best the Proponent retained 34% of the original data (number of species in the spring was reduced from 50 to 17), and at worst only 12% of the data was retained (summer species was reduced from 49 to a mere 6).<sup>195</sup> The extensive culling of the dataset severely compromises the integrity of the statistical analysis.
109. As a result of the culling of the data, even KI species were removed from the ordination analysis. Marbled murrelet was removed for the fall season, surf scoter in the summer season, and neither the black oystercatcher nor the spotted sandpiper was included in the ordination at all.<sup>196</sup> If the purpose of the ordination, as Mr. Green stated, is to determine whether or not the selected KIs represent interaction of routine activities with marine birds,<sup>197</sup> and to show how KIs relate to other species by showing linkages in habitat use,<sup>198</sup> then the fact that the data-screening required the removal of KIs from the analysis clearly demonstrates that either the Proponent's ordination methodology is flawed or the selected KIs were inappropriate, or perhaps both.
110. Once the ordination analysis was complete, stress values were applied to assist in the interpretation of the results. Stress values greater than 20 indicate that the results are "likely misleading."<sup>199</sup> Values between 10 and 20 are usable, but upper values are potentially misleading.<sup>200</sup> For the summer season, which data was heavily culled by screening, the stress value is 28.15.<sup>201</sup> Therefore, as Mr. Green testified, "we believe it's unreliable and we wouldn't use that association."<sup>202</sup> For spring, the stress value is 19.5,<sup>203</sup> which Mr. Green agreed meant that the ordination result was "potentially misleading."<sup>204</sup> Finally, the stress values for fall and winter are 17.2 and 16.6 respectively, both of which fall under the upper half of the 10 to 20 range.

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<sup>193</sup> *Id.*, at p. 3-2

<sup>194</sup> Transcript Vol. 111, *supra* note 133, at paras. 8986 & 8991

<sup>195</sup> B46-37, *supra* note 167, Table 4 at p. 3-2

<sup>196</sup> *Id.*, Table 5 at pp. 3-2 to 3-3

<sup>197</sup> Transcript Vol. 111, *supra* note 133, at para. 8967

<sup>198</sup> *Id.*, at para. 9020

<sup>199</sup> B46-37, *supra* note 167, Table 6 at p. 3-3

<sup>200</sup> *Id.*

<sup>201</sup> *Id.*, at p. 3-5

<sup>202</sup> Transcript Vol. 111, *supra* note 133, at para. 9064

<sup>203</sup> B46-37, *supra* note 167, at p. 3-5

<sup>204</sup> Transcript Vol. 111, *supra* note 133, at para. 9078

111. In the face of these high stress values, Mr. Green stated:<sup>205</sup>

9084. **MR. JEFFERY GREEN:** They are values within the 10 to 20 category. There [sic] in the upper part of that. And as we said before, that this is [common]<sup>206</sup> for ecological community analyses.

9085. So yes, they're not the most accurate. But again, this is -- all this is, is telling us that for the species we chose they tend to represent these species and habitat uses. It doesn't have any implication on whether or not the effects are or are not significant.

Except for the statement that the KIs represent other species and their habitat uses, we agree. The entire Exhibit B46-37, both the literature review section and the ordination analysis section, is rife with inaccuracies. The results of this document contribute nothing to the determination of significance in the Application. The Proponent fails to fulfil Environment Canada's request for justification of the Proponent's selection of KIs. To the extent that concerns over the adequacy of the Proponent's choice of marine bird KIs are outstanding and are not remedied by Exhibit B46-37, we submit that the Proponent has failed to satisfy the requirement in the *Scope of Factors* to properly describe marine habitat use (*supra* para. 16(f)), and the Application remains incomplete.

*iv) Failure to properly assess Project impacts on marine birds*

112. BC Nature and Nature Canada submits that the Proponent has failed to properly assess the impact of artificial light-induced mortality, collisions, displacement by vessels, prey-mediated impacts, and catastrophic spills on marine birds.<sup>207</sup> Moreover, we submit that the Proponent has also failed to properly assess the impact of chronic oiling on marine avifauna.

113. Unlike catastrophic spills, which are single events during which large volumes of oil are released into the environment, chronic oiling describes the collective discharge of small volumes of oil from multiple sources. Non-compliant vessels and accidental discharge from ships and/or coastal facilities are two major sources of chronic oiling.<sup>208</sup> Scientific literature defines chronic oiling as releases of less than 1000 litres of oil.<sup>209</sup>

114. During the cross-examination of the Marine ESA Panel, Mr. Green agreed that there is a growing realization that chronic oiling is a major problem for marine birds:<sup>210</sup>

8605. **MR. TOLLEFSON:** ...

8608. ... So would you agree with this statement that:

"Globally there is a growing awareness that smaller scale operational ship source oily discharges of less than 1,000 litres contribute more to oil pollution in marine environments than the larger scale often catastrophic oil spills." (As read)

8609. That's the first sentence. Do you agree with any or all of that statement?

<sup>205</sup> *Id.*, at paras. 9084-9085 (emphasis added)

<sup>206</sup> "uncommon" was changed to "common" by errata, Transcript Vol. 112, Dec. 11, 2012, A3E1X1, at adobe 8

<sup>207</sup> See written evidence of BC Nature and Nature Canada, D12-8-2, *supra* note 117

<sup>208</sup> D12-8-2, *supra* note 117, at para. 31

<sup>209</sup> Transcript Vol. 111, *supra* note 133, at para. 8366

<sup>210</sup> *Id.*, at paras. 8605-8613 (emphasis added)

8610. **MR. JEFFREY GREEN:** Yes, we would agree that there is growing awareness and as a result of that, all of these papers by O’Hara and Serra-Sogas are getting at the need for increased surveillance and increased enforcement. And so yes, it is a problem. There is absolutely no question it’s a problem; oil and birds are not a good combination.

8611. **MR. TOLLEFSON:** And then the next sentence:

“Ecological impacts attributed to the smaller, more chronic levels of oil pollution have also been shown to be greater over the long-term than the larger spills.” (As read)

8612. Do you agree with that?

8613. **MR. JEFFREY GREEN:** That’s what it says. I think -- I would assume that’s a reasonable assumption here.

115. The *Scope of Factors* requires the Proponent to assess both major *and* minor accidental releases of oil or condensate (*supra* para. 16(h)). But despite the recognition that chronic oiling is an issue and despite the requirement of the *Scope of Factors*, the Proponent makes no effort to properly consider the impact of chronic oiling on marine birds.

116. The Proponent refuses to accept that chronic oiling ought to be considered in the marine ESA due to a fundamental disagreement over the definition of chronic oiling that should be used in the Application. In contrast, BC Nature and Nature Canada submit that the definition which prevails in scientific literature should apply here. As Mr. Green aptly stated at a later witness panel in relation to risk assessment, this is a “science-based” assessment and that “one has to use science to conduct the assessment.”<sup>211</sup> However, the Application does not use the prevailing definition, as illustrated by the following exchange during BC Nature and Nature Canada’s cross-examination of the Marine ESA Panel:<sup>212</sup>

8364. **MR. JEFFREY GREEN:** Could you define what you mean by "chronic oiling", please?

8365. **MR. TOLLEFSON:** I would define "chronic oiling" as distinct from a catastrophic or an acute oil event of -- of a major proportion. Chronic oiling is oiling that arises in the context of routine operations.

8366. **MR. JEFFREY GREEN:** If you’re speaking to oil discharges during routine operations, then the limit used in our assessment is 15 parts per million. The literature is full of references to chronic oiling that includes releases of 1,000 litres, a tonne of oil. We would not consider that to be a routine activity for this project.

8367. So there are regulated and approved ways of dealing with oil at sea. And we can get into those if you like, but the limit is 15 parts per million, which is defined as no visible sheen on the water surface.

...

8597. Northern Gateway will fully require that all of the shippers for this project follow that. They have to follow Canadian law. If you discharge more than 15 parts per million, you’ve violated the *Shipping Act*, you’ve violated the *Environmental Protection Act*. You likely will have violated the *Migratory Bird Act*. You’ll likely have violated the *Fisheries Act* and perhaps the *Species at Risk Act*.

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<sup>211</sup> Transcript Vol. 133, Feb. 4, 2013, A3F2I4, at para. 420

<sup>212</sup> Transcript Vol. 111, *supra* note 133, at paras. 8364-8367, 8597 (emphasis added)

117. According to Mr. Green, there are regulated discharges under 15 parts per million (“ppm”), and then there are illegal spills. Within this large category of spills over 15ppm, the Proponent makes no attempt to differentiate between single-event catastrophic spills and routine chronic oiling. Within the Application, the Proponent considered spills at seven locations, with each location having been modelled once for summer and once for winter.<sup>213</sup> None of these spill models considers spills less than 1000 litres. The Proponent also considered an ecological and health impact assessment of an oil spill, but that was for a large 36,000m<sup>3</sup> diluted bitumen spill off Wright Sound.<sup>214</sup> To the extent that the Proponent has failed to conduct a proper environmental assessment of minor accidental spills per the *Scope of Factors* (*supra* para. 16(h)), the Application remains incomplete.

C) Emergency Response & Preparedness (Consequences of Spills on the Marine Environment)

118. During the cross-examination of the Marine ESA Panel, Mr. Green stated that “oil and birds are not a good combination.”<sup>215</sup> We agree.

119. The Application contains many references to the potential effects of diluted bitumen or synthetic oil to marine birds. For example, potential effects include mortality from hypothermia or ingestion of hydrocarbons, reduced health from increase energy expenditure for preening to remove oil, reduced health from having to switch to non-contaminated but inferior prey-base, reduced breeding success, asphyxiation from toxins, and loss or damage to habitat.<sup>216</sup>

120. The Terms of Reference requires the Proponent to consider:<sup>217</sup>  
environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out [and the] significance of the effects.

Further, the *Scope of Factors* requires the Proponent to examine “sensitive components of the environment that could be affected in the event of an accident or malfunction” and assess the risk of both “minor and major accidental releases of oil and condensate” (*supra* para. 16(g) & (h)).

121. To this day, the Proponent’s risk assessment of the probability and consequence of an oil or condensate spill into the marine environment remains inadequate and incomplete. In particular, BC Nature and Nature Canada notes the following deficiencies:

- i. Failure to employ a proper risk assessment approach;
- ii. Failure to properly assess the consequences of spill;
- iii. Failure to properly assess the recovery of marine birds from spill; and,
- iv. Failure to properly assess and present information regarding the probability of spill.

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<sup>213</sup> Transcript Vol. 133, *supra* note 211, at para. 663

<sup>214</sup> *Id.*, at para. 664

<sup>215</sup> Transcript Vol 111, *supra* note 133, at para. 8610 (emphasis added)

<sup>216</sup> B3-39, *supra* note 165, at p. 8-46

<sup>217</sup> Hearing Order, *supra* note 3, at p. 25 (emphasis added)

*i) Failure to employ a proper risk assessment approach*

122. The Proponent largely equates “risk” with the probability of a spill. This is due to the fact that the Proponent assumes the consequence of any major oil spill on the environment will be adverse and significant; as such, the Proponent’s risk assessment focuses on likelihood of spills.<sup>218</sup>

Northern Gateway believes that the outcome of any assessment of the environmental effects of a major spill in the CCAA and OWA would arrive at a similar conclusion of multiple adverse and significant effects to the marine biophysical environment and human use. What is important in assessing these adverse and significant effects, is the likelihood or statistical probability that a spill will occur during the life of the Northern Gateway Project.

123. Northern Gateway President and Director Mr. John Carruthers confirmed the Proponent’s position on this issue during BC Nature and Nature Canada’s cross-examination of the Northern Gateway Marine Emergency Preparedness and Response witness panel (“Emergency Response Panel”):<sup>219</sup>

470. **MR. TOLLEFSON:** Is it fair then to say that it is the Proponent’s position -- predominantly your position is that the probability of a major spill is so small that -- despite major significant adverse consequences associated with such a spill, the risk is so small that this project should be allowed to proceed?

471. That’s your position, isn’t it?

--- (A short pause/Courte pause)

472. **MR. JOHN CARRUTHERS:** Yes, certainly, we looked at the risk and we looked at the extent of the risk and had that assessed and then we looked at a number of things that the project could do to reduce that risk even further.

124. The Proponent’s approach to dealing with the risk of oil or condensate spill on marine birds is three-fold. Firstly, the Proponent describes the potential effects of oil or condensate on marine birds within the Application<sup>220</sup> and other documents such as the Reply Evidence.<sup>221</sup> Secondly, the Proponent examines the probability of spill before and after mitigation is applied. This information is predominantly presented in the Marine Shipping Quantitative Risk Analysis (“QRA”).<sup>222</sup> Thirdly, once the Application is approved, the Proponent will develop Oil Spill Response Plans (“OSRP”) including a General OSRP (“GOSRP”), a Marine OSRP, a Terminal OSRP, and a Response Organization OSRP “so that a response capability is in place to address accidents and malfunctions.”<sup>223</sup>

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<sup>218</sup> B46-2, *supra* note 103, at p. 190

<sup>219</sup> Transcript Vol. 133, *supra* note 211, at paras. 470-472 (emphasis added)

<sup>220</sup> B3-39, *supra* note 165, at pp. 8-46 to 8-49

<sup>221</sup> B83-17 - Attachment 8 - Recovery of the Biophysical and Human Environments from Oil Spills - A2V1T1

<sup>222</sup> B23-34 - TERMPOL TDR - Marine Shipping Quantitative Risk Analysis A1Z6L8

<sup>223</sup> B3-37 - Vol 8C - Risk Assessment and Mgmt of Spills - Marine Transportation (Part 1 of 6) - A1T0I7, at p. 5-3

125. During BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel, Mr. Carruthers summarized the Proponent’s approach to spill risk as follows: “So there’s the two components: It’s, (1), to look at what is the chance of an incident, get that as low as practicable; and then, (2), respond very quickly and have sufficient capacity to respond.”<sup>224</sup>
126. Setting aside the issue that finalized versions of these OSRPs have not even been created and not been placed before the JRP for scrutiny,<sup>225</sup> we submit that the Proponent’s approach is inappropriate because reducing spill probability and creating response plans is a requisite risk *response* approach properly applied after a determination is already made that the risk is acceptable and that the Project should go forward. To decide whether or not the risk is acceptable, risk *assessment* must be done with the view to determine whether or not the risk is significant, and this determination must be made with regard to both the probability of that event occurring and the severity of consequences of that event should it occur. A proper risk assessment approach, then, can be conceived of as a matrix of probability and consequence.<sup>226</sup> The risk of a very probable event that has minor impacts can be equally as risky, and hence just as significant, as a relatively improbable event that has severe consequences.
127. Some parties have already challenged the Proponent’s characterization of risk as predominantly about probability of spill. For example, both Environment Canada (IR 2.76<sup>227</sup>) and the Gitxaala Nation (IR 1.12.2<sup>228</sup>) have argued that “risk” is a product of the probability and consequence. In fact, in its written evidence, Raincoast put forward a risk assessment that “explicitly combines the probability of an oil spill with the environmental consequences.”<sup>229</sup> BC Nature and Nature Canada commend the risk assessment conducted by Raincoast.<sup>230</sup>
128. In its response to BC Nature and Nature Canada IR 1.11(b), the Proponent conceded that “[r]isk is made up of the likelihood of an event occurring and the consequence associated with the event.”<sup>231</sup> During BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel, Northern Gateway’s Manager in Emergency Management Mr. Owen McHugh also agreed that “risk” is typically defined as the product of probability and consequences.<sup>232</sup> In practice however, nowhere in the Application does the Proponent provide a risk assessment that combines probability and consequence of spill together in a quantitative manner, such as that conducted by Raincoast.

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<sup>224</sup> Transcript Vol. 133, *supra* note 211, at para. 475

<sup>225</sup> *Id.*, at para. 942

<sup>226</sup> D170-2-21 - Raincoast Conservation Foundation - Written submission of Raincoast Conservation Foundation, Part 7-1, Dec 21, 2011 - A2K318, Figure 1 at p. 26

<sup>227</sup> E9-4-1, *supra* note 102, at pp. 74-75

<sup>228</sup> D72-6-2 - Gitxaala Nation - Information Requests No. 1 A2C4H0, at p. 30

<sup>229</sup> D170-2-14, *supra* note 125, at para. 52

<sup>230</sup> *Id.*, at paras. 52-66 & D170-2-21, *supra* note 226, at paras. 58-66

<sup>231</sup> B41-2, *supra* note 174, at p. 42

<sup>232</sup> Transcript Vol. 133, *supra* note 211, at para. 389

129. The Proponent has failed to provide a proper risk assessment pursuant to the *Scope of Factors* (*supra* para. 16(g) & (h)). Without this risk assessment, the Proponent's evidence on risk management alone, such as mitigation and response measures, does not discharge the Proponent's burden of proof that the Project is unlikely to cause significant adverse environmental effects. As such, the Application remains incomplete.

ii) Failure to properly assess the consequences of spill

130. The Proponent has conceded that the consequence of an oil spill on the marine environment is adverse and significant.<sup>233</sup> However, borrowing the words of Environment Canada in its written evidence, BC Nature and Nature Canada remain of the view that the Application must "adequately convey the degree of potential significance of a spill to marine birds; this includes understanding the potential effects from the perspective of severity, geographic extent, duration, reversibility and ecological context."<sup>234</sup> This, the Proponent has failed to do. Since the *Scope of Factors* requires the Proponent to adequately identify the criteria used to assign significance and to adequately describe the environmental effects of spill (*supra* para. 16(h) & (j)), the Application is incomplete.

131. The Proponent conveys information regarding the impact of spill on the marine environment in four main ways. Firstly, Proponent provided a qualitative description generally of the potential effects of oil or condensate on marine birds using KIs as examples within the Application.<sup>235</sup> Secondly, the Proponent conducted trajectory and mass balance models of spills at seven locations, with each location having been modelled once for summer and once for winter.<sup>236</sup> Thirdly, the Proponent provided brief qualitative descriptions of environmental impacts for some of these spill scenarios.<sup>237</sup> Lastly, the Proponent summarized its risk assessment for only one example of diluted bitumen released into the marine environment in Wright Sound.<sup>238</sup>

132. There are three major deficiencies in the Proponent's assessment of spill consequences that illustrate the Proponent's failure to properly describe the consequence of oil spill and properly assess the significance of adverse environmental effects pursuant to the *Scope of Factors*:

- a. Failure to assess consequences in a quantitative manner;
- b. Failure to consider potential consequences to marine environment when selecting spill scenarios; and,
- c. Failure to assess an adequate number and spectrum of spill scenarios.

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<sup>233</sup> B46-2, *supra* note 103, at p. 190

<sup>234</sup> E9-6-32, *supra* note 104, at para. 218 (emphasis in original)

<sup>235</sup> B3-39, *supra* note 165, at pp. 8-46 to 8-49

<sup>236</sup> Transcript Vol. 133, *supra* note 211, at para. 663

<sup>237</sup> B3-42 - Vol 8C - Risk Assessment and Mgmt of Spills - Marine Transportation (Part 6 of 6) - A1T0J2, at pp. 10-3 to 10-39

<sup>238</sup> *Id.*, at pp. 11-1 to 11-29

a) Failure to assess consequences in a quantitative manner

133. Since the risk assessment must be made by taking together considerations for the probability of spill and for ecological consequences, having qualitative assessments of potential impacts of spill on marine birds is not sufficient. BC Nature and Nature Canada agree with Raincoast when it states in its written evidence: “What’s crucially absent in Volume 8C is an actual assessment of risk, by which we mean not only of the probability of an oil spill, but also a quantitative assessment of consequences of a spill.”<sup>239</sup> Without any quantitative analysis of how spills may impact the natural variability of marine bird populations, there can be no complete assignment of the significance of spill risk.
134. During BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel, Dr. Owens agreed that the Proponent has not conducted sufficient quantitative assessment of the consequences of spills.<sup>240</sup>
958. **MR. TOLLEFSON:** Would it be fair, Dr. Owens, to say though, and recognizing everything that you’ve said, that much of the work to actually inventory and identify specifically, in a quantitative way, populations, vulnerability, sensitivities much of that work lies ahead?
959. **DR. EDWARD OWENS:** There is no doubt. It’s like everything in the oil spill response business, the more information you have the better decisions you can make.
135. Due to the lack of sufficient quantitative baseline information, the Proponent fails to satisfy the requirements of the *Scope of Factors* (*supra* para. 16(d) & (f)). Such information cannot be provided after approval of the Project, but ought to be presented as part of a complete application. Without proper quantitative assessment of the consequences of spills on the marine environment, the Application is incomplete.

b) Failure to consider consequences when selecting spill scenarios

136. With regards to the way in which spill trajectory scenarios were chosen, the Proponent has provided contradictory evidence. In the *Hydrocarbon Mass Balance Estimates: Inputs for Spill Response Planning* document (“Exhibit 25-2”), in which the Proponent describes the methodology and results of spill trajectory modelling, the Proponent states that “[s]pill locations for this modelling study were selected based on the quantitative risk assessment (QRA) results.”<sup>241</sup> Furthermore, in a response to Federal Government IR 1.116, the Proponent states:<sup>242</sup>
- Northern Gateway noted that spill trajectory models had been provided for five locations (three in the Confined Channel Assessment Area (“CCAA”) and two in the Open Water Area (“OWA”)) to demonstrate how oil may compartmentalize in the environment, the response actions and to support an assessment of the environmental consequence of a spill. The locations of the scenarios were selected based on the

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<sup>239</sup> D170-2-14, *supra* note 125, at para. 39

<sup>240</sup> Transcript Vol. 133, *supra* note 211, at paras. 958-959

<sup>241</sup> B25-2 - Hydrocarbon Mass Balance Estimates - Inputs for Spill Response Planning TDR - 2011 A1Z6T0, at p. 1-

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<sup>242</sup> B41-4, *supra* note 75, at p. 238

Increased Risk Areas (“IRAs”) identified in the Marine Shipping Quantitative Risk Analysis (Det Norske Veritas 2010, Section 7.7).

137. According to the QRA, the IRAs were developed through three steps: “(1) Which segments have the highest risk for an oil spill? (2) Which incident type contributes most to the risk of each selected segment? (3) Where along the selected segments is the incident most likely to occur?”<sup>243</sup> Clearly, the Proponent has chosen locations for spill trajectory modelling based solely on places where the probability of spill is greatest. This inference is confirmed in the Proponent’s response to BC Nature and Nature Canada IR 1.11:<sup>244</sup>

The location of the scenarios were selected based on the Increased Risk Areas (“IRAs”) identified in the Marine Shipping Quantitative Risk Analysis (Det Norske Veritas 2010, Section 7.7). These were specific to navigation and the evaluation of specific mitigation measures (e.g., use of tugs). The potential for adverse consequences on coastal and marine sensitivities does not influence the likelihood of a spill incident occurring and, therefore, was not considered when identifying the IRAs.

138. In its written evidence, Environment Canada states that “the mass balance examples provided in the Application may not be representative of credible worst case scenarios. The selection of spill sites is based largely on areas of higher probability and needs to better take into account potential ecological consequences.”<sup>245</sup> When Environment Canada, in IR 2.76, again challenged the Proponent’s lack of consideration for ecological consequences in spill trajectory modelling, the Proponent reversed its position:<sup>246</sup>

In Northern Gateway’s response to Federal Government IR 116, Northern Gateway did, as cited by the Federal Government’s reviewer, indicate that the locations of the scenarios were selected based on the Increased Risk Areas identified in the Marine Shipping Quantitative Analysis. However, that statement was incomplete. The factors considered in selecting these locations included the likelihood of a mishap. They also took into account the environmental and human setting, information on which is provided elsewhere in the Application (Volume 8C). As stated at p.10-3 the pathways developed are based on proximity to navigational hazards or to unique sensitive environmental features or to both. The locations selected were:

- Emilia Island (proximate to Aboriginal communities at Hartley and Malsey Bays);
- Wright Sound (proximate to Hartley Bay, the Kayel Aboriginal community, and numerous Aboriginal fisheries as described in publicly available information);
- Midway on Principe Channel (proximate to Aboriginal use areas of Gitxaala Nation);
- Ness Rocks / Camaño Sound (proximate to Gitxaala Nation and Gitga’at FN traditional territory and use areas); and
- Butterworth Rocks in North Hecate Strait (i.e., open water, 35 km west of Prince Rupert).

<sup>243</sup> B23-34, *supra* note 222, at p. 7-113

<sup>244</sup> B41-2, *supra* note 174, at pp. 42-43 (emphasis added)

<sup>245</sup> E9-6-32, *supra* note 104, at para. 212(c)

<sup>246</sup> B46-2, *supra* note 103, at pp. 183-184

139. While Vol. 8C does indeed state that “pathway examples developed are based on proximity to navigational hazards or to unique or sensitive environmental features, or both,”<sup>247</sup> the Application does not indicate how sensitive environmental features were taken into account. None of the bullet points offered by the Proponent in its response to Environment Canada IR 2.76 appear in the Application.
140. The evidence remains that from the filing of the Application in May 2010, to the filing of Exhibit 25-2 in June 2011, up to the moment before the Proponent’s response to Environment Canada’s IR 2.76 in November 2011, the Proponent’s position was that locations chosen for spill trajectory modelling were based solely on the relative probability of spill along different portions of shipping routes and not on the relative ecological consequences associated with various spill locations. The *ex post facto* justification offered by the Proponent in response to IR 2.76 is not evidence that the Proponent has considered risk as a product of both probability and consequence. The failure to consider consequences when selecting spill scenarios is a failure to satisfy the requirement of the *Scope of Factors* to analyze the environmental effects of spills (*supra* para. 16(h)).

c) Failure to assess an adequate number and spectrum of spill scenarios

141. In addition to the lack of proper justification for those spill scenarios that the Proponent has selected, the number and type of spill scenarios are also inadequate. Given the broad geographic scope that Project effects may extend, and the high ecological value of the BC coast, seven spill scenarios are inadequate at capturing the breadth of potential impacts a spill may have on the marine environment. BC Nature and Nature Canada agree with Environment Canada’s written evidence, which states:<sup>248</sup>
- Environment Canada suggests that the inclusion of additional spill scenarios (including additional locations, volumes and products) for modelling purposes would improve both the ability to inform spill response planning and the confidence in ecological risk assessment predictions... While the additional selected spill scenarios are not expected to be exhaustive, they should provide a wide range of high-risk scenarios which enable an evaluation of the relative risk and potential environmental and socioeconomic effects of a spill should it occur.
142. To date, the Proponent has declined to provide additional spill scenarios because “there are an infinite number of scenarios that might transpire in respect of spill events.”<sup>249</sup> This refusal to provide more spill scenarios, as suggested by Environment Canada, is disconcerting, especially taking into consideration the concession made by the Principal of Polaris Applied Sciences Inc. Dr. Edward Owens during BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel:<sup>250</sup>
954. **DR. EDWARD OWENS:** I think, to be honest with you, this question is the [*sic*] entire coast is equally susceptible because we have no idea where any accidental spill

<sup>247</sup> B3-42, *supra* note 237, at p. 10-3

<sup>248</sup> E9-6-32, *supra* note 104, at para. 89

<sup>249</sup> B46-2, *supra* note 103, at p. 182 (emphasis added)

<sup>250</sup> Transcript Vol. 133, *supra* note 211, at para. 954 (emphasis added)

may come from and -- of the many passing tankers and the other vessels that are in the area.

143. The proper response in the face of such uncertainty is not to foreclose further investigation, but to conduct more spill modelling in areas of particular interest. Had the Proponent adopted a definition of risk that incorporated probability of spill and consequences to marine environments, then the Proponent would not have chosen only a few locations where the QRA had identified higher probabilities of spill. The Proponent would also have conducted spill modelling in areas of high ecological value or areas with sensitive ecological components, as required by the *Scope of Factors* (*supra* para. 16(g)). Environment Canada states in its technical review of the Proponent's spill modelling studies:<sup>251</sup>
- The issue of an “infinite number” of scenarios is not specific to this project. The aim of a spill analysis is not to address an “infinite number” of scenarios, but is meant to define and address spill scenarios that pose the highest risk to environmental and socioeconomic resources.
144. At the very least, the Proponent should have assessed: (1) additional worst-case scenarios; (2) scenarios where a spill may interact cumulatively with existing stressors on sensitive marine bird populations; and (3) additional scenarios in the OWA. The failure to include additional spill scenarios renders the Application in respect of consequence analysis incomplete.
145. The *Scope of Factors* requires the Proponent to consider “severe and/or extreme weather conditions and external events” (*supra* para. 16(i)). Such events are by definition rare, but the analysis of which is important for assessing the risk of worst-case scenarios. In declining Environment Canada's request to provide additional worst-case scenarios, the Proponent states that in the event of a spill, “it is impossible to predict where oil would end up and the associated consequences.”<sup>252</sup> Therefore, the Proponent will develop trajectory models “so that spill response and environmental protection actions can be deployed to the estimated spill pathway.”<sup>253</sup> The Proponent's approach can only be considered an attempt at risk *response*, but not risk *assessment*.
146. Risk is composed of probability and consequence (*supra* paras. 122-129). The proper assessment of risk must be done with an integrated view of the likelihood of an event and the potential impact of that event should it occur. Statistically rare but potentially catastrophic events, also known as black swan events, are unpredictable but carry massive impacts.<sup>254</sup> The risk of such events must be analyzed quantitatively as to their likelihood and potential impacts to the CCAA and OWA. Only then can the Proponent present information on the various ranges of geographical locations and environmental conditions within which different levels of risk for these worst-case scenarios can be assigned. Not

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<sup>251</sup> E9-39-2 - Government of Canada - Environment Canada - Technical Review of ENG Marine Spill Modelling Studies - Written Evidence - A2Z9W1, at p. 14 (emphasis in original)

<sup>252</sup> B41-4, *supra* note 75, at p. 238

<sup>253</sup> *Id.*, at p. 239

<sup>254</sup> D170-2-21, *supra* note 226, at para. 15

only has the Proponent not done this, the Proponent fails to provide any spill modelling of worst-case scenarios at all.

147. Related to worst-case scenarios are scenarios in which Project effects may interact cumulatively with existing stressors on sensitive environmental components. The *Scope of Factors* requires the Proponent to examine “sensitive components of the environment that could be affected in the event of an accident or malfunction, and that could potentially make the consequences worse” (*supra* para. 16(g)). Species at risk is a type of sensitive environmental component that already suffers from stressors that are affecting their population viability, be they habitat destruction, overharvesting, climate change or others. The Proponent makes no effort to provide evidence on how a spill may interact cumulatively with these stressors on marine species at risk contrary to the *Scope of Factors* (*supra* para. 16(b) & (g)).
148. During BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel, the following exchange took place:<sup>255</sup>
793. **MR. TOLLEFSON:** Has the Proponent turned its mind to, in terms of impacts on birds, the concept of a tipping point or a breaking point? There is a certain point at which a species is not going to come back regardless of what efforts are put into recovery. Have you looked at that?
794. **MR. JEFFREY GREEN:** No, that was not done in our assessment. The Proponent’s failure to do this is a clear neglect of the requirement in the *Scope of Factors* to examine the impact of spills on sensitive species that “could make the consequences worse” (*supra* para. 16(g)).
149. The Proponent has so far refused to conduct such cumulative impact assessments of spills on marine birds. In response to Haisla IR 1.60(c), the Proponent states that:<sup>256</sup>
- An assessment of the potential cumulative effects of a hydrocarbon spill in combination with existing and current stressors was not conducted. Under the *CEA Act* and associated documents, cumulative effects assessments are not typically completed for the assessment of potential accidents and malfunction.
150. Similarly, when BC Nature and Nature Canada asked Mr. Green whether or not the Application included an assessment of the cumulative impacts of oil spills, he testified that:<sup>257</sup>
787. **MR. JEFFREY GREEN:** No, there is not and there is no direction under the Canadian Environmental Assessment Act or any associated guidance documents. I have -- I am not aware of any assessment of accidents and malfunctions for any project in Canada that has included a cumulative effects assessment.
151. BC Nature and Nature Canada disagree with the Proponent’s position on the need for cumulative impact assessment of accidents and malfunctions. The *Scope of Factors* clearly requires the Proponent to consider the impact of accidents on components of the ecosystem

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<sup>255</sup> Transcript Vol. 133, *supra* note 211, at paras. 793-794

<sup>256</sup> B39-3 - Northern Gateway Response to Haisla Nation IR No. 1 - A2E8Y0, at p. 206

<sup>257</sup> Transcript Vol. 133, *supra* note 211, at para. 787

that are already sensitive due to other stressors. The lack of cumulative impact assessment of spills also directly conflicts with the precautionary principle, which the *Scope of Factors* requires the Proponent to incorporate into the Application (*supra* para. 16(a)). Under the precautionary principle, the Proponent is obliged to proactively identify and address all sources of uncertainty associated with potentially significant adverse environmental effects so that the JRP can make a decision under the *CEAA, 2012* in a “careful and precautionary manner to avoid significant adverse environmental effects” (*supra* para. 7). Finally, a stated purpose of the *CEAA, 2012* is “to encourage the study of the cumulative effects of physical activities in a region and the consideration of those study results in environmental assessments” (*supra* para. 7). Despite these requirements, the Proponent has failed to provide any spill scenarios that analyze or assess the impacts of spills on species at risk.

152. Moulting birds are another sensitive environmental component; however, the Proponent has neither presented evidence on nor analyzed the effects of spills to moulting bird populations. One of the qualities that make moulting birds vulnerable is that they can be flightless when moulting. The Proponent recognizes that moulting birds can be flightless. For example, the Proponent states within the Application that:<sup>258</sup>

Surf Scoters undergo a moult, during which time they are flightless and are dependent on their immediate environment for forage and shelter. Moulting flocks, which may number in the hundreds to thousands, can be found in shallow protected bays and inlets.

153. During BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel, Dr. Alan Maki of AW Maki Consulting LLC states it is “generally true” that flightless birds during molting season are particularly vulnerable to oil.<sup>259</sup>

637. **MR. TOLLEFSON:** Dr. Maki, for some species at some times of year -- molting season in particular -- a species will be very vulnerable because it is flightless, it cannot move or is -- its mobility is significantly reduced. Would you agree with that proposition?

638. **DR. ALAN MAKI:** Yes, that’s generally true. Most of the marine avifauna in the Pacific Northwest go through a molt cycle, usually some time in the summer, early fall prior to their migration, if they migrate. Many of them don’t migrate.

154. Even though some marine bird species moult during the fall, the Proponent has not conducted any spill scenarios in that season when flightless bird populations may not be able to escape an oil spill. During cross-examination of the Emergency Response Panel, Mr. Green suggested that the Proponent’s summer and winter models can represent the fall as well.<sup>260</sup>

652. **MR. JEFFREY GREEN:** So the word "fall", first of all, it’s a difficult term. So I -- some species of birds are molting in late summer, some are molting in early fall like - - so anywhere from August-September time periods. And we’ve modelled the time of year, which was essentially the inflow season where winds are predominantly blowing on shore. And we think that’s relatively representative of most of the late spring to early fall period.

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<sup>258</sup> B3-15, *supra* note 122, at p. 12-3

<sup>259</sup> Transcript Vol. 133, *supra* note 211, at paras. 637-638 (emphasis added)

<sup>260</sup> *Id.*, at para. 652

BC Nature and Nature Canada submit that this is not an adequate justification for the lack of modelling in the fall, especially when both Dr. Maki and Mr. Green have testified that some marine bird species moult in early fall. BC Nature and Nature Canada agree with Environment Canada's recommendation in its written evidence that the Proponent conduct an "[a]ssessment of potential environmental impacts related to spill modelling work for each of the four seasons, and preferably for each month of the year."<sup>261</sup>

155. During BC Nature and Nature Canada's cross-examination of the Emergency Response Panel, Dr. Alan Maki also testified that marine bird populations that are moulting and flightless can perceivably make the consequences of an oil spill worse:<sup>262</sup>
639. **MR. TOLLEFSON:** For those species, if there were an oil spill in their molting season, late summer, early fall, the consequences would be significantly worse than at any other time of the year. Is that right?
640. **DR. ALAN MAKI:** Well, one could imagine such a scenario, exactly, if the habitat that the birds occupy was oiled through some sequence of events. But the reality is the proposal that Northern Gateway has put before you and discussed in detail involves first identifying these sensitive areas, prioritizing them for oil spill response and providing protective measures of these areas, including booming, selective use of dispersants to avoid exactly that scenario.
156. Dr. Maki's testimony highlights again that the Proponent's approach to dealing with the risk of oil is predominantly one of risk *response* rather than risk *assessment*. The Proponent fails to provide a proper risk assessment of the impact of oil on molting marine birds, and fails to analyze the significance of that risk, contrary to the requirements of the *Scope of Factors* (*supra* para. 16(g) & (j)). A release of oil to locations where molting birds are gathered during their flightless season is a worst-case scenario of Project impact on a sensitive environmental component that the Proponent ought to have done. This, the Proponent has failed to do.
157. Additional sensitive environmental components include the numerous conservancies, protected areas, ecological reserves, provincial and marine parks, and Important Bird Areas ("IBAs") that are scattered throughout the CCAA and OWA. The Proponent has shown that the CCAA contains many of these sensitive ecological areas.<sup>263</sup> While four modelled spill locations (i.e. Kitimat Terminal, Emilia Island, Wright Sound, Principe Channel) are within the CCAA, in none of these spill scenarios does the Proponent properly describe the consequences of these spills to surrounding sensitive ecological areas.
158. The OWA contains 30 IBAs. Each of these IBAs is home to 1% or more of the global population of at least one marine bird species.<sup>264</sup> The Proponent, within its Application, recognizes at least 15 important ecological and biological areas in the OWA.<sup>265</sup> BC Nature and Nature Canada's uncontradicted written evidence directly addresses the lack of spill

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<sup>261</sup> E9-39-2, *supra* note 251, at p. 3

<sup>262</sup> Transcript Vol. 133, *supra* note 211, at paras. 639-640

<sup>263</sup> B9-15, *supra* note 129, Figure 3-1 at p. 3-2

<sup>264</sup> D12-8-2, *supra* note 117, at para. 132

<sup>265</sup> B3-37, *supra* note 223, Figure 6-4 at p. 6-7

scenarios in certain areas of high ecological value along the two tanker approaches in the OWA.<sup>266</sup> Despite the exceptional conservation importance to marine birds of this area, the Proponent has chosen to conduct merely two locations for spill scenarios in the OWA (i.e. Ness Rock and Butterworth Rock). We submit that this paltry number of spill scenarios in the OWA cannot be considered to constitute a proper risk assessment of Project impacts on the marine environment.

159. BC Nature and Nature Canada agree with Environment Canada when it states in its written evidence that:<sup>267</sup>

While the additional selected spill scenarios are not expected to be exhaustive, they should provide a wide range of high-risk scenarios which enable an evaluation of the relative risk and potential environmental and socioeconomic effects of a spill should it occur.

The number and spectrum of spill scenarios that the Proponent has put forward are simply not sufficient for a proper risk assessment of the impact of spills on the marine environment that would satisfy the requirements of the *Scope of Factors* (*supra* para. 16(a), (b), (g)-(i)). The Proponent's failure to provide an adequate array and assessment of spill scenarios renders the Application incomplete.

iii) Failure to properly assess the recovery of marine birds from spill

160. A complete risk assessment must contain a proper examination of the potential for bird populations to recovery from adverse impacts of an oil spill. Such an examination should form part of a complete analysis of the consequences of an accident or malfunction that is required by the *Scope of Factors* (*supra* para. 16(g) & (h)). The Proponent does not disagree with the premise that oil harms birds, as exemplified by the Proponent's discussion of the potential effects of oil and condensate on birds in Vol. 8C.<sup>268</sup> However, the Proponent's evidence regarding recovery of marine bird populations from oil spills is misleading and inadequate.

161. The Application conveys an overly optimistic assessment of marine bird recovery from spills that is inconsistent with other scientific literature and even with the Proponent's own evidence. The Proponent states that "[p]opulations of localized species may be at risk, but evidence suggests no permanent damage occurs in regional seabird populations."<sup>269</sup> Using marine bird KIs as examples, the Proponent estimates that recovery of surf scoter and bald eagle to be about two years following a spill, and two to five years for black oystercatcher.<sup>270</sup> The Proponent's discussion of the recovery of marbled murrelet populations is instructive on this issue:<sup>271</sup>

Recovery of Marbled Murrelet populations could take four to five years, based on reproduction and survival rates (Beissinger 1995; Cam et al. 2003; McShane et al.

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<sup>266</sup> D12-8-2, *supra* note 117, at para. 87

<sup>267</sup> E9-6-32, *supra* note 104, at para. 89

<sup>268</sup> B3-39, *supra* note 165, at pp. 8-46 to 8-49

<sup>269</sup> B3-22 - Vol 7C - Risk Assessment and Mgmt of Spills - Kitimat (Part 1 of 1) - A1T0H2, at Table 7-1 at p. 7-2 (emphasis added)

<sup>270</sup> *Id.*, at pp. 7-27 to 7-28

<sup>271</sup> *Id.*, at p. 7-27 (emphasis added)

2004). Recovery would take longer if chronic effects have reduced bird health or reduced food availability. The loss of birds from the small nesting population in the Kitimat area could have serious implications to the local population, but would likely have little effect on the coastal population unit, which comprises birds from Alaska to California (Friesen et al. 2005, 2007). Additionally, effects would be limited if the birds remain in inlets such as Gilttoeyes Inlet and Foch Lagoon, which can be boomed.

162. One of the defining characteristics of avian species is their uncanny ability to fly in the air. Booms work to prevent substances within the water to cross a man-made barrier. The effectiveness of booms is greatly reduced above the surface of the water. The implication that the placement of booms in the water would somehow suppress the evolutionary flight instinct of bird species, such as marbled murrelets, to fly over them is difficult to fathom.
163. Several parties have challenged the Proponent's assessment of recovery from spills. For example, BC Nature and Nature Canada (IR 1.11(1)<sup>272</sup>) and the Gitxaala (IR 1.12.2.5<sup>273</sup>) have both asked the Proponent to reconcile its conclusion that there will be "no permanent damage" with studies that show contrary result. Environment Canada in its written evidence also challenged the Proponent's assessment:<sup>274</sup>

Overall, there is significant debate in the literature regarding the effects of the Exxon Valdez Oil Spill on marine birds. The Proponent's current discussion relies heavily on results in a 2006 paper by Harwell and Gentile, the conclusions of which have been contradicted in the literature (see Landis 2006, Peterson 2003, amongst others). It is important to understand that there is a broad spectrum of results from Exxon Valdez Oil Spill studies on marine birds; some provide evidence of longer-term impacts (including suggestions that impacts to some species are still ongoing) and some suggest that impacts only persisted in the short to mid term.

164. BC Nature and Nature Canada have made similar comments in our written evidence:<sup>275</sup> The Application incorporates only a portion of the information that has become available from EVOS into its discussion of the potential impacts of an oil spill on marine birds. The discussion is based primarily on the conclusions of Harwell and Gentile (2006) who found no remaining significant effects on the marine ecosystem of Prince William Sound following the Exxon Valdez Oil Spill (EVOS). However, those conclusions are controversial. Landis (2006) compares the main conclusions of Harwell and Gentile with respect to continuing impacts of EVOS with those of Peterson et al. (2003) and points out that the discrepancies appear to be due, at least in part, to "interpretation of data in support of specific values or policies".

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<sup>272</sup> D12-2-1, *supra* note 138, at p. 14

<sup>273</sup> D72-6-2 - Gitxaala Nation - Information Requests No. 1 A2C4H0, at p. 31

<sup>274</sup> E9-6-32, *supra* note 104, at para. 234 (emphasis added)

<sup>275</sup> D12-8-2, *supra* note 117, at para. 72 (emphasis added)

165. In response to these critiques, the Proponent filed two additional documents:
- *Effects of the Exxon Valdez Oil Spill on Marine Birds: A Literature Review* (“EVOS Review”);<sup>276</sup> and,
  - *Reply Evidence: Recovery of the Biophysical and Human Environments from Oil Spills* (“Recovery Reply”).<sup>277</sup>
166. The first document addresses the literature surrounding the aftermath of the Exxon Valdez Oil Spill (“EVOS”). The EVOS occurred on March 24, 1989 when a bulk oil carrier T/V Exxon Valdez ran aground in Prince William Sound, Alaska.<sup>278</sup> The Exxon Valdez Oil Spill Trustee Council (“EVOSTC”) was established to study the impact of the EVOS on the environment. In the EVOS Review, the Proponent concedes that there is a wider debate on the recovery of marine species post-EVOS:<sup>279</sup>
- More than 20 years after the spill, there continues to be an ongoing debate in peer-reviewed literature as to whether marine birds in PWS are exposed to residual oil, whether residual exposure has caused effects at the individual or population level, and whether recovery is occurring or has occurred for distinct marine bird species (Esler et al. 2011; Wiens et al. 2010; Boehm et al. 2007; Peterson et al. 2003; Esler et al. 2002; Short et al. 1999; Day et al. 1997a). While it appears there has been a general recovery of marine bird diversity and numbers (e.g., Day et al. 2003; Day et al. 1997b; Wiens et al. 1996), there has been longer-term population depressions observed in some vulnerable taxa (e.g., Esler et al. 2010; Esler et al. 2002; Trust et al. 2000).
167. The Proponent also concedes in the EVOS Review that “limited recovery of some species may actually be attributed to a complex interaction of both natural and anthropogenic factors and not necessarily to chronic effects of the EVOS.”<sup>280</sup> This is clear recognition that effects of spills can and do interact cumulatively with existing stressors that can potentially make consequences to sensitive components of the environment worse. The *Scope of Factors* requires the Proponent to assess these situations (*supra* para. 16(g)). To date, the Proponent has failed to do so (*supra* paras. 147-151).
168. Dr. Maki confirmed the existence of a well-documented and wide debate regarding contradictory perspectives of post-EVOS recovery during BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel.<sup>281</sup>
1280. **MR. TOLLEFSON:** Wouldn’t it be fair to say, Dr. Maki, that within the realm of peer-reviewed science, that there are irreconcilable differences of views?
1281. From Harwell and Gentile to Petersen 2003 is a big gulf, would you not agree?
1282. **DR. ALAN MAKI:** There are big differences between what Petersen and Harwell and Gentile put together in those two articles you cite, but there are a number of other citations also that add additional perspective onto what the differences are,

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<sup>276</sup> B137-3 - NGP - Attachment Federal Government IR 116 - Effects of Exxon Valdez Oil Spill on Marine Birds - A3C0T4

<sup>277</sup> B83-17 - Attachment 8 - Recovery of the Biophysical and Human Environments from Oil Spills - A2V1T1

<sup>278</sup> B137-3, *supra* note 276, at p. 1-2

<sup>279</sup> *Id.*, at p. 2-4

<sup>280</sup> *Id.*, at p. 3-1

<sup>281</sup> Transcript Vol. 133, *supra* note 211, at paras. 1280-1282

what the root causes of those differences are and help elucidate some of the variables that are -- impact those differing decisions.

169. Despite the recognition of the debate within the scientific community about the proper interpretation of species recovery after an oil spill, the Proponent offers no guidance to the JRP on how the risk of non-recovery should be assessed, nor the criteria for assigning the significance of this risk. So far, the Proponent has offered three different definitions of species recovery following a spill. Firstly, in a response to BC Nature and Nature Canada IR1.11(o), the Proponent states that:<sup>282</sup>

Assessing oil spill effects requires rigorous definitions of "impact" and "recovery".

Impact is defined as 'a statistically significant difference between samples exposed to oil and reference samples'. Recovery is then the disappearance through time of that statistical difference.

Secondly, in the Recovery Reply, the Proponent defines recovery as "a return of the ecosystem or a particular valued ecosystem component (VEC) to some desirable state following a disturbance."<sup>283</sup> And, finally, in the EVOS Review, the Proponent indicates that the definition of recovery used by the EVOSTC is "a return to conditions that would have existed had the spill not occurred."<sup>284</sup>

170. The Proponent does not offer any analysis of which or whether all of these definitions should prevail, and in the event of the latter, an analysis on the conditions under which any one definition is more appropriate to the circumstances. The *Scope of Factors* requires the Proponent to clearly identify the criteria used to assign significance (*supra* para. 16(j)). Given the various definitions that the Proponent has employed in this Application, the evidence remains uncertain with regards to how the Proponent assesses the significance of the risk of non-recovery of marine bird populations if an oil spill were to occur.

171. The evidentiary record is equally murky and unsatisfactory with respect to the Proponent's claim that there will be "no permanent damage" to marine birds following a spill. During BC Nature and Nature Canada's cross-examination of the Emergency Response Panel, Stantec Senior Environmental Consultant Dr. Walter Pearson stated that permanence "would essentially be an extinction, if you're talking about a fish or a bird,"<sup>285</sup> and, in the case of physical environment, it would be to "change it physically in some way in which case it wasn't a beach -- uplift during an earthquake or something like that."<sup>286</sup> For greater certainty, Dr. Pearson elaborated that "[e]xtinction is the loss of an entire species."<sup>287</sup> We submit that this cannot be the proper interpretation of permanence for damage to bird populations after a spill. Such a drastic interpretation would eliminate as insignificant any and all spill events that are anything less than catastrophic on a geologic timescale. If the Proponent's interpretation of permanence is reflected by Dr. Pearson's statements, then any

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<sup>282</sup> B41-2, *supra* note 174, at p. 52

<sup>283</sup> B83-17, *supra* note 277, at p. ii

<sup>284</sup> B137-3, *supra* note 276, at p. 3-1

<sup>285</sup> Transcript Vol. 133, *supra* note 211, at para. 1297

<sup>286</sup> *Id.*, at para. 1298

<sup>287</sup> *Id.*, at para. 1300

of the Proponent's assertions that the risk of an oil spill to marine birds will be insignificant should be greatly suspect.

172. Along with the Proponent's questionable interpretation of recovery and permanence, the Proponent's conclusion regarding the recovery of marine birds in its Recovery Reply is both misleading and based on incomplete information. In the Recovery Reply, the Proponent makes the following bold assertion: "the scientific literature is clear that ecosystems and their components recover."<sup>288</sup> Table A.5 of the Recovery Reply shows the mean time to recover following a spill for various VEC categories.<sup>289</sup> This table was corrected first by errata,<sup>290</sup> then by Response to Undertaking U-65.<sup>291</sup> The following discussion uses Table A.5 as it appears in the Response to Undertaking U-65.
173. According to Table A.5, the Proponent claims that the mean time for recovery of marine VECs is about 5.1 years. This is a misleading figure. First of all, the Proponent examined a total of 87 marine VECs. The 5.1 year mean was calculated based on only 47 of those marine VECs; while 28 other VECs are still recovering, and 12 VECs have either not recovered or show no evidence of recovery. For those 28 marine VECs that are still recovering, the average length of time that those species have been studied was 8.1 years, meaning that those species are taking on average more than the reported 5.1 years for recovery.
174. Secondly, Dr. Pearson acknowledged during cross-examination that the 5.1 year average for recovered marine VECs was based on only seven marine bird studies and no studies on marine mammals or marine reptiles.<sup>292</sup> Of those seven marine bird studies, only one contained data on recovery time, which showed that marine bird species took ten years to recovery from an oil spill, almost twice as long as the average reported on Table A.5.<sup>293</sup>
175. During cross-examination, Dr. Pearson agreed that the Proponent's evidence lacks important data to support its conclusion that "ecosystems and their components recover":<sup>294</sup>
1490. **MR. TOLLEFSON:** Isn't it problematic not to have mammals when we're talking about the marine environment; especially, where you just earlier, sir, that it's marine mammals or mammals at least and reptiles who have the longest life spans and the longest time to recovery?
1491. Isn't it problematic that there aren't any in this study?
1492. **DR. WALTER PEARSON:** Yes, sir.
176. Dr. Pearson also acknowledged during cross-examination that in writing the Recovery Reply the Proponent did not use the full extent of the best available literature. While the Recovery Reply used only seven studies on marine birds, the EVOSTC has published data on the recovery status on many marine bird species. During cross-examination, BC Nature

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<sup>288</sup> B83-17, *supra* note 277, at p. i (emphasis added)

<sup>289</sup> *Id.*, Table A.5 at p. A-12

<sup>290</sup> B188-6 - Errata Attachment 4 - A3E8X6, Table A.5 at adobe 7

<sup>291</sup> B191-1 NGP - Response to Undertaking U 65 - A3F2J6, Table A.5 at adobe 1

<sup>292</sup> Transcript Vol. 134, Feb. 5, 2013, A3F2R3, at paras. 1600-1605

<sup>293</sup> *Id.*, at para. 1573

<sup>294</sup> Transcript Vol. 133, *supra* note 211, at paras. 1490-1492

and Nature Canada used one such EVOSTC publication as an aid to questioning.<sup>295</sup> The following exchange took place:<sup>296</sup>

1623. **MR. TOLLEFSON:** And they could have gone and looked anywhere to peer-reviewed sources, to government sources, to private consultancy sources.

1624. You put no fetters on where they could look; did you?

1625. **DR. WALTER PEARSON:** I wanted them to be independent; that's correct, sir.

1626. **MR. TOLLEFSON:** Right.

1627. And for birds, they only came back with seven studies; is that right?

1628. **DR. WALTER PEARSON:** Yes, sir.

1629. **MR. TOLLEFSON:** Where there was -- out of all of that, there was only seven studies that they came back with.

1630. Now, they didn't -- it's interesting, you know, they didn't use any of the research done by the EVOS Trustees Council; was there a reason for that, sir?

1631. **DR. WALTER PEARSON:** Not that -- they didn't use the table from the -- from your document. That's probably true.

1632. **MR. TOLLEFSON:** Well, you know that, every several years -- it look like it's every three to four years, based on that table -- that the trustees put out a report ---

1633. **DR. WALTER PEARSON:** Right.

1634. **MR. TOLLEFSON:** --- that reports on the status of the various species. That seems to be a very analogous process to what you were doing.

1635. Why didn't you use their data?

1636. **DR. WALTER PEARSON:** I -- I think that the -- the people, the analysts that were doing it marched through the data they had and the data they could get, the studies they could get and, in the time that they had, and this is the result.

1637. They've had since more time and -- and have done more work, but it's not in this -- this round.

As shown by the above transcript excerpt, BC Nature and Nature Canada put to Dr. Pearson twice (at transcript paras. 1630 & 1635) that the researchers who produced the Recovery Reply did not use information published by the EVOSTC, and offered Dr. Pearson an opportunity to explain or justify this omission. On both occasions, Dr. Pearson did not deny the suggestion that that his research team did not use EVOSTC information; nor, in our submission, did he provide any convincing reason for their failure to do so.

177. In his oral response to Undertaking U-65, Dr. Pearson testified that while the Recovery Reply looked at 155 VECs in total, the Proponent has increased its analysis to 175 VECs since the filing of that document.<sup>297</sup> BC Nature and Nature Canada submit that this testimony is unsubstantiated and should be disregarded. The Proponent has not put on record its analysis of those additional 20 VECs, nor have other parties been given the opportunity to test that evidence. Dr. Pearson's testimony that the average time to recovery for marine VECs, after taking into account those additional VECs, has decreased from 5.1 to 5.0 years, in addition to being misleading due to the reasons canvassed above, cannot be taken for the truth of its content.

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<sup>295</sup> AQ60-B

<sup>296</sup> Transcript Vol. 134, *supra* note 292, at paras. 1623-1637 (emphasis added)

<sup>297</sup> *Id.*, at para. 1515

178. Lastly, the Proponent claims in its Recovery Reply that, “[o]f the total VECs examined from all environments, 81% were recovered or recovering.”<sup>298</sup> The corollary of that claim, as Dr. Pearson agreed, is that no recovery is evident in about 20% of cases.<sup>299</sup> The fact that such a substantial percentage of cases show no evidence of recovery, along with all the deficiencies that have been canvassed above in this section, puts into grave doubt the Proponent’s claim that “ecosystems and their components recover.”
179. At the beginning of BC Nature and Nature Canada’s cross-examination on the Recovery Reply, Dr. Pearson stated that the values for the mean time to recover are “robust.”<sup>300</sup> The fact that so many VECs show no evidence of recovery, the lack of data on marine mammals and marine birds, and the fact that the one marine bird study that the Proponent used showed ten years for recovery, together raise a substantial doubt on the robustness or even validity of the conclusions drawn by the Proponent in the Recovery Reply. Given so many parties have challenged the Proponent’s assessment of post-spill recovery, the Recovery Reply is an important piece of evidence that demands close and critical scrutiny.
180. Towards the end of BC Nature and Nature Canada’s cross-examination of the Emergency Response Panel, Dr. Pearson was repeatedly offered the opportunity to justify his assessment that the conclusion in the Recovery Reply was “robust”:<sup>301</sup>
1772. **MR. TOLLEFSON:** Do you think that “robust” is the right way to describe the data on birds and marine mammals, sir?
1773. **DR. WALTER PEARSON:** I think when you look at the data that you’ll find that birds and marine mammals still recover and if you look at more of the data, I think you’ll find -- even in the trustee data -- you’ll find that marine mammals -- some marine mammals recover in 15 years, some after 20 are still in the recovered status -- or recovering status.
1774. **MR. TOLLEFSON:** But right now, Dr. Pearson, we’re talking about your study and your numbers. And would you agree with me that your numbers on recovery for birds and marine mammals, that those are not robust numbers?
1775. **DR. WALTER PEARSON:** They don’t speak to the issue that you wish them to speak to, yes, that’s true.
- As the above transcript excerpt shows, Dr. Pearson failed to provide a clear and responsive answer. While BC Nature and Nature Canada was still in the process of trying to secure a clear and responsive answer from the witness, we were instructed to move onto another line of questioning.<sup>302</sup>
181. In the assessment of recovery of marine ecosystem components from the impacts of spills, the Proponent fails to identify the criteria for assigning significance as required by the *Scope of Factors* (*supra* para. 16(j)) by failing to provide adequate definitions of “recovery” and “permanence.” The Proponent fails to properly assess the time marine

<sup>298</sup> B83-17, *supra* note 277, at p. iii; as amended by errata, B188-2 - Marine Emergency Preparedness and Response Panel Errata - A3E8X2, at p. 4

<sup>299</sup> Transcript Vol. 134, *supra* note 292, at para. 1759

<sup>300</sup> Transcript Vol. 133, *supra* note 211, at para. 1371

<sup>301</sup> *Id.*, at paras. 1772-1775

<sup>302</sup> *Id.*, at paras. 1780-1803

VECs take to recover from the impacts of spills, and thereby fails to properly assess the environmental effects of accidental releases to the marine environment as required by the *Scope of Factors* (*supra* para. 16(g) & (h)). The overly optimistic assessment of recovery time fails to consider the significant percentage of marine VECs that have shown no evidence of recovery after an average of ten years. As such, the Proponent fails to properly incorporate the precautionary principle as required by the *Scope of Factors* (*supra* para. 16(a)). Taken together, the Proponent has failed to discharge its burden of proof to show that “ecosystems and their components recover” and to show that the risk of spills to the marine environment will be insignificant. The Proponent’s assessment of the consequences of spills to the marine environment is incomplete.

*iv) Failure to properly assess and present information regarding the probability of spill*

182. As canvassed above, risk is a product of probability and consequences (*supra* paras. 122-129). The Proponent has conceded that the consequences of an oil spill on the marine environment is adverse and significant (*supra* para. 122); therefore, the Proponent’s conclusion that the risk of spills to the marine environment will be insignificant relies predominantly on the Proponent’s assessment of the probability of spills and spill response (*supra* para. 123). However, the Proponent’s assessment of spill probability is deficient and misleading. The Proponent fails to satisfy the requirements of the *Scope of Factors* (*supra* para. 16(a), (c), (e), & (h)). As such, the Proponent fails to discharge its burden of proof to show that the risk of adverse environmental effects due to spills is insignificant. The following section will discuss this issue further.

*D) Shipping and Navigation (Probability of Spills)*

183. The Proponent presents its analysis of the probability of spills into the marine environment through a report authored by an independent consultant firm *Det Norske Veritas* (“DNV”) entitled *Marine Shipping Quantitative Risk Analysis Technical Data Report* (“QRA”). The QRA calculates the probability of spills in return periods for the various approaches and route segments that will be used by tankers coming to and from Kitimat Terminal. The QRA also includes sensitivity analyses of certain input parameters. Lastly, the QRA compares the probability of spill before and after risk mitigation measures have been applied.
184. BC Nature and Nature Canada submit that there were significant breaches of procedural fairness and natural justice during the cross-examination with respect to this important piece of evidence. Those procedural deficiencies will be examined in Part IV.
185. In terms of the substantive evidence in the QRA and the testimony regarding the QRA, the Proponent’s evidence is deficient in the following ways:
- i. Failure to properly account for underreporting of spills;
  - ii. Failure to properly assess scaling factors;
  - iii. Failure to avoid double-counting of the use of tugs as a mitigation measure;
  - iv. Failure to properly provide calculations of margins of error; and,
  - v. Failure to present probabilities in terms of the life of the project.

Due to these deficiencies, BC Nature and Nature Canada submit that the Proponent's Application in respect of risk assessment is incomplete.

*i) Failure to properly account for underreporting of spills*

186. In the QRA, DNV makes use of world-wide data on the frequency of maritime incidents from the Lloyds Register Fairplay marine casualty database.<sup>303</sup> This database is currently known as the IHS Fairplay.<sup>304</sup> From the IHS Fairplay, DNV extracted incident frequency data on four types of incidents: grounding (powered and drift), collision, foundering, and fire and/or explosion.<sup>305</sup> DNV also extracted from the IHS Fairplay data on damage taken by tankers in order to calculate conditional probabilities of spills.<sup>306</sup> The probability of a spill resulting from an incident per nautical mile is the product of the incident frequency and the conditional probability.<sup>307</sup>
187. During the cross-examination of the Northern Gateway Shipping and Navigation witness panel ("Shipping Panel") by BC Nature and Nature Canada, Senior Principal Engineer and Associate Director of DNV Mr. Audun Brandsæter, who is a co-author of the QRA, testified regarding the increasing concern about underreporting to maritime databases:<sup>308</sup>  
31303. **MR. AUDUN BRANDSAETER:** Whether or not it's increasing, I'm not absolutely sure of because it has been well known for quite a long time that it's more likely that too few events is reported than too many. So we have always been aware of the fact that there is under-reporting.
188. When BC Nature and Nature Canada asked Mr. Brandsæter whether or not DNV was aware of underreporting when it prepared the QRA, he testified that:<sup>309</sup>  
31309. **MR. AUDUN BRANDSAETER:** Yes, we were aware that it was a significant under-reporting. We also were aware that some had estimated it to be in the order of 30 percent of the total events that were reported. It is, though, very important to connect that to a lower under-reporting of the incidents or accidents involving spills of hydrocarbons compared to the under-reporting of accidents only causing material damage to the vessels.
189. In fact, BC Nature and Nature Canada used as an aid to questioning a 2009 report authored by George Psarros, Rolf Skjong, and Magnus Strandmyr Eide, who examined the reporting performance of maritime databases.<sup>310</sup> Mr. Brandsæter confirmed that, to his knowledge, Skjong and Eide are employees of DNV.<sup>311</sup> Mr. Brandsæter further agreed that Psarros *et al.* (2009) showed that at most only 30% of maritime incidents are reported to the IHS

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<sup>303</sup> B23-34, *supra* note 222, at p. 5-49

<sup>304</sup> Transcript Vol. 155, Mar. 18, 2013, A3G1L2, at para. 31280

<sup>305</sup> B23-34, *supra* note 222, at p. 5-49

<sup>306</sup> *Id.*, at p. 6-76

<sup>307</sup> *Id.*, at p. 7-94

<sup>308</sup> Transcript Vol. 155, *supra* note 304, at para. 31303 (emphasis added)

<sup>309</sup> *Id.*, at para. 31309 (emphasis added)

<sup>310</sup> AQ74-A

<sup>311</sup> Transcript Vol. 155, *supra* note 304, at paras. 31318-31325

Fairplay.<sup>312</sup> Another AQ used by BC Nature and Nature Canada was an article by Hassel *et al.* (2010), also on reporting performance of maritime databases.<sup>313</sup> Hassel *et al.* (2010) cited a related article by Thomas & Skjong (2009). Mr. Brandsæter confirmed that both Thomas and Skjong are his colleagues at DNV.<sup>314</sup> He also confirmed that the conclusion of Thomas & Skjong (2009) corresponded with that of Psarros *et al.* (2009).<sup>315</sup>

190. Given the fact that, based on Mr. Brandsæter’s testimony, DNV was apparently well aware of underreporting to maritime databases, it is notable that nowhere in the QRA does DNV mention or address underreporting of incidents to the IHS Fairplay. Mr. Brandsæter explained that, while some incidents may be underreported, “[w]hen it then comes to reporting of oil spills, which fortunately is much more difficult for the owners to hide... we have a much higher reliability of the reported accidents when it comes to environmental spills.”<sup>316</sup> In this testimony, Mr. Brandsæter appears to be suggesting that underreporting of incidents that lead to spills is less widespread than underreporting of incidents that do not lead to any release of oil. This is a proposition in support of which the Proponent has provided no corroboration or verification. Regardless, however, the more pressing concern is that the QRA makes absolutely no reference to the broad phenomenon of incident or spill underreporting.
191. BC Nature and Nature Canada’s cross-examination of the Shipping Panel clearly establishes that DNV not only fails to mention the underreporting of spills to the HIS Fairplay in the QRA, but also neglects to make any adjustments to account for any underreporting that may have occurred. This was confirmed by Mr. Brandsæter during cross-examination:<sup>317</sup>
31441. **MR. AUDUN BRANDSAETER:** No, we have not mentioned, as you say, any specific adjustments for underreporting but we have several other assessments with quite conservative assessments of the numbers used. So the final results, as I said, we believe are correct.
- BC Nature and Nature Canada note that Mr. Brandsæter was the only qualified expert witness to speak to the QRA (*infra* Part IV), and he did not offer any further clarification on how the QRA was “conservative.”
192. Since Mr. Brandsæter testified that the phenomenon of underreporting was well-known within and beyond DNV, we submit that DNV ought to have mentioned and addressed this issue in the QRA. We submit that DNV’s failure to account for underreporting of maritime incidents and spills to the IHS Fairplay database means that the QRA likely underestimated the probability of spill. The Proponent’s failure to adequately address underreporting is also a failure to fulfil its requirement under the *Scope of Factors* to incorporate the precautionary principle (*supra* para. 16(a)).

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<sup>312</sup> *Id.*, at para. 31364

<sup>313</sup> AQ74-B

<sup>314</sup> Transcript Vol. 156, Mar. 19, 2013, A3G1V4, at paras. 31470-31471

<sup>315</sup> Transcript Vol. 155, *supra* note 304, at paras. 31413-31416

<sup>316</sup> *Id.*, at para. 31432

<sup>317</sup> *Id.*, at para. 31441

ii) Failure to properly assess scaling factors

193. Since local data were limited, DNV used world-wide incident frequency data from the IHS Fairplay in order to obtain a sufficient dataset.<sup>318</sup> To adjust the world-wide data to match the local conditions of the BC coast, DNV applied “scaling factors” onto the incident frequencies.<sup>319</sup> DNV used a Hazard Identification (“HAZID”) process comprised of a workshop with maritime experts, a trip with navigational experts near and around Prince Rupert, and local interviews with certain stakeholder groups.<sup>320</sup> The results of the HAZID process were used to estimate local scaling factors.<sup>321</sup>
194. The HAZID process suffers from the following important deficiencies:
- Failure to assess local conditions in the quantitative manner;
  - Failure to include key stakeholder groups; and,
  - Failure to account for current and future liquefied natural gas (“LNG”) developments in British Columbia.

Due to these deficiencies, the Proponent fails to satisfy the requirement of the *Scope of Factors* (*supra* para. 16(h)), and the Application in respect of risk assessment is incomplete.

a) Failure to assess local conditions in the quantitative manner

195. As a key component of a document entitled “*Quantitative*” Risk Analysis, the HAZID suffers from being chiefly a *qualitative* exercise. The HAZID workshop was held for only one day, April 27<sup>th</sup>, 2009, in Vancouver, and participants included only seven individuals, although several other facilitators and observers were present.<sup>322</sup> Mr. Brandsæter explained what transpired at the workshop:<sup>323</sup>

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

196. When BC Nature and Nature Canada asked whether or not the spreadsheet to which Mr. Brandsæter referred is still available, Mr. Brandsæter was not able to provide a response, but testified that the “results of that spreadsheet is what is presented on the next page, in Figure 4-4 in the [QRA].”<sup>324</sup> Marine Structural Engineer of WorleyParsons Canada Services Ltd. Mr. Michael Cowdell, who acted as one of the facilitators in the HAZID workshop, testified that “detailed comments were not taken and recorded.”<sup>325</sup> The fact that

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<sup>318</sup> Transcript Vol. 156, *supra* note 314, at para. 31723

<sup>319</sup> *Id.*, at para. 31724

<sup>320</sup> B23-34, *supra* note 222, at pp. 4-40 to 4-47

<sup>321</sup> *Id.*, at p. 4-40

<sup>322</sup> *Id.*, at pp. 4-40 to 4-41

<sup>323</sup> Transcript Vol. 156, *supra* note 314, at para. 31762

<sup>324</sup> *Id.*, at para. 31764

<sup>325</sup> *Id.*, at para. 31767

the workshop took only one day, that so few experts participated, and that no detailed records were kept raise serious questions about the rigour and reliability of the HAZID process.

197. Aside from the HAZID workshop with experts, DNV also conducted local meetings and interviews with certain stakeholder groups. These interviews suffer from the same lack of rigour as the HAZID workshop. As with the HAZID workshop, neither DNV nor the Proponent kept detailed minutes of the local interviews.<sup>326</sup> There is no evidence that the local interviews contributed to creating quantitatively verifiable scaling factors for the QRA; indeed the evidence is to the contrary.
198. The results of the HAZID process also show a lack of scientific and quantitative rigour. For example, based on the HAZID process, DNV arrived at scaling factors for local traffic density for each route segment, as shown in Table 5-11 of the QRA. The table shows that for segment 2, the scaling factor for traffic density is 0.6; while for segment 3, the scaling factor is 0.4.<sup>327</sup> Mr. Brandsæter confirmed that there is no quantitative justification for the 0.2 difference in the scaling factors between segment 2 and segment 3:<sup>328</sup>
31891. **MR. AUDUN BRANDSAETER:** There is no direct mathematical relationship there. This is based on a qualitative process, as we discussed earlier this morning.
31892. So the traffic is higher, there's more crossings in segment two where you're crossed in the passage. In the segment three you go out to the -- off the passage. There are also some traffic that could cross under or at least one sharp turn which also could cause it. So this was the result of the expert panel's estimation.
199. However, Principal Marine Consultant of Penanderwood Enterprises Inc. Mr. Thomas Wood, who was not qualified to offer expert opinion on the QRA, testified the following:<sup>329</sup>
31896. **MR. THOMAS WOOD:** I could also add that the relevance of segment 2 which is Wright Sound. The figures that were previously shown were an annual traffic of 5,552 vessels which is equal to roughly 15 per hour which transmits to an average daily traffic frequency of 0.6.
200. When BC Nature and Nature Canada asked whether or not Mr. Wood was providing a quantitative justification for the 0.6 value in contradiction to the qualitative justification given by Mr. Brandsæter, Mr. Cowdell (who was also not qualified to offer expert opinion on the QRA; *infra* Part IV) interjected that Mr. Wood was merely "trying to add some context to the discussion."<sup>330</sup> In the end, we submit that the JRP has no evidence to suggest that there are discernible, quantifiable, and verifiable differences among the values of the scaling factors applied by DNV onto the world-wide incident frequency data.

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<sup>326</sup> *Id.*, at para. 31829

<sup>327</sup> B23-34, *supra* note 222, Table 5-11 at p. 5-62

<sup>328</sup> Transcript Vol. 156, *supra* note 314, at paras. 31891-31892 (emphasis added)

<sup>329</sup> *Id.*, at para. 31896

<sup>330</sup> *Id.*, at para. 31900

201. Given the subjective nature of the HAZID process, DNV should have performed a quantitative validation of the scaling factors by comparing the scaled incident frequencies produced through the HAZID process with available local incident data. DNV states in the QRA that “[a]fter the initial scaling factors were established... a peer review was conducted to validate the findings.”<sup>331</sup> However, nowhere in the QRA does DNV provide further elaboration on the validation process, neither does DNV provide the results of the validation. Due to the questionable validity of the scaling factors produced by the HAZID process, the Proponent fails to satisfy the requirement of the *Scope of Factors* (*supra* para. 16(h)), and the Application is incomplete.

b) Failure to include key stakeholder groups

202. As part of the QRA, local interviews were conducted to discuss the “proposed shipping routes and whether there were any local hazards or conditions that should be incorporated into the QRA.”<sup>332</sup> The Proponent led these local interviews, as DNV is based in another country.<sup>333</sup> The main topics of discussion during these interviews were:<sup>334</sup>

- exceptional weather conditions along the route;
- areas of increased traffic; and,
- areas of difficult navigation.

203. DNV lists in Chapter 4.3 of the QRA the local stakeholders that were included in this process:<sup>335</sup>

- tour boat operators (Prince Rupert & Kitimat);
- logging contractors running barges to/from logging sites (Kitimat);
- sports fishermen (Kitimat);
- environmental groups (Kitimat);
- terminal operators (Kitimat); and,
- tug and barge operator (Vancouver).

204. Missing from this list of participants are local Aboriginal groups and commercial fishermen. BC Nature and Nature Canada submit that both local Aboriginal groups and commercial fishermen would have valuable knowledge pertaining to the three topics of discussion listed above for the local area, such as knowledge about severe and/or extreme weather conditions as required by the *Scope of Factors* (*supra* para. 16(i)). During cross-examination, Mr. Carruthers and Mr. Cowdell confirmed that neither local Aboriginal groups nor commercial fishermen were interviewed for their inputs.<sup>336</sup> However, Mr. Carruthers testified that ten Aboriginal groups were contacted for their interest in forming “a working group comprised of Aboriginal, environmental and community organizations to help oversee the completion of the QRA.”<sup>337</sup> None of the Aboriginal groups participated.

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<sup>331</sup> B23-34, *supra* note 222, at p. 5-52

<sup>332</sup> *Id.*, at p. 4-46

<sup>333</sup> Transcript Vol. 156, *supra* note 314, at para. 31780

<sup>334</sup> B23-34, *supra* note 222, at p. 4-46

<sup>335</sup> *Id.*

<sup>336</sup> Transcript Vol. 156, *supra* note 314, at paras. 31796- 31803, 31818-31819

<sup>337</sup> *Id.*, at para. 31778

*c) Failure to account for current and future LNG developments in BC*

205. The projected traffic increase in the study area due to current and pending LNG projects can affect the probability of spill, because the estimated probability of collision between two vessels is adjusted with respect to the scaling factor for predicted traffic density in the region.<sup>338</sup>

206. During BC Nature and Nature Canada's cross-examination of the Shipping Panel, we asked Mr. Brandsæter whether or not he was aware of the increase in LNG development in northern BC in recent years. Mr. Cowdell provided the answer:<sup>339</sup>

31921. **MR. TOLLEFSON:** ...

31922. I'm sure Mr. Brandsæter and others on the panel are well aware that over the last year or so, there have been many announcements about development in this part of British Columbia around LNG facilities, five in the regulatory process. Are you aware about those announcements, sir?

31923. **MR. MICHAEL COWDELL:** Yeah, we are aware of those announcements.

207. After Mr. Cowdell offered this answer, we asked whether or not these developments have been monitored to determine their impact in terms of traffic density. Mr. Brandsæter testified that DNV only included the traffic impact of LNG projects known at the time without stating which specific projects were included, but that DNV conducted a sensitivity analysis on the traffic density scaling factor to account for possible additions.<sup>340</sup>

31925. **MR. AUDUN BRANDSAETER:** We included the project that was known at the time of doing the QRA and we also did a sensitivity analysis to take account of possible additional ones.

31926. So to some extent, we have but, of course, the information that has become available after we prepared our analysis that was, unfortunately, not possible for us to take into account.

208. Later during the cross-examination, Mr. Cowdell testified that the QRA may have underestimated the level of LNG development in the province, and thus the traffic density of the region:<sup>341</sup>

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

209. DNV's failure to fully account for current and future LNG developments in northern BC may well underestimate traffic density in the region, and therefore raises doubts about the QRA's conclusions regarding the probability of spills due to collisions with other vessel

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<sup>338</sup> B23-34, *supra* note 222, at p. 5-61

<sup>339</sup> *Id.*, at paras. 31921-31923

<sup>340</sup> Transcript Vol. 156, *supra* note 314, at paras. 31925-31926

<sup>341</sup> *Id.*, at para. 31993 (emphasis added)

traffic. As such, the Proponent has failed to fully describe the local setting as required by the *Scope of Factors* (*supra* para. 16(d)), and the Application is incomplete.

*iii) Failure to avoid double-counting of the use of tugs as a mitigation measure*

210. The QRA purports to serve two purposes: (1) to “enable a discussion of risk acceptability”; and (2) to “provide an informed and organized platform for selecting risk mitigation measures.”<sup>342</sup> Chapter 8 of the QRA contains a discussion of the effectiveness of the use of tug escorts as a mitigation measure to reduce the likelihood of spills. However, the QRA’s analysis of tug escort use suffers from double-counting, and thus overestimates the mitigation effect of tug escorts on spill probabilities.
211. As Mr. Brandsæter testified, to analyze the effect of mitigation, “you need one case without and one with those mitigation measures,” and mitigation measures that are already commonly used would be in the base case.<sup>343</sup> As will be discussed below, there is strong evidence that tug escorts have been in use in marine terminals world-wide for many years. Therefore, the effect of tug escorts would already be reflected in the incident frequency data of the IHS Fairplay. As such, BC Nature and Nature Canada submit that DNV double-counted the effect of tug escorts when it applied tug escorts as an additional mitigation measure.
212. During BC Nature and Nature Canada’s cross-examination of the Shipping Panel, Chief Operating Officer of Foss Marine Holdings, Inc. Mr. Steven Scalzo testified that “[t]ractor tugs have been used at many terminals and areas of tanker transit over the last 15 years.”<sup>344</sup> Mr. Scalzo agreed that during the time period examined in the QRA, 1990 to 2006, certain United States ports legally mandated the use of tug escorts. He testified that Washington State required the use of tugs starting in the 1970s, while at the same time period US federal regulation required the use of tugs around Prince William Sound and Puget Sound.<sup>345</sup> He further agreed that California state law required the use of tug escorts in San Francisco, Los Angeles, and Long Beach.<sup>346</sup>
213. Tanker operations consultant Mr. Jerry Aspland provided testimony on the prevalence of the use of tugs in the West Coast:<sup>347</sup>
32208. **MR. TOLLEFSON:** And, Captain Aspland, are you familiar with the prevalence of use of tugs in other American jurisdictions?
32209. **MR. JERRY ASPLAND:** Yes, somewhat.
32210. Along the West Coast, it’s very, very prevalent. I don’t think -- but someone can correct me -- but I don’t think it’s necessary in Oregon but we do have them in Valdez. They are not in Cook Inlet. The State of Washington has them all through the Puget Sound and all California ports and probably -- this is a little bit of an estimate now --

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<sup>342</sup> B23-34, *supra* note 222, at p. 8-118

<sup>343</sup> Transcript Vol. 156, *supra* note 314, at paras. 32192-32193

<sup>344</sup> *Id.*, at para. 32197

<sup>345</sup> *Id.*, at paras. 32200-32202

<sup>346</sup> *Id.*, at paras. 32203-32206

<sup>347</sup> *Id.*, at paras. 32208-32211 (emphasis added)

around the world, somewhere around 35 to 40 ports of oil terminals and I'm going to say there's a couple thousand oil terminals around the world.

32211. So it is a new prevalent prevention application of tug technology that we didn't have before and Mr. Scalzo is an expert and a beginner and a pioneer in this particular type of operation.

214. Furthermore, retired marine pilot Mr. Al Flotre provided testimony on the voluntary use of tug escorts in the US, Canada, and internationally within the time period examined by the QRA.<sup>348</sup>

32217. **MR. AL FLOTRE:** If I could just speak to that, we have a voluntary operation in Canada.

32218. The Port of Vancouver regulates that, through the harbour itself and out the First Narrows Bridge or Lions Gate Bridge, they have to have two escort tugs. But the escort down at East Point, travelling to the pilot station, is a voluntary agreement between the pilots and the oil shippers. And the pressure to put that in place was from the oil shippers because they realize the value of the escort tug.

32219. So that is an example of a volunteer escort tug program that's been in effect since 1991.

215. The QRA concludes that the "use of escort tugs is predicted to have an important effect on reducing the overall spill frequency. The implementation and proper operation of escort tugs more than triples the return period for oil spills in the area, from 78 to 250 years."<sup>349</sup> The QRA's conclusion is inconsistent with the testimony set out above offered by the Proponent's own experts; namely, Mr. Scalzo, Mr. Aspland, and Mr. Flotre.

216. Given the fact that the use of tug escorts has been implemented, either legally or on a voluntary basis, in terminals and tanker traffic areas around the world during the period examined by the QRA, it follows that the effect of tug escorts would already be reflected in the incident frequency data used by DNV from the IHS Fairplay. Therefore, DNV failed to demonstrate that the QRA does not double-count the use of tugs as a mitigation measure. As such, the Proponent has failed to provide a proper analysis of the potential impact of spills onto the marine environment, as required by the *Scope of Factors* (*supra* para. 16(h)).

iv) Failure to properly provide calculations of margins of error

217. The *Scope of Factors* requires the Application to provide calculations of margins of error such as confidence intervals and possible sources of error (*supra* para. 16(e)). Within the QRA, DNV does not provide any confidence intervals for any of the QRA's data or return periods. Mr. Brandsæter confirmed this fact during cross-examination:<sup>350</sup>

32118. **MR. TOLLEFSON:** Yeah. Well, let's -- I just want to be clear on the record that there's no confidence intervals in this entire document that I -- that I can't find. That was a deliberate choice. You didn't use confidence intervals.

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<sup>348</sup> *Id.*, at paras. 32217-32219

<sup>349</sup> B23-34, *supra* note 222, at p. 8-125; as amended by errata, B210-2 - Marine Shipping and Navigation Errata - A3F9E0, at p. 12

<sup>350</sup> Transcript Vol. 156, *supra* note 314, at paras. 32118-32119

32119. **MR. AUDUN BRANDSAETER:** That is correct. There's no confidence intervals calculated and we used the sensitivity analysis to assess these aspects.

218. Despite Mr. Brandsæter's testimony that DNV used sensitivity analysis in lieu of confidence intervals, in many instances the QRA contains neither confidence intervals nor sensitivity analyses for many key input parameters. As such, DNV fails to properly convey the true extent of the margin of error in the reported return periods in the QRA. Some of the deficiencies include:

- a. Failure to conduct a sensitivity analysis for underreporting;
- b. Failure to conduct a sensitivity analysis for the effectiveness of mitigation;
- c. Failure to conduct a sensitivity analysis for important scaling factors; and
- d. Failure to conduct a sensitivity analysis for a credible range of tanker calls.

In respect of the description of possible sources of error for the QRA, the Application remains incomplete.

*a) Failure to conduct a sensitivity analysis for underreporting*

219. DNV acknowledges that underreporting is an issue with regards to the base incident frequencies and spill data within the IHS Fairplay database (*supra* paras. 186-192). Mr. Brandsæter testified that the conservatism already built into the QRA would counteract the effects of the underreporting, but did not provide any elaboration on how that was possible (*supra* para. 191). Moreover, DNV fails to include confidence intervals or sensitivity analysis to provide information on the reliability of the spill data. Mr. Brandsæter testified that:<sup>351</sup>

32310. **MR. AUDUN BRANDSAETER:** Yes, we could have done the sensitivity analysis on base frequency as well. The results are proportional to the frequencies in that respect.

32311. Though, keep in mind the fact that we explained earlier today related to the use of frequencies of spill rather than frequencies of incidents. Though it should be noted that the conclusions drawn from that analysis is fairly robust. It wouldn't have changed the conclusions in the report whether we had added another 25 percent to the frequency. As Mr. Michel indicated, that he expected maybe was related to the underreporting of spills.

220. BC Nature and Nature Canada submit that serious questions surround Mr. Brandsæter's conclusion that sensitivity analysis of the base incident frequencies was unnecessary. This input is fundamental to the analysis set out in the QRA. DNV has offered no sufficient justification as to why sensitivity analysis of this input could be dispensed with. The Proponent has, at all times, the burden of proof to persuade the JRP that the risk of spills is insignificant. To meet this burden of proof, the Proponent must provide an analysis that addresses the margin of errors associated with all inputs, including the base frequencies.

221. Furthermore, BC Nature and Nature Canada disagree with Mr. Brandsæter's assertion that increasing the base frequencies by 25% will not change the QRA's conclusions. One of the stated objectives of the QRA is to fulfil requirements of TERMPOL 2011 (TP743E), which

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<sup>351</sup> *Id.*, at paras. 32310-32311 (emphasis added)

recommends the examination of the probability of spills along tanker routes and at the terminal.<sup>352</sup> Therefore, to the extent that a purpose of the QRA is to determine spill probabilities, the return periods that DNV has calculated are “conclusions” of the QRA. If the probability of spill changes in proportion to a 25% increase to base frequency, as suggested by Mr. Brandsæter above, then the QRA’s conclusion regarding spill probability will necessarily change with that increase. Mr. Brandsæter’s testimony that a sensitivity analysis of underreporting of spills “wouldn’t have changed the conclusions in the report whether we had added another 25 percent to the frequency” is incorrect. The lack of sensitivity analysis to account for underreporting shows that the Proponent fails to provide margins of error due to underreporting, as required by the *Scope of Factors* (*supra* para. 16(e)).

b) Failure to conduct a sensitivity analysis for the effectiveness of mitigation

222. DNV predicts a substantial positive impact of tug escorts as a mitigation measure against spills (*supra* para. 218). However, the effectiveness of tug escorts in reducing spill return periods is suspect due to the double-counting of the use of tugs in the QRA (*supra* paras. 210-216). Also, the QRA relies on previous DNV studies to arrive at predicted frequency reductions due to tug escorts.<sup>353</sup> DNV presents the predicted frequency reduction effects of tug escort for various incident types in Table 8-1 of the QRA. According to Table 8-1, use of tug escorts would reduce incident frequencies by 5% for collisions, 80% for powered grounding and most drift grounding, and 90% for drift grounding of laden tankers using close and tethered escort.<sup>354</sup> None of the values reported in Table 8-1 contain any margins of error such as confidence intervals or sensitivity analysis. DNV also does not discuss any potential sources of error for these reduction values.
223. While DNV predicts a high effectiveness for reducing incident frequencies by using tug escorts (close to 80-90% reduction in incident frequencies), Mr. Scalzo provided a range of tug effectiveness that is three times as large as that reported in the QRA.<sup>355</sup>  
32282. You know, over the course of recent years, there have been some studies done and probably between six or eight -- maybe a few more -- that have looked at the effectiveness of escort tugs for use with tanker transits and the result of those studies have shown mitigation or reduction in risk anywhere from 68 to 98 percent; and that depends, again, on the area and the location and the application of the tugs.
224. Given the wide 30% range of incident frequency reduction reported by Mr. Scalzo, DNV should have conducted sensitivity analysis using the lower and upper bounds of tug effectiveness in the QRA. The lack of such sensitivity analysis is a failure to satisfy the requirement of the *Scope of Factors* to include calculations of margins of error (*supra* para. 16(e)).

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<sup>352</sup> B23-34, *supra* note 222, at p. 1-4

<sup>353</sup> *Id.*, at p. 8-119

<sup>354</sup> *Id.*, Table 8-1 at p. 8-120

<sup>355</sup> Transcript Vol. 156, *supra* note 314, at para. 32282 (emphasis added)

c) Failure to conduct a sensitivity analysis for important scaling factors

225. As attested by Mr. Brandsæter, one of the rationales for conducting sensitivity analyses is to detect the influence of qualitative assessments on the results of the QRA:<sup>356</sup>  
32246. **MR. AUDUN BRANDSAETER:** As we have stated in the QRA, we know that there are several qualitative assessment that has been done as basis for the QRA. And we wanted to check the influence of those assessments and therefore we did a sensitivity analysis. So to check out further possibilities not exactly aligned with the first assumptions we had made.
226. One of the most important qualitative inputs into the QRA are the results of the HAZID process which led to scaling factors that DNV applied to the world-wide incident frequency data (*supra* paras. 195-201). BC Nature and Nature Canada submit that DNV should have conducted sensitivity analysis on all scaling factors. However, Chapter 7.4 of the QRA shows that DNV only conducted sensitivity analyses for four input parameters, which included only two out of a total of nine scaling factors.<sup>357</sup> In fact, Fisheries and Oceans Canada (“DFO”) requested the Proponent to provide “a sensitivity analysis for the QRA for key parameters, in particular the scaling factors” in Federal Government IR 2.75(b).<sup>358</sup> In response, the Proponent merely referred DFO back to Chapter 7.4 of the QRA, in which DNV conducted sensitivity analyses for four input parameters, which included only two out of a total of nine scaling factors.<sup>359</sup>
227. In the end, out of numerous input parameters for which DNV could have done sensitivity analyses, DNV conducted sensitivity analyses for only four parameters: (1) scaling factor for grounding; (2) scaling factor for traffic density; (3) number of tanker calls to Kitimat; and (4) length of route segments 5 and 8.<sup>360</sup> According to Mr. Brandsæter, DNV chose these four parameters because these “were the issues that we found most important, and as such most interesting to see the effect of evaluating the sensitivity.”<sup>361</sup> Neither Mr. Brandsæter’s testimony nor the QRA provides any elaboration as to why only these four parameters were “important” or “interesting” but not any of the other parameters. Since DNV arrived at all these scaling factors through qualitative assessments, DNV should have conducted sensitivity analyses on all of the scaling factors. The lack of such sensitivity analysis is a failure to satisfy the requirement of the *Scope of Factors* to include calculations of margins of error (*supra* para. 16(e)).

d) Failure to conduct a sensitivity analysis for a credible range of tanker calls

228. Chapter 7.4.3 of the QRA depicts a sensitivity analysis of the impact of the number of tanker calls to Kitimat Terminal on the unmitigated spill return periods for each tanker route.<sup>362</sup> DNV used three values for the number of tanker calls per year in the sensitivity

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<sup>356</sup> *Id.*, at para. 32246

<sup>357</sup> B46-2, *supra* note 103, at p. 176

<sup>358</sup> E9-4-1, *supra* note 102, at pp. 72-73

<sup>359</sup> B46-2, *supra* note 103, at p. 176

<sup>360</sup> B23-34, *supra* note 222, at pp. 7-99 to 7-104

<sup>361</sup> Transcript Vol. 156, *supra* note 314, at para. 32257

<sup>362</sup> B23-34, *supra* note 222, at pp. 7-101 to 7-102

analysis: 190, 220, and 250 calls per year.<sup>363</sup> DNV then compared the unmitigated spill return periods for each route assuming equal traffic on each route segment.<sup>364</sup> BC Nature and Nature Canada submit that the results reported in the QRA depict a close and significant correlation between an increase in tanker calls and a decrease in return periods. For example, increasing tanker calls in the North route by about 14% reduces the corresponding return period by 12%.<sup>365</sup>

229. During cross-examination, Mr. Brandsæter confirmed that the Proponent had provided DNV with information about the projected Project-related ship traffic to the Kitimat Terminal.<sup>366</sup> Table 7-6 of the QRA shows the forecast distribution of tankers, and it also shows that the Proponent projects a range of 190 to 250 tanker calls per year to Kitimat Terminal.<sup>367</sup> It would appear that DNV conducted the sensitivity analysis on tanker calls based on the upper and lower bounds of predicted tanker traffic provided by the Proponent. BC Nature and Nature Canada submit that DNV used an inadequate range of tanker calls in the sensitivity analysis is inadequate, and has failed to provide the JRP with essential information regarding the robustness of the QRA's conclusions on spill probabilities.
230. The *Scope of Factors* requires the Proponent to consider the “design life of engineered structures” (*supra* para. 16(c)). The Application states that the operational life of this Project is 50 years.<sup>368</sup> Over this time period, the Proponent is projecting an increase of oil pipeline capacity from 525kbpd to 850kbpd and of condensate pipeline capacity from 193kbpd to 275kbpd.<sup>369</sup> If the Proponent estimates the need for an average of 220 tankers for the transport of 525kbpd of oil and 193kbpd of condensate, then simple extrapolation indicates that the Project will require an average of 330 tankers for the transport of 850kbpd of oil and 275kbpd of condensate. As such, BC Nature and Nature Canada submit that the upper bound of the sensitivity analysis should have been significantly greater than 250 tanker calls. In our submission, a more appropriate upper bound would have been 330 tanker calls per year.
231. Given the discrepancy between the 330 tanker calls that DNV should have used and the 250 upper bound that DNV actually used in its sensitivity analysis, the robustness and validity of the spill probabilities reported in the QRA are suspect. Moreover, when BC Nature and Nature Canada sought and received permission from the JRP to pursue a line of questioning aimed at the need for a sensitivity analysis with 330 tanker calls during cross-examination of the Shipping Panel, the witnesses and counsel for the Proponent resisted (*infra* Part IV). Without this information, the Proponent fails to satisfy the requirement to calculate margins of error in the *Scope of Factors* (*supra* para. 16(e)), and the Application in respect of risk assessment is incomplete.

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<sup>363</sup> *Id.*, Figure 7-4 at p. 7-102

<sup>364</sup> *Id.*

<sup>365</sup> Transcript Vol. 156, *supra* note 314, at paras. 32415-32418

<sup>366</sup> *Id.*, at para. 32343

<sup>367</sup> B23-34, *supra* note 222, Table 7-6 at p. 7-104

<sup>368</sup> B3-20 - Vol 7B - Risk Assessment and Mgmt of Spills - Pipelines (Part 1 of 2) - A1T0H0, at p. 3-2

<sup>369</sup> B32-2 - Northern Gateway Response to JRP IR No. 3 A2C5T3, at pp. 9-10

v) Failure to present probabilities in terms of the life of the Project

232. The QRA reports spill probabilities in return periods. DNV defines “return period” as “another way of stating the annual probability of an incident or spill along a given segment or route. A return period is the likely time (in years) between events.”<sup>370</sup> According to the QRA, the oil spill return period for marine transportation without any mitigation measures is 78 years, while the mitigated oil spill return period for marine transportation is 250 years.<sup>371</sup>
233. The manner in which DNV has expressed these spill probabilities is potentially misleading and contrary to the requirement of the *Scope of Factors*. The *Scope of Factors* requires the Proponent to consider the “design life of engineered structures” (*supra* para. 16(c)). The Application states that the operational life of this Project is 50 years.<sup>372</sup> Risk of spill from marine transportation is directly related to the expected life of the pipelines and the marine terminal. The proper way to express spill probabilities is the probability of a spill over the life of the Project.
234. The formula for calculating the probability,  $P$ , of an event over a fixed period of time, assuming a Poisson distribution, is:
- $$P = 1 - (1 - A)^n$$
- where  $A$  is the annual probability of spill and  $n$  is the number of years. Annual probability of spill is merely the inverse of the return period.<sup>373</sup> This formula appears in the Proponent’s evidence,<sup>374</sup> and was confirmed by Mr. Brandsæter during cross-examination.<sup>375</sup>
235. Using 50 as the number of years and 78 and 250 as the return periods, the above formula yields a 47.5% probability of having a spill during marine transportation over the 50-year life of the Project without the use of tugs, and an 18.2% probability with the use of tugs. These probabilities represent a significant risk of spill to the marine environment. The failure of the Proponent to express spill risk in terms of probability of spill over the life of the Project is a failure to satisfy the requirement of the *Scope of Factors* to consider the “design life of engineered structures” (*supra* para. 16(c)); as such, the Application is incomplete.

E) Substantive Deficiencies – Summary of Submissions

236. Table 2 below is a summary of the substantive deficiencies within the Proponent’s Application. The Application is insufficient in its assessment of Project impacts on woodland caribou and on marine birds, and is insufficient in its risk assessment of spills on the marine environment. Given these substantive deficiencies, BC Nature and Nature

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<sup>370</sup> B23-34, *supra* note 222, at p. 7-94

<sup>371</sup> *Id.*, at p. 8-125; as amended by errata, B210-2 - Marine Shipping and Navigation Errata - A3F9E0, at p. 12

<sup>372</sup> B3-20 - Vol 7B - Risk Assessment and Mgmt of Spills - Pipelines (Part 1 of 2) - A1T0H0, at p. 3-2

<sup>373</sup> B23-34, *supra* note 222, at p. 7-93

<sup>374</sup> B83-4 - Attachment 2 - Public Interest Benefit Evaluation - Update and Reply Evidence - A2V1R8, Footnote 89 at p. 80

<sup>375</sup> Transcript Vol. 156, *supra* note 314, at para. 32168

Canada submit that the Proponent has failed to discharge its burden of proof to show that the Application meets present and future public convenience and necessity, is unlikely to cause significant adverse environmental effects, and properly incorporates the principles of sustainable development and the precautionary approach. For these reasons, we respectfully submit that the JRP should conclude that the Application is incomplete, and therefore decline to forward a recommendation to the federal Minister of Natural Resources Canada. In the alternative, we submit that the JRP must recommend to the Minister of Natural Resources Canada that the Application be dismissed.

Table 2

<i>Summary of Substantive Deficiencies</i>		
Requirement	Status of Application	Rationale
<i>Filing Manual (supra paras. 12-14)</i>		
<ul style="list-style-type: none"> <li>identify their habitat(s), including any critical habitat(s) identified in a Recovery Strategy or an Action Plan listed on the SARA public registry</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to provide baseline information (terrestrial ESA)</li> <li>Failure to assess impact on caribou summer habitat</li> </ul>
<ul style="list-style-type: none"> <li>determine whether the species, its habitat, or the residences of those species could be affected by project activities</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to provide baseline information (terrestrial ESA)</li> <li>Failure to account for impact on the Bearhole-Redwillow herd</li> <li>Failure to properly consider significance in the context of a SARA listed species</li> <li>Failure to assess impact on caribou summer habitat</li> <li>Failure to use the “Sorensen approach” for assessing impact on caribou</li> <li>Failure to provide any basis for using a 1.8km/km<sup>2</sup> linear feature density threshold</li> </ul>
<ul style="list-style-type: none"> <li>For species at risk with no recovery strategy or action plan, applicants should use the best available information</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to provide baseline information (terrestrial ESA)</li> <li>Failure to account for impact on the Bearhole-Redwillow herd</li> <li>Failure to assess impact on caribou summer habitat</li> <li>Failure to use the “Sorensen approach” for assessing impact on caribou</li> <li>Failure to provide any basis for using a 1.8km/km<sup>2</sup> linear feature density threshold</li> </ul>
<i>Scope of Factors (supra para. 16)</i>		
<ul style="list-style-type: none"> <li>Echoing the CEAA, 2012, the Scope of Factors requires that the principles of sustainable development and precautionary approach shall be incorporated into the Application</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to assess an adequate number and spectrum of spill scenarios</li> <li>Failure to properly assess the recovery of marine birds from spill</li> <li>Failure to properly assess and present information regarding the probability of spill</li> <li>Failure to properly account for underreporting of spills</li> </ul>

Table 2 (Cont'd)

*Summary of Substantive Deficiencies*

Requirement	Status of Application	Rationale
<i>Scope of Factors (supra para. 16) (Cont'd)</i>		
<ul style="list-style-type: none"> <li>Regarding baseline information, the Proponent “must provide a sufficient description of the local setting to allow the Panel, other regulators, the public, and others to clearly understand the rationale for environmental assessment decisions”</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to provide baseline information (marine ESA)</li> <li>Failure to select an appropriate suite of marine bird KI species</li> <li>Failure to adequately describe marine bird vulnerabilities to Project effects</li> <li>Failure to assess consequences in a quantitative manner</li> <li>Failure to assess an adequate number and spectrum of spill scenarios</li> <li>Failure to account for current and future LNG developments in BC</li> </ul>
<ul style="list-style-type: none"> <li>Again on baseline information, the Proponent “should include calculations of margins of error and other relevant statistical information, such as confidence intervals and possible sources of error”</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to provide baseline information (marine ESA)</li> <li>Failure to properly assess and present information regarding the probability of spill</li> <li>Failure to properly provide calculations of margins of error</li> <li>Failure to conduct a sensitivity analysis for underreporting</li> <li>Failure to conduct a sensitivity analysis for the effectiveness of mitigation</li> <li>Failure to conduct a sensitivity analysis for important scaling factors</li> <li>Failure to conduct a sensitivity analysis for a credible range of tanker calls</li> </ul>
<ul style="list-style-type: none"> <li>On the marine environment, the Proponent ought to provide a “description of marine habitat use and species presence, including population status, life cycle, sensitive periods, habitat requirements for each life stage, abundance (local and regional), distribution and use of habitat type, and for anadromous species, the seasonal range, migration patterns, and sensitivity to disturbance”</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to provide baseline information (marine ESA)</li> <li>Failure to select an appropriate suite of marine bird KI species</li> <li>Failure to justify choice of marine bird KIs</li> <li>Failure to adequately describe marine bird vulnerabilities to Project effects</li> <li>Failure to use NMS ordination to justify choice of KIs</li> <li>Failure to assess consequences in a quantitative manner</li> </ul>

Table 2 (Cont'd)

*Summary of Substantive Deficiencies*

Requirement	Status of Application	Rationale
<i>Scope of Factors (supra para. 16) (Cont'd)</i>		
<ul style="list-style-type: none"> <li>With regards to the effects of the environment on the Project, the Proponent “will take into account how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events ... could adversely affect all project components”</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to assess an adequate number and spectrum of spill scenarios</li> <li>Failure to include key stakeholder groups (HAZID process)</li> </ul>
<ul style="list-style-type: none"> <li>On the determination of significance of residual effects, the Proponent “will identify the criteria used to assign significance ratings to any predicted adverse effects”</li> </ul>	Deficient & Incomplete	<ul style="list-style-type: none"> <li>Failure to select an appropriate suite of marine bird KI species</li> <li>Failure to properly assess the consequences of spill</li> <li>Failure to assess an adequate number and spectrum of spill scenarios</li> <li>Failure to properly assess the recovery of marine birds from spill</li> </ul>

## Part IV – Procedural Deficiencies

237. In this Part, we describe the procedural deficiencies in the Hearing that, in our submission, require the JRP to conclude that the Application is incomplete. This Part is divided into six sections. Section A describes the Motion filed by BC Nature and Nature Canada on April 2<sup>nd</sup>, 2013, and the relevance of that Motion and associated procedural concerns to this written argument. Section B discusses the role of expert witness testimony in judicial and quasi-judicial settings. Section C sets out the process by which expert witnesses are sworn and qualified in this Hearing; it then considers this process in relation to witnesses that testified concerning the QRA and risk assessment. Section D canvasses excerpts of the cross-examination of the Shipping Panel by BC Nature and Nature Canada, and identifies and elaborates concerns arising from that cross-examination. Section E describes the procedural fairness implications of the foregoing discussion. Lastly, Section F summarizes BC Nature and Nature Canada’s position on the procedural deficiencies in this Hearing.

### A) BC Nature and Nature Canada Motion Regarding Procedural Fairness

238. On April 2<sup>nd</sup>, 2013, BC Nature and Nature Canada filed a motion with the JRP seeking a Procedural Direction aimed at clarifying the nature of the right of cross-examination and the obligations of expert witnesses under cross-examination (“Motion”). The relief sought pursuant to the Motion included extending the Shipping Panel to allow BC Nature and Nature Canada and other intervenors liberty to re-open their cross-examinations so as to ensure a proper testing of the evidence.<sup>376</sup> The Motion was brought while the Shipping Panel was still sitting, and was based primarily on the witness panel transcript of our appearance at that panel on March 18<sup>th</sup> and 19<sup>th</sup>, 2013.

239. BC Nature and Nature Canada do not intend to re-argue the merits of the Motion. We would be remiss, however, not to draw to the attention of the JRP continuing and closely related procedural concerns with the Shipping Panel with which, in adjudicating this matter, the JRP must now grapple.

240. As reprised in the Motion, and not disputed by the Proponent, in conducting this Hearing, the JRP is acting in a quasi-judicial capacity and is a court of record.<sup>377</sup> As such, it is bound by the rules of natural justice.

241. Accordingly, we submit, the JRP must recognize that this Hearing bears many of the hallmarks of an adversarial process and must be governed accordingly. The Ontario Court of Appeal has stated:<sup>378</sup>

Civil trials and purely administrative hearings, be they public or private, are invariably disputes between parties and institutions. They may involve a broad public interest, such as the impact upon the environment, or a narrow dispute, as here to the right to tenure. There is some *lis* between the participants presented for determination by the decision-maker. The driving force is the adversary system which assumes that each of

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<sup>376</sup> D12-29-2 BC Nature Nature Canada - Motion Seeking Procedural Direction - A3G5F6

<sup>377</sup> *Committee for Justice and Liberty v. Canada (Energy Board)*, [1978] 1 S.C.R. 369 at para 17

<sup>378</sup> *Hurd v. Hewitt*, 120 DLR (4<sup>th</sup>) 105 (OntCA) at para 23

party will present the best possible evidence and argument in favour of that party's position and that the role of the tribunal or judge is to reach a decision based upon that evidence and argument.

242. Prior to BC Nature and Nature Canada bringing the Motion, the JRP had offered some guidance in the form of Procedural Directions relating to cross-examination. That guidance primarily was in the form of restrictions on the right to cross-examination. However, the JRP provided little comparable guidance with respect to the obligations that bind expert witnesses sworn and qualified to give testimony in the Hearing.
243. While the full range of the evidentiary and procedural rules that would apply in a judicial setting at common law do not necessarily apply to this Hearing, BC Nature and Nature Canada submit that this JRP must proceed in a manner that is mindful and respectful of common law principles when making determinations as to what evidentiary and procedural rules will govern this Hearing. Moreover, we submit that there are certain bedrock principles of the common law that this JRP must, in any event, accept and apply. These principles include requirements governing the admission of expert opinion evidence.
244. In support of the Motion, BC Nature and Nature Canada filed an Affidavit of Pak Yan Anthony Ho ("Ho Affidavit").<sup>379</sup> Mr. Ho was available for cross-examination on his Affidavit, but the Proponent did not exercise this opportunity, neither did the Proponent challenge the accuracy of the observations set out in his Affidavit. As such, we submit that the Ho Affidavit should be accepted as an accurate description of the witness activities during the various witness panels where BC Nature and Nature Canada participated in cross-examination.
245. On April 26<sup>th</sup>, 2013, the JRP dismissed the Motion in Ruling 159 ("Ruling").<sup>380</sup> In its Ruling, the JRP specifically mentioned the lateness of the application, the past practice of the NEB in utilizing sworn witness panels and "back row" support staff, and the failure of the applicant to raise objections during the course of cross-examination.<sup>381</sup>
246. We submit that due to procedural defects first drawn to the JRP's attention in the Motion, BC Nature and Nature Canada and other intervenors have been denied a full and fair opportunity to cross-examine the Shipping Panel in a manner consistent with the rules of natural justice and procedural fairness. As a result, the evidence at issue before the Shipping Panel has not been fully tested before the JRP. Consequently, the JRP has been deprived of the information it needs to make an informed decision on this Application. Accordingly, we submit that the JRP must conclude that the Application is incomplete pursuant to the threshold requirement set out in s. 52(1) of the *NEB Act*.

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<sup>379</sup> D12-29-3 BC Nature Nature Canada - Affidavit of Anthony Ho - A3G5F7

<sup>380</sup> A352-1 - Panel-Commission - Ruling no. 159 - Notice of Motion filed by BC Nature Nature Canada on 2 April 2013 - A3H3F6

<sup>381</sup> *Id.*, at pp. 5-6

i) Seriousness of the issues at stake

247. If, as the JRP states in its Ruling on the Motion, expert witness panels have and will continue to be used in NEB hearings, it is both prudent and important for this JRP to clarify its interpretation of the rules governing the admission of expert opinion evidence in this proceeding.
248. The discretion of this JRP to depart from the strict rules at common law governing the admission of expert opinion evidence is neither unlimited nor unfettered. In particular, BC Nature and Nature Canada submit that while through the issuance of Procedural Directions the JRP is entitled to recast common law evidentiary rules to suit the requirements of this Hearing, some bedrock common rules governing the admission of expert opinion evidence must be followed. Specifically, in our submission, the JRP must ensure that expert witnesses are properly sworn and qualified; that such witnesses do not testify beyond the scope of their qualification; and that they testify in a manner that is neutral, unbiased, and non-partisan.<sup>382</sup> It is the duty of the JRP, in analysing the evidence at this final stage of the Hearing, to ensure that expert testimony offered in this Hearing meets these threshold common law requirements.

ii) Significance of the QRA

249. The QRA is of central importance to this Application. As discussed in Part III, Section C of this written argument, in this Application risk is quantified as the product of the probability of a spill and the consequence of a spill. The Proponent has previously conceded that the consequence of an unmitigated spill would be significant (*supra* paras 122-123). Therefore, the Proponent's Application hinges on the quantification of the probability of spills. The QRA speaks directly to the probability of a spill into the marine environment, making the QRA a highly important and central part of the Application.
250. Following a competitive RFP process, the Proponent selected DNV to produce the QRA.<sup>383</sup> The authors of the QRA are Mr. Audun Brandsæter and Mr. Peter Hoffmann. Mr. Brandsæter is the Principal Consultant for the QRA, and the only individual tendered by the Proponent as an expert witness at the Shipping Panel to answer questions as to the QRA.

B) Role of an Expert Witness

251. When considering the role of expert witnesses in a proceeding such as this, it is critical to bear in mind that expert witnesses enjoy a special status in law. Among other things, ordinarily only a duly sworn and qualified expert witness is entitled to offer an opinion upon which a decision maker can rely as evidence.<sup>384</sup>

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<sup>382</sup> *Lockridge v. Director (Ministry of Environment)* (“*Lockridge*”), 2012 ONSC 2316, 2012 CarswellOnt 7116

<sup>383</sup> B23-34, *supra* note 222, at p. 138

<sup>384</sup> *Lockridge*, *supra* note 382, at para. 94. See also *R v Graat* (“*Graat*”), [1982] 2 SCR 819 (SCC), 1982 CarswellOnt 101 and *Smith v Inco*, 2012 ONSC 4749, 2012 CarswellOnt 10172, both of which confirm that under certain circumstances, lay witnesses may also offer opinions. However, this ability is restricted to “matters requiring

252. Because of the special status of expert opinion evidence, the common law has insisted that a witness shall only be deemed an “expert” after being duly sworn and qualified. Moreover, expert witnesses are only entitled to offer opinions within the “four corners of their qualification.” They must also testify in a manner that is neutral, unbiased, and non-partisan.<sup>385</sup>
253. The Ontario Superior Court of Justice has recently considered at length the proper role of expert witnesses and expert testimony in *Lockridge v. Ontario (Director, Ministry of Environment)*.<sup>386</sup> There, the Court excluded affidavit evidence submitted by the plaintiff as improper opinion evidence because the affiants had not been properly qualified as experts, and had offered opinions on issues for which they were not qualified in their affidavits. The Court was also critical of the fact that the affiants had not “claim[ed] to be neutral, unbiased or non-partisan in their evidence as required by... common law principles governing the role of expert witnesses.”<sup>387</sup>
254. In striking significant portions of the affidavit evidence that had been submitted into the evidentiary record, the Court stated emphatically that “[o]pinion evidence may only be tendered through the evidence of a properly qualified expert. Unqualified expert opinion is impermissible and should be struck.”<sup>388</sup>
255. Citing the inquiry by Mr. Justice Goudge of the forensic pathology work of Dr. Charles Smith, the Court further stated that it is the duty of the court to act as a gatekeeper to exclude improper expert evidence. According to the Court, this gatekeeper function is to be carried out in various ways, “including by defining the precise subject area of expertise for which a witness is qualified to give evidence and ensuring that expert evidence is only admitted within the narrow scope for which the witnesses has been properly qualified.”<sup>389</sup>
256. The common law also rigorously insists that expert witnesses be neutral, unbiased and non-partisan in their evidence.<sup>390</sup> As such, expert witnesses should always strive to offer neutral assistance to the adjudicator, and avoid at all costs the perception that they have assumed the role of advocate by, among other things, offering argumentative or speculative testimony:<sup>391</sup>
- One of the fundamental duties of the expert witness in a civil case is to provide independent assistance to the court by way of objective, unbiased opinion in relation to

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no special knowledge, where it is virtually impossible to separate the witness's inference from the facts on which the inference is based”: *Graat*, at para. 15. This narrow exception would not apply to any of the witnesses proffered by the Applicant at the Shipping Panel, however, as it was constituted on the basis that every witness was an “expert” witness.

<sup>385</sup> See, *Lockridge*, *supra* note 382 and *Graat*, *supra* note 384

<sup>386</sup> *Lockridge*, *supra* note 382, at paras. 94-100

<sup>387</sup> *Id.*, at paras. 96-97

<sup>388</sup> *Id.*, at para. 94

<sup>389</sup> *Id.*, at para. 95. See also, *Ontario, Inquiry into Pediatric Forensic Pathology in Ontario, Report: Policy and Recommendations*, vol. 3 (Toronto: Queen's Printer, 2008)

<sup>390</sup> *Lockridge*, *supra* note 382, at para. 96

<sup>391</sup> *Id.*, at para. 99

matters within the witness' expertise. An expert witness should not assume the role of advocate.

257. As the Ontario Superior Court of Justice has stated in another recent case, concerns about expert opinion evidence apply generally across the Canadian justice system:<sup>392</sup>

The concerns about expert evidence are not limited to the criminal sphere. The Honourable Coulter A. Osborne, Q.C. devoted an entire chapter of his 2007 *Civil Justice Reform Project: Summary of Findings & Recommendations* to the problems of expert evidence. Although his focus was more on the proliferation of experts and the negative effects this has on litigants, he noted and shared many of the same concerns underlying the Goudge Inquiry. Clearly, the potential pitfalls of expert opinion evidence cross the spectrum of cases in the judicial system.

*i) Expert testimony at the Hearing*

258. The JRP has prescribed rules in the form of a Procedural Direction No. 9 (“P.D. 9”) that addresses the distinction between expert and lay witnesses.<sup>393</sup> To a large degree, we submit that these rules are consistent with the applicable common law as set out above. According to P.D. 9, prior to an expert witness testifying before it, the JRP must have “determined [that particular witness] has expertise on a matter to be addressed and is able to express an expert opinion on a specific topic.”<sup>394</sup> In contrast, a lay witness “is someone who has personal knowledge on a topic” but who does not offer their opinion before the JRP.<sup>395</sup>

259. At this Hearing, expert witnesses are sworn<sup>396</sup> and qualified before the JRP whereupon they are entitled to offer their expert opinion.<sup>397</sup> However, to be admissible, the expert opinion evidence must meet all of the requirements outlined above (*supra* paras. 251-257), including that the testimony remains within the “four corners” of the witness’s expert qualification and that is presented in a manner that is neutral, unbiased, and non-partisan.

260. The JRP has exercised its gatekeeper function through a specific practice of requiring Parties to “file a *curriculum vitae* (CV) or resume for each witness as one means of demonstrating their qualifications to speak on a particular topic” in advance of a set deadline prior to the convening of the panel during which the witness is to appear.<sup>398</sup> This practice allows an opportunity for Parties to review in advance the specific areas of expertise for which each witness is presented, and to raise any objections or concerns they may have with those witnesses. This is a written process where all filings are made on the Public Registry.

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<sup>392</sup> *Bedford v Canada*, 2010 ONSC 4264, 2010 CarswellOnt 7249, at para 103

<sup>393</sup> A225-3 - Panel-Commission - Procedural Direction no. 9 - Final Hearings for Questioning - A2X2Z3

<sup>394</sup> *Id.*, at p. 2

<sup>395</sup> *Id.*

<sup>396</sup> Throughout this written argument, “sworn” means a witness has taken an oath or affirmation that the information they provide during cross-examination and/or redirect is accurate and truthful to the best of their knowledge: *See*, A225-3, *supra* note 393, at p. 7

<sup>397</sup> A225-3, *supra* note 393, at p. 7

<sup>398</sup> *Id.*, at p. 2

261. Following this written process, the witnesses are then presented in person to the JRP at the beginning of the witness panel in which they are to take part. The witnesses take an oath or affirmation before the JRP confirming “that the information they are about to provide orally (in response to questions) is accurate and truthful to the best of their knowledge.”<sup>399</sup> Finally, the specific areas of expertise to which the proposed witness may testify is confirmed before the JRP. If there are no objections from other Parties, the JRP then accepts the witness as an expert to give opinion evidence in the identified areas. Only at the conclusion of this process is a witness qualified to provide expert opinion testimony before the JRP.<sup>400</sup>
262. The oath or affirmation that an expert witness must take is a personal act. Consistent with this, witnesses testify in their personal, individual capacity as to their own opinion, knowledge or belief. Following this procedure ensures that the evidentiary record clearly indicates who is testifying, and under what qualification.
263. In keeping with the overarching importance of the principle of individual testimonial accountability, BC Nature and Nature Canada submit that expert testimony using the plural “we” instead of the singular “I” is inappropriate for a variety of reasons. As discussed above (*supra* paras. 251-257), expert witnesses are required by common law principles to be neutral, unbiased, and non-partisan and to testify accordingly. In our submission, use of “we” or other similar terms undermines the appearance of expert witness neutrality. When testifying, expert witnesses must offer their personal opinions and beliefs. This requires the use of the singular “I” to clearly indicate their testimony is based upon personal opinion and belief.
264. The principle of individual testimonial accountability is consistent with P.D. 9, which states that “[s]ometimes members of a witness panel consult with each other before providing the answer.”<sup>401</sup> This procedural rule, which contemplates that witnesses may consult prior to answering question, in no way alters the requirement that witnesses must testify in their individual capacity. BC Nature and Nature Canada submit that the JRP does not have the authority to depart from this common law principle. Regardless, we submit that P.D. 9 does not purport to authorize such a departure.
265. We submit that the QRA is likely the most important single piece of evidence tendered for consideration at the Shipping Panel, if not the entire marine technical assessment for the Project. Moreover, it is a quintessential third party “expert report” which purports to offer expert opinion evidence on one of the key issues that this JRP must adjudicate.

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<sup>399</sup> *Id.*, at p. 7

<sup>400</sup> For the qualification and swearing in of Mr. Audun Brandsæter, see *infra* paras. 266-267. For the qualification and swearing in of Mr. Keith Michel, see *infra* paras. 268-271. For the qualification and swearing in of Mr. Michael Cowdell, see *infra* paras. 272-274.

<sup>401</sup> A225-3, *supra* note 393, at p. 5 (emphasis added)

C) QRA and the Swearing in and Qualifications of Expert Witnesses

i) Mr. Audun Brandsæter

266. The document filed by the Proponent introducing Mr. Brandsæter for the purposes of this Hearing, known as his “Direct Evidence,” states that his area of focus since 1989 has been risk analysis, risk assessments and related work.<sup>402</sup> He is a Senior Principal Engineer and Associate Director at DNV, and holds a Master of Science from the Technical University of Norway (NTH).<sup>403</sup> His Direct Evidence makes clear that his purpose for appearing at the proceeding was to testify to “questions related to the evidence of Northern Gateway concerning marine transportation including in respect of matters pertaining to risk assessment.”<sup>404</sup>

267. When Mr. Brandsæter was sworn and qualified in as an expert witness before the JRP, he was sworn as:<sup>405</sup>

a member of [the] witness panel to speak generally to the evidence of Northern Gateway concerning operations, safety and accident prevention related to the proposed marine terminal and marine transportation, and specifically to Exhibit B23-34 which is the “Marine Shipping Quantitative Risk Analysis Technical Data Report” and related responses to information requests.

As will be discussed below, none of the other witnesses on the Shipping Panel were tendered by the Proponent to testify either to the QRA or to risk assessment more generally.

ii) Mr. Keith Michel

268. Mr. Michel’s Direct Evidence states that he was to “respond to questions related to the evidence of Northern Gateway concerning marine transportation including in respect of matters pertaining to design and construction of oil tankers and corrosion, inspection and maintenance of oil tankers.”<sup>406</sup> He has a Bachelor of Science Degree in Naval Architecture and Marine Engineering from the Webb Institute.<sup>407</sup> Mr. Michel is President-elect of the Webb Institute.<sup>408</sup>

269. Mr. Michel was sworn and qualified before the JRP specifically to:<sup>409</sup>  
... speak generally to the evidence of Northern Gateway concerning operations, safety and accident prevention related to the proposed marine terminal and marine transportation, and specifically to Exhibit B83-20, which is the document entitled

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<sup>402</sup> B90-13 - Northern Gateway Pipelines Limited Partnership - Brandsaeter, Audun - Direct Evidence - A2X6T3, at p. 1

<sup>403</sup> *Id.*, at p. 2

<sup>404</sup> *Id.*, at p. 1

<sup>405</sup> Transcript Vol. 155, *supra* note 304, at paras. 31047-31048

<sup>406</sup> B91-6 - Northern Gateway Pipelines Limited Partnership - Michel, Keith - Direct Evidence - A2X6V5, at p. 1

<sup>407</sup> *Id.*

<sup>408</sup> Transcript Vol 155, *supra* note 304, at para. 31081

<sup>409</sup> *Id.*, at paras. 31083-31084

“Corrosion Inspection and Maintenance of Oil Tankers” and Exhibit B83-21, which is the document entitled “Design and Construction of Oil Tankers.”

Mr. Michel was neither sworn nor qualified before the JRP to testify to the QRA or to issues of risk assessment generally.

270. While Mr. Michel’s Direct Evidence states that his expertise “covers risk assessment, marine transportation, and conceptual, preliminary, and contract level design, shipyard negotiations, and plan approval of commercial ships,”<sup>410</sup> it is not the prerogative of a witness to decide in which area they are qualified to testify before the JRP. Instead, as has been discussed above (*supra* para. 255), it is the responsibility of the tribunal authorizing him to testify as an expert to act as a gatekeeper “by defining the precise subject area of expertise for which a witness is qualified to give evidence and ensuring that expert evidence is only admitted within the narrow scope for which the witnesses has been properly qualified.”<sup>411</sup>

271. Mr. Michel was clearly neither properly sworn nor qualified to testify to the QRA or to risk assessment generally. Neither may the JRP retroactively deem him to have been so sworn and qualified, as to do so would undermine the right of other Parties who may well have objected to the Proponent tendering him for the purpose of answering questions about risk assessment or the QRA.

*iii) Mr. Michael Cowdell*

272. Mr. Cowdell’s Direct Evidence states that he specializes in the “design, construction, and inspection of marine and industrial structures as well as maritime port and terminal planning.”<sup>412</sup> He holds a Bachelor of Applied Science in Civil Engineering and a Master of Engineering in Civil Engineering from the University of British Columbia.<sup>413</sup> Mr. Cowdell works at WorleyParsons Canada Services Ltd as a Marine Structural Engineer.<sup>414</sup>

273. Mr. Cowdell was sworn and qualified before the JRP to “speak to the evidence of Northern Gateway concerning operations, safety, and accident prevention related to the proposed marine terminal and marine transportation,” and he “participated in preparation of portions of the evidence of Northern Gateway listed in... Exhibit B210-6.”<sup>415</sup>

274. Mr. Cowdell was clearly neither properly sworn nor qualified to testify to the QRA or to risk assessment generally. Neither may the JRP retroactively deem him to have been so sworn and qualified, as to do so would undermine the right of other Parties who may well have objected to the Proponent tendering him for the purpose of answering questions about risk assessment or the QRA.

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<sup>410</sup> B91-6, *supra* note 406, at p. 1 (emphasis added)

<sup>411</sup> *Lockridge*, *supra* note 382, at para. 95

<sup>412</sup> B210-3 - Cowdell, Michael - Direct Evidence - A3F9E1, at p. 1

<sup>413</sup> *Id.*, at p. 6

<sup>414</sup> *Id.*, at p. 1

<sup>415</sup> Transcript Vol 155, *supra* note 304, at paras. 31104-31105

D) Cross-examination of the Shipping Panel by BC Nature and Nature Canada

275. As discussed previously, Mr. Brandsæter was the only witness on the Shipping Panel who was sworn and qualified before the JRP to testify to the QRA and risk assessment. Neither Mr. Michel nor Mr. Cowdell was sworn or qualified to testify to either of those issues, although they answered many questions specifically related to those topic areas “on behalf” of the witness panel, as evidenced by examples from the transcript to be discussed below.
276. Because Mr. Brandsæter was uniquely qualified in relation to the QRA, he was a critical witness in the testing of the QRA evidence. However, as the Motion<sup>416</sup> and the Ho Affidavit<sup>417</sup> describe, BC Nature and Nature Canada were denied the opportunity to properly and fully test this evidence because of the numerous interceptions by other witnesses of questions directed to Mr. Brandsæter. Of the seventeen (17) interceptions referenced in the Motion, eleven (11) related to questions posed to Mr. Brandsæter.<sup>418</sup>

i) Concerns arising from BC Nature and Nature Canada’s cross-examination of the Shipping Panel

277. During the cross-examination of the Shipping Panel by BC Nature and Nature Canada, on numerous occasions expert witnesses regularly intercepted, redirected and usurped questions posed by counsel as set out in the Motion. A review of the transcript of this witness panel also reveals that some expert witnesses answered questions well beyond the scope of the subject matters for which they were sworn and qualified, as we set out below.
278. Another concern flows from the requirement of expert witness testimony to be neutral, unbiased, and non-partisan. In our submission, persistent use of the plural “we” or “us,” is capable of giving rise to an “us versus them” perception, inconsistent with the tradition that expert witnesses eschew advocacy on behalf of a party and strive to testify in an entirely neutral fashion.<sup>419</sup>

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<sup>416</sup> D12-29-2, *supra* note 376

<sup>417</sup> D12-29-3, *supra* note 379

<sup>418</sup> See e.g. Transcript Vol. 156, *supra* note 314, at paras. 31712-31716 (Mr. Flotre interrupted a question for Mr. Brandsæter, and then Mr. Michel provided the answer instead); para. 31767 (Mr. Cowdell intercepting a question for Mr. Brandsæter); paras. 31844-31847 (Mr. Cowdell intercepted a question for Mr. Brandsæter after a witness conference); paras. 31851-31855 (Mr. Flotre intercepting a question for Mr. Brandsæter while latter is in mid-answer); paras. 32094-32097 (Mr. Michel interrupts and intercepts a question for Mr. Brandsæter); paras. 32110-32111 (Mr. Michel intercepts a question for Mr. Brandsæter); para. 32170-32178 (Mr. Michel intercepts a question for Mr. Brandsæter); paras. 32192-32197 (Mr. Cowdell intercepts a question for Mr. Brandsæter and refers it to Mr. Scalzo); paras. 32259-32260 (Mr. Scalzo intercepts a question to Mr. Brandsæter); paras. 32270-32276 (Mr. Cowdell intercepts a question for Mr. Brandsæter and refers it to Mr. Scalzo); paras. 32312-32318 (Mr. Cowdell intercepts a question for Mr. Brandsæter)

<sup>419</sup> BC Nature and Nature Canada do not take issue with instances where the witness appears to be testifying in relation to a jointly-authored document for which they have authorial credit. Consequently we would not include in this category any references to situations Mr. Brandsæter is referring to his work for DNV in connection with the QRA report which he co-authored with one Peter Hoffman. We have no objection to Mr. Brandsæter saying “we” when he describes this joint work product. It is also relevant that Mr. Hoffman was *not* called as a witness in this Hearing, and that Mr. Brandsæter was qualified with specific responsibility to testify as to the QRA. BC Nature and Nature Canada also do not take issue with situations where “we” is used to indicate an interaction or conversation that the witness is having or has had with counsel during the cross-examination of the Shipping Panel. Instead, BC

279. Moreover, use of the plural “we” undermines the JRP’s ability to assess the evidence in a full and fair manner. The use of “we” is problematic as it deprives the JRP of the capacity to know the specific identity of the individual(s) or other entities on whose behalf the testimony is being offered, and consequently undermines the ability of the trier of fact to determine issues of evidentiary credibility, reliability, and weight.
280. BC Nature and Nature Canada submits that the cumulative impact of the foregoing is threefold:
- the QRA and related risk assessment evidence submitted by the Proponent has not been properly tested in this Hearing;
  - the right of the Parties to test the said evidence has been compromised contrary to the principles of natural justice; and,
  - the current evidentiary record contains improper opinion evidence from experts that have neither been properly sworn nor qualified to give the evidence in question.

*ii) Differences between day one and day two at the Shipping Panel*

281. As discussed in the Motion and the supporting Ho Affidavit, there was a marked difference between the first and second day of the cross-examination of the Shipping Panel by BC Nature and Nature Canada. The uncontradicted Ho Affidavit describes the change between the first and second day of our cross-examination:<sup>420</sup>

On day 1 of Cross-exam #4 (March 18, 2013), Mr. Tollefson’s cross-examination focused on Mr. Audun Brandsæter. On that day, Mr. Brandsæter was largely unaided by other witnesses in his testimony. On day 2 of Cross-exam #4 (March 19, 2013), when Mr. Tollefson continued his cross-examination of Mr. Brandsæter, conferencing increased significantly. On that day, conferencing predominately occurred among Mr. Michael Cowdell, Mr. Keith Michel, and Mr. Brandsæter. On many occasions, Mr. Brandsæter would confer with Mr. Michel and Mr. Cowdell before testifying to a question posed by Mr. Tollefson. On some of the occasions when conferencing did not occur, Mr. Brandsæter turned his head away from Mr. Tollefson and looked to Mr. Michel and Mr. Cowdell in response to a question posed by Mr. Tollefson, and only testified after Mr. Michel and/or Mr. Cowdell nodded his/their head(s).

282. In its response to the Motion, the Proponent did not take issue with either the Ho Affidavit or the Exhibit A appended to that Affidavit.<sup>421</sup> In Exhibit A, which is a copy of a newspaper article authored by Mr. Peter James from the *Prince George Citizen* entitled “Pipeline Squad Leans on Back Row,” a “back row” staff person at the Hearing confirmed that support staff and witnesses “conduct a full debrief in the evening” following each day of witness panel testimony.<sup>422</sup> The above assertion in Mr. James’ article that conferencing

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Nature and Nature Canada take issue with the use of “we” or “us” when it is used in such a way that it indicates the witness is not testifying solely to their own opinion or experience as is required by the common law rules of expert opinion testimony. In those cases, BC Nature and Nature Canada consider the use of “we” or “us” especially problematic when the testimony relates to a key point in issue.

<sup>420</sup> D12-29-3, *supra* note 379, at para. 10

<sup>421</sup> B220-1 - NGP Response to BC Nature - Nature Canada Motion - A3G6X9

<sup>422</sup> D12-29-4 BC Nature Nature Canada - Exhibit A to Affidavit of Anthony Ho - A3G5F8, at p. 1

occurs on a nightly basis amongst the Proponent's expert witnesses, staff and/or others to discuss evidence being tendered at the Hearing was neither mentioned nor challenged by the Proponent in its response to the Motion.

283. During the first day of our cross-examination, once questioning began, BC Nature and Nature Canada asked 45 questions directed at Mr. Brandsæter, all of which were answered by Mr. Brandsæter alone.<sup>423</sup> However, on the second day of our cross-examination of the same witness panel, a significant difference was noted in the behaviour of the witnesses. On this second day, the interruptions and interception of our questions increased significantly. On that second day, 99 questions were posed to Mr. Brandsæter specifically. At least eleven (11) of these questions were intercepted and answered by other witnesses,<sup>424</sup> while many more questions gave rise to interruptions by other witnesses to whom no question had been posed. In ten of these eleven cases Mr. Brandsæter never offered an answer to the question posed.

*iii) Examples of unqualified expert opinion testimony*

284. Both Mr. Michel and Mr. Cowdell testified to issues outside of the purview of their expert witness qualifications on many occasions during the course of BC Nature and Nature Canada's second day of cross-examination of the Shipping Panel. Much of this testimony was offered in addition to other witnesses' answers or as usurpations or interceptions of questions asked of Mr. Brandsæter in relation to the QRA or risk assessment.

*a) Mr. Keith Michel*

285. Despite being neither sworn nor qualified before the JRP to do so, Mr. Michel offered expert opinion evidence as to the methodology used in the QRA,<sup>425</sup> the nature of the QRA,<sup>426</sup> risk assessment and sensitivity analyses generally,<sup>427</sup> and spills probability generally.<sup>428</sup>

286. Mr. Michel testified directly about the methodology used in the QRA on three separate occasions despite apparently having had no part in its preparation:<sup>429</sup>

- 31558. **MR. KEITH MICHEL** ... I believe that the methodology that's utilized by the DNV in the QRA is very conservative and in fact overestimates the number of incidents”;
- 31644. But the QRA uses the number of incidents only to get the proportions of groundings to collisions to fire and explosion – the relative percentages. It uses the probability of an oil spill, the conditional probability to get the likelihood of spills which is really what we're interested in here, a return period of spills.

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<sup>423</sup> Transcript Vol 155, *supra* note 304, at paras. 31278-31455

<sup>424</sup> See examples *supra* note 418

<sup>425</sup> Transcript Vol. 156, *supra* note 314, at paras. 31558, 31644-31648, & 32114

<sup>426</sup> *Id.*, at paras. 32295, & 32329

<sup>427</sup> *Id.*, at paras. 31639-40, 31940-31941, 32319

<sup>428</sup> *Id.*, at paras. 32174-32177

<sup>429</sup> *Id.*, at paras. 31558, 31644-31648, 32114 (emphasis added)

31645. And there the data is much more reliable and I believe it's the -- the 25 percent range.

31646. And that's really the key here on how DNV assure the conservative nature of this analysis. The oil spill data is the basic input that's utilized. I believe as the National Academy Report put in that that's under-estimated by approximately 25 percent. So you'd want to add 25 percent to those numbers.

31647. DNV did not specifically add the 25 percent. What they did was account for it in a different way. They took a very conservative assumption on the likelihood of the oil spills. And again, they way they did that is something we've been talking about this morning.

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

- 32114. So again, the QRA went back to accident level so it could have the most data possible and know the percentages of accidents that are related to groundings, to collisions, et cetera, but when it determined the probability of a spill, that's based on the spill data, the number of spills in the database.

287. Mr. Michel also testified as to the nature of the QRA despite being neither sworn nor qualified to do so:<sup>430</sup>

- 32295. And I'd just like to re-emphasize what was said at -- this type of study is a very conservative study but it really isn't meant to specifically say what the probability of a spill is, it's meant to assess mitigation measures. And, in this manner, it's very effective and the determination was to use what is a very expensive solution which is two escort tugs for laden tankers, one tethered.
- 32329. And you know, I could repeat myself about the factor of three and 300 percent. We absolutely believe this assessment is very conservative and that it provided the data we needed to make determinations on risk assessment.

288. Another area in which Mr. Michel testified despite having been neither sworn nor qualified before the JRP to do so was risk assessment and sensitivity analyses generally.<sup>431</sup>

- 31639. **MR. KEITH MICHEL:** In risk assessment, we -- we study reliability of data in a number of different ways.  
31640. We'll do uncertainty analysis and we'll account for that uncertainty. We'll also do sensitivity studies which is another way to approach it in which we increase the balance of our assumptions to the outer balance of what we expect and we see the impacts of that.
- 31939. **MR. KEITH MICHEL:** I think it's important to take this in context to how this study was done.

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<sup>430</sup> *Id.*, at paras. 32295, 32329 (emphasis added)

<sup>431</sup> *Id.*, at paras. 31639-31640, 31939-31941(emphasis added).

31940. You can do a risk assessment in one of two ways looking forward. One approach is what was done here: a point in time at the time that the risk assessment was done, best available data was utilized to do a risk assessment and determine probabilities. And it was assumed that that would be constant over the 50-year period.

31941. The other approach you can take is to estimate the change in traffic over that 50-year period and then you have the challenge you need to both evaluate the change in traffic and the change in operations and regulatory approach that might reduce the likelihood of collisions in this case.

In the latter example (at paras. 31393-31941), in addition to testifying about risk assessment generally, Mr. Michel also testified as to how the QRA was done. In neither of these areas was he sworn or qualified to give expert opinion evidence. Moreover, in the course of that interjection, Mr. Michel usurped Mr. Brandsæter's opportunity to testify on this important issue.

289. The expert opinion evidence offered by Mr. Michel at paragraphs 31939-31941 of the transcript immediately followed a similar intervention by Mr. Cowdell when Mr. Cowdell answered a question posed to Mr. Brandsæter. This question specifically queried Mr. Brandsæter's personal awareness of the Kitimat LNG Project when he co-authored the QRA report, and whether or not it had been taken into account in the QRA.<sup>432</sup> Mr. Cowdell's intervention also preceded the incident where Mr. Carruthers was understood to be reading into the record a portion of a Government of Canada press release regarding the announcement of a "World-Class Tanker Safety System" that had previously been struck by the JRP from the Public Registry.<sup>433</sup> Due to the continuing interruptions and interventions by each of Mr. Michel, Mr. Cowdell, and Mr. Carruthers, Mr. Brandsæter did not ever directly answer the question of whether the Kitimat LNG Project was taken into account in the QRA. The cumulative result of these interruptions and interjections is that the JRP has been left without any admissible evidence on the matter, and this important evidentiary issue has not been tested.

290. Mr. Michel again interjected and answered a question regarding expression of risk over the life of the Project that had been asked of Mr. Brandsæter, the only witness sworn and qualified to testify to such issues:<sup>434</sup>

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

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

32173. **MR. KEITH MICHEL:** Well, maybe it's best to put it in context to some of the numbers that we've been talking about.

32174. Again, say you had an average of one spill every 250 years, so a 250-year return period, you can express that spill in a number of different ways. You could express it as

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<sup>432</sup> *Id.*, paras 31933-31936.

<sup>433</sup> D12-29-3, *supra* note 379, at para. 13

<sup>434</sup> Transcript Vol 156, *supra* note 314, at paras. 32171-32178

a four-tenth of one percent probability of a spill in a given year. That says exactly the same thing.

32175. And those two expressions are the way that risk people normally look at it because it's easy to utilize those numbers to add probabilities and manipulate them as needed. But you could also calculate a spill over a proposed lifetime, assuming that it's constant over that lifetime.

32176. And again, if we take that one in 250-year return period, applying the Poisson distribution that this formula does, you get about a 16 percent probability of a spill over that 50-year life.

32177. And you can look at it in different ways. Myself, I have a hard time thinking of probabilities over 50 years because I don't know, as I said this morning, what's going to happen over those 50 years.

32178. Over the last 33 years the number of spills from tankers is reduced by an order of magnitude, a factor of 10. And yet we've said in the QRA we've conservatively estimated that number and then we've applied a -- if you apply a Poisson distribution, you're assuming it's constant over the life of the project. So it can be done. It's one way to express numbers, and -- but you have to be very careful when you express it in that way over a long period of time.

In the course of Mr. Michel's testimony as set out above, he denied Mr. Brandsæter the opportunity to answer a question squarely within Mr. Brandsæter's expertise, resulting in another important evidentiary issue relating to the QRA remaining untested. At the same time, Mr. Michel testified using the plural "we" in relation to the QRA.<sup>435</sup> This testimony is problematic as it can be interpreted as suggesting that Mr. Michel was an author of and/or was qualified as an expert by the JRP to testify about the QRA, neither of which, in our submission, is true.

291. Finally, Mr. Michel and Mr. Cowdell again intervened in response to a question posed to Mr. Brandsæter about DNV's decision not to undertake sensitivity analyses with respect to various input parameters in the QRA. When BC Nature and Nature Canada directly asked Mr. Brandsæter whether there were "a lot of inputs here that could have been run through a sensitivity analysis,"<sup>436</sup> Mr. Cowdell interjected first to ask for clarification of the question,<sup>437</sup> and again to state that they had already answered the question.<sup>438</sup> Mr. Cowdell then stated his interpretation of the QRA and his opinion about the use of sensitivity analyses before inviting Mr. Michel (rather than Mr. Brandsæter) to add his thoughts on the matter.<sup>439</sup> Mr. Michel accepted this invitation, and in doing so testified to issues outside of his expert witness qualification:<sup>440</sup>

32319. **MR. KEITH MICHEL:** Only that it's less interesting to do sensitivity analysis when it proportionately changes the entire result. For instance, you know, we -- if the spill data is underreported by 25 percent it would have reduced, effectively, the return period by 25 percent. The fact that we were conservative because we used 1990 to 2006

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<sup>435</sup> *Id.*, at para. 32178

<sup>436</sup> *Id.*, at para. 32312

<sup>437</sup> *Id.*, at para. 32313

<sup>438</sup> *Id.*, at para. 32315

<sup>439</sup> *Id.*, at paras. 32317-32318

<sup>440</sup> *Id.*, at paras. 32319-32325 (emphasis added)

data were conservative by a factor of 300 percent, it would have changed the return period by a factor of three. It would have ---

32320. **MR. TOLLEFSON:** Right.

32321. **MR. KEITH MICHEL:** --- gone from 250 years to 750 years.

32322. **MR. TOLLEFSON:** So ---

32323. **MR. KEITH MICHEL:** And so you do sensitivity analysis to add value ---

32324. **MR. TOLLEFSON:** Right.

32325. **MR. KEITH MICHEL:** --- when there's uncertainty that might change your conclusions.

292. In addition it is important to point out that, in the previous two excerpts (*supra* paras 290-291, at transcript paras. 32178 & 32319-32325), Mr. Michel consistently employed the plural "we." This practice highlights two procedural problems about which the JRP should be concerned:

- firstly, Mr. Michel's use of the term "we" in relation to the QRA could be construed to suggest that he was a co-author of the document when this was not, in fact, the case; and,
- secondly, it is unclear whether and to what extent, by using the term "we," Mr. Michel is purporting to speak on behalf of Mr. Brandsæter and his co-author Peter Hoffman, and whether Mr. Brandsæter and Mr. Hoffmann in fact concur with the impermissible opinion evidence Mr. Michel has offered.

293. Finally, the JRP should be attentive and concerned about the practice of unqualified expert testimony being offered that seeks to bolster other unqualified expert opinion testimony. An example of this occurred when Mr. Cowdell stated, "[s]o there is a sensitivity analysis in the QRA as Mr. Michel there has said that is one way that you can look at uncertainty."<sup>441</sup> Here, Mr. Cowdell, who was unqualified to give expert opinion testimony on sensitivity analysis, was trying to bolster the testimony of Mr. Michel, who also was unqualified to give expert opinion testimony on sensitivity analysis.

*b) Mr. Michael Cowdell*

294. Like Mr. Michel, despite being neither sworn nor qualified before the JRP to do so, Mr. Cowdell testified to areas beyond his expert witness qualifications. These included testimony about sensitivity analyses,<sup>442</sup> and his interpretations and conclusions based on the Proponent's risk assessment, in particular the QRA.<sup>443</sup>

295. When BC Nature and Nature Canada asked Mr. Brandsæter for his "opinion about the sensitivity analysis,"<sup>444</sup> first Mr. Scalzo and then Mr. Cowdell intervened and sought to answer the question. Mr. Cowdell discussed sensitivity analysis at length before Mr. Brandsæter was finally able to provide his answer.<sup>445</sup>

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<sup>441</sup> *Id.*, at para. 31657 (emphasis added)

<sup>442</sup> *Id.*, at paras. 31657, 32266, 32317, 32386-32388, 32391-32392, & 32397

<sup>443</sup> *Id.*, at paras. 31557, 32269, 32315, & 32317

<sup>444</sup> *Id.*, at para. 32260

<sup>445</sup> *Id.*, at paras. 32266-32269

296. Following Mr. Brandsæter's answer, Mr. Cowdell proceeded to testify further to the issue of sensitivity analysis:<sup>446</sup>

32386. **MR. MICHAEL COWDELL:** Also, there is a reason sensitivity analyses are done each on their own because it doesn't make sense to combine one sensitivity analysis after another taking your worst case assumptions.

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

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

297. Additionally, Mr. Cowdell's testimony included conclusory statements upon which he explicitly urged the JRP to rely. BC Nature and Nature Canada submit that not only was it inappropriate for him to urge these conclusions on the JRP, but that these statements pertained to a subject matter that was entirely beyond his qualification as an expert witness:<sup>447</sup>

31557. And I'll let Mr. Brandsæter and Mr. Michel talk about this, but I don't want the Panel to be left with the impression that the QRA underestimates the incident or spill frequencies for the project traffic in the future.

This answer highlights Mr. Cowdell's lack of understanding as to the nature and role of expert witnesses; in particular, the requirement that they restrict their testimony to the scope of their qualifications and avoid the appearance of partisanship.

298. Mr. Cowdell made further conclusory statements about the QRA when he testified that "while the results may be sensitive to changes in scaling factors, I do not believe that the conclusions from the risk assessment are -- are sensitive to those changes."<sup>448</sup> He restated this opinion later:<sup>449</sup>

32317. **MR. MICHAEL COWDELL** ... we've talked about some of the conservatism in the QRA already, and the fact that we don't believe that the conclusions that we came to, based on the QRA, would change with the changes in the sensitivity analysis.

This example also highlights Mr. Cowdell's problematic use of the plural "we."

299. There are various other illustrations of Mr. Cowdell's failure to appreciate the limited scope of his expert witness qualification:<sup>450</sup>

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

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<sup>446</sup> *Id.*, at paras. 32386-32388 (emphasis added)

<sup>447</sup> *Id.*, at para. 31557 (emphasis added)

<sup>448</sup> *Id.*, at para. 32269

<sup>449</sup> *Id.*, at para. 32317 (emphasis added)

<sup>450</sup> *Id.*, at paras. 32035 & 32315

- 32315. **MR. MICHAEL COWDELL:** I think we already answered that question. We could have done a sensitivity analysis on a variety of factors. We picked the ones that we felt were of interest.

300. Moreover, the above excerpts (*supra* para. 299, at transcript paras. 32035 & 32315) highlight Mr. Cowdell’s use of the plural “we” in a manner similar to the examples discussed in relation to Mr. Michel (*supra* para. 292). This practice highlights three procedural problems about which the JRP should be concerned:

- firstly, Mr. Cowdell’s use of the term “we” in relation to the QRA could be construed to suggest that he was a co-author of the document when this was not, in fact, the case;
- secondly, it is unclear whether and to what extent, by using the term “we,” Mr. Cowdell is purporting to speak on behalf of Mr. Brandsæter and his QRA co-author Peter Hoffman, and whether Mr. Brandsæter and Mr. Hoffmann in fact concur with the impermissible opinion evidence Mr. Cowdell has offered; and,
- finally, Mr. Cowdell appears to be improperly testifying on behalf of multiple panel members and engaging in partisan argumentation with counsel by registering the objection that “we already answered that question.”<sup>451</sup>

*iv) The obligation of witnesses to answer questions*

301. The JRP has ruled that a witness has a duty to answer directly the questions posed to them before providing any additional information that may be helpful to the JRP.<sup>452</sup> Also, P.D. 9 sets out the instances and applicable procedures for when a witness wishes to object to a question:<sup>453</sup>

... you may feel that a question is irrelevant, has already been answered, or that you are being asked the same question repeatedly to attempt to get a different answer. If you want to object, you or your representative must let the Panel know of the objection and the reasons why, before you answer the question. The Panel will decide whether you have to answer the question.

302. While testifying about sensitivity analyses, an area in which they were neither sworn nor qualified to offer expert opinion evidence, Mr. Cowdell and Mr. Michel refused to answer a question from BC Nature and Nature Canada concerning the impact of an increased number of tanker calls to Kitimat each year. This refusal came despite the JRP giving permission to BC Nature and Nature Canada to pursue this line of questioning about sensitivity analysis so long as the questions were based on the existing application.<sup>454</sup>

303. Moreover, during this critical concluding portion of the cross-examination, Mr. Cowdell, Mr. Carruthers, and Mr. Michel repeatedly used the plural pronouns “we” and “us.” We excerpt the following passage at some length to highlight the failure of these witnesses: (1) to appreciate that as expert witnesses they are required to testify in a neutral, non-partisan,

<sup>451</sup> *Id.*, at para. 32315

<sup>452</sup> Transcript Vol. 138, Feb. 18, 2013, A3F4V0, at paras. 8324, 8484, & 8812-8815

<sup>453</sup> A225-3, *supra* note 393, at p. 6

<sup>454</sup> Transcript Vol 156, *supra* note 314, at para. 32468

and unbiased way; (2) to appreciate the requirement, subject to the provisions of P.D. 9 and pursuant to the JRP's ruling,<sup>455</sup> to answer questions posed to them; and (3) to restrict their testimony to the "four corners" of their expert qualification as sworn and qualified before the JRP:<sup>456</sup>

32467. **THE CHAIRPERSON:** Mr. Tollefson, it sounds like your question relates around the potential expansion of the sensitivity analysis and that's not required to go to any potential expansion situation in order to do that.

32468. So I would suggest that you frame your questions to this panel based on the existing application that's in front of the Panel.

32469. **MR. TOLLEFSON:** I do want to divorce these two things, keep them separate, so I'll simply ask the question.

32470. Assuming that there are 330 tanker visits annually to Kitimat Terminal could you please undertake to calculate for us what the impact of that would be on the return period for the routes described in Figure 7-4? That is my question.

32471. **MR. MICHAEL COWDELL:** Could you just perhaps explain to us so we understand what you're asking, where the number you just referenced comes from or what the basis of that number is?

32472. **MR. TOLLEFSON:** What I've tried to do is to come up with a number that represents a significant increase in traffic so as to revisit whether the impact that we have seen on the return period in Figure 7-4, whether that continues -- that decrease in the return period continues at the same or at a different rate.

32473. **MR. JOHN CARRUTHERS:** We're just having trouble determining where that scenario comes from. Can you point us to that please?

32474. **MR. TOLLEFSON:** I'm posing it as a thought experiment; let's try that number and see where it takes us.

32475. **MR. MICHAEL COWDELL:** But I think in the QRA we've just spent the afternoon talking about what we felt were the realistic sensitivity analysis to carry out on what we feel is a realistic forecast of tanker traffic coming to the Kitimat Terminal.

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

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

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

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

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

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<sup>455</sup> Transcript Vol. 138, *supra* note 452, at paras. 8324, 8484, & 8812-8815

<sup>456</sup> Transcript Vol 156, *supra* note 314, at paras. 32467-32489 (emphasis added)

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

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

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

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

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

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

--- (A short pause/Courte pause)

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

32488. Those are our questions.

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

304. Contrary to what transpired during the testimony set out above, witnesses are not entitled to decline to answer a question based on their perception of what is "reasonable." The JRP has issued rules within P.D. 9 that govern the answering of questions (*supra* para. 258). Under P.D. 9, "reasonableness" is not one of the enumerated grounds upon which a witness is entitled to object to a question. Moreover, in any event, witnesses are not entitled to decline to answer a question on their own volition or through their legal representative. Rather, the correct procedure, based upon P.D. 9, is to advise the JRP of the proposed objection, and allow the JRP to make a ruling on the objection after hearing from both sides.
305. BC Nature and Nature Canada submit that the witness testimony set out in the excerpt above is inconsistent with both the applicable common law principles of evidence, and with the JRP's own rules. As a result, not only were the cross examination rights of BC Nature and Nature Canada impeded contrary to the principles of natural justice, but the JRP was ultimately denied the benefit of relevant answers to a line of questioning it had explicitly allowed with regards to the sensitivity analysis of how the number of tanker calls can impact the conclusions of the QRA, an issue of key importance to this Application.
306. Also highlighted by the testimony set out above is a clear illustration of improper testimony on the part of Mr. Cowdell, Mr. Carruthers, and Mr. Michel as indicated by their repeated use of the plural "we" throughout the excerpt. Their testimony is inconsistent with the requirements set out above for expert witnesses to testify to their own personal opinion and experience. Moreover, in our submission, use of the pronoun "we" is inconsistent with the obligation of expert witnesses to testify in a neutral, unbiased, and non-partisan manner.

### E) Procedural Fairness Implications

307. As we have previously submitted in this written argument, issues surrounding the probability of spills are at the very centre of the Proponent's Application. Because of this, BC Nature and Nature Canada submit that the concerns outlined above regarding the cross-examination of the Shipping Panel must be squarely addressed by the JRP. We submit that during our cross-examination of this witness panel, extensive impermissible expert opinion evidence was offered and is now part of the record of this Hearing. Of equal concern is the corresponding deprivation of the intervenors' right to secure answers from Mr. Brandsæter for questions posed to him, the only witness sworn and qualified before the JRP to respond to questions regarding the QRA and risk assessment.
308. In recognition of the significance of these procedural deficiencies, BC Nature and Nature Canada filed a detailed 16-page motion within two weeks of the conclusion of our cross-examination, while the Shipping Panel was still sitting. The Motion suggested that these procedural deficiencies could be mitigated by extending the witness panel and allowing further questioning of Mr. Brandsæter by the intervenors. The Motion was dismissed. In the circumstances, we submit that the only way now for the JRP to respond to these procedural deficiencies is to conclude that the Application is incomplete.

### F) Procedural Deficiencies – Summary of Submissions

309. The purpose of this Hearing is to test the evidence through cross-examination of sworn and qualified experts who are presented by the Proponent to answer questions within their specific area of expertise.<sup>457</sup> However, because of extensive procedural deficiencies, the evidence in relation to the QRA and related issues of risk assessment has not been fully tested.
310. These procedural deficiencies include: (1) experts testifying beyond their expert witness qualifications; (2) witnesses intercepting questions posed to the only witness qualified to offer expert opinion evidence on the QRA and risk assessment; and (3) witnesses answering questions using the plural pronouns "we" and "us," and in a fashion that is inconsistent with the common law requirement that expert witnesses testify in a neutral, unbiased, and non-partisan manner.
311. At this Hearing, two expert witnesses repeatedly offered unqualified expert opinion evidence on matters clearly outside the expert witness qualifications for which they had been respectively sworn before the JRP. This included testifying to areas related to the methodology used in the QRA; the nature of the QRA; risk assessment and sensitivity analyses generally; spill probabilities; and interpretations and conclusions based on the

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<sup>457</sup> See e.g., Transcript Vol. 75, Sept. 18, 2012, A47571, at para. 21786; Transcript Vol. 83, Sept. 27, 2012, A47874, at para. 3304; Transcript Vol. 89, Oct. 13, 2012, A48404, at para. 9570; Transcript Vol. 101, *supra* note 40, at para. 25024; Transcript Vol. 104, Nov. 8, 2012, A49083, at para. 28922; Transcript Vol. 105, Nov. 9, 2012, A49126, at para. 32043; Transcript Vol. 144, Feb. 25, 2013, A50603, at para. 16697; Transcript Vol. 148, Mar. 1, 2013, A50682, at para. 20968; Transcript Vol. 153, Mar. 15, 2013, A50863, at para. 28535; Transcript Vol. 156, *supra* note 314, at para. 31565

Proponent's risk assessment, in particular the QRA. All of the above were areas exclusively within the unique expert witness qualification of Mr. Brandsæter.

312. On day two of BC Nature and Nature Canada's cross-examination of the Shipping Panel, many questions posed to Mr. Brandsæter relating to the QRA and risk assessment were intercepted by other witnesses. Frequently, the individuals who intercepted the questions were the same witnesses who then offered unqualified expert opinion testimony as set out in the preceding paragraph. As a consequence, the right of BC Nature and Nature Canada to test the evidence regarding the QRA and related issues through cross-examination of Mr. Brandsæter, the only witness qualified to offer expert opinion evidence in this area, was undermined; thereby depriving the JRP of critical information necessary to assess this Application.
313. During day two of BC Nature and Nature Canada's cross-examination of the Shipping Panel, witnesses also frequently answered questions using the plural pronouns "we" and "us." We submit that this practice raises several profound concerns for the JRP. Firstly, the use of the term "we" in relation to the QRA by individuals who were not co-authors of this key report creates confusion and uncertainty as to the nature and reliability of the opinions being offered in the testimony. Secondly, it is unclear whether and to what extent, by using the term "we," unqualified witnesses were purporting to speak on behalf of Mr. Brandsæter and his co-author Mr. Hoffman, and whether Mr. Brandsæter and Mr. Hoffmann in fact concurred with the impermissible opinion evidence given by these unqualified witnesses. Finally, we submit that this frequent use of the plural "we" or "us" gives rise to an unfortunate "us versus them" perception inconsistent with the time-honoured common law requirement that expert witnesses eschew advocacy on behalf of a party and strive to testify in a neutral, unbiased, and non-partisan manner.
314. In short, as a result of these procedural deficiencies, the JRP has been deprived of answers to key questions concerning spill probabilities, a central issue in this Application. Instead, BC Nature and Nature Canada respectfully submit that the evidentiary record before the JRP now contains extensive inadmissible opinion evidence from witnesses not properly qualified to offer testimony and who, particularly during day two of our cross examination, testified in a manner that could reasonably give rise to a perception of partisanship.
315. Therefore, the Proponent has failed to meet the burden of proof as set out in Part II of this written argument by failing to provide evidence sufficient to demonstrate the reliability of the conclusions set out in the QRA. The procedural deficiencies surrounding expert witness testimony in this Hearing effectively denied BC Nature and Nature Canada the opportunity to test the evidence regarding the QRA in a robust way through a thorough cross-examination of Mr. Brandsæter. Consequently, the Application as it stands is incomplete.
316. Had the JRP granted the Motion sought by BC Nature and Nature Canada to extend the Shipping Panel and allow for further questioning of Mr. Brandsæter, many of the procedural deficiencies set out herein that have undermined the testing of the evidence in this Hearing could potentially have been remedied or mitigated. At this juncture, however, BC Nature and Nature Canada respectfully submit that there is no other available means to

address these grave procedural deficiencies short of concluding that this Application is incomplete.

## **Part V – Conclusion**

317. Based on the foregoing substantive and procedural deficiencies elaborated on in this written submission, BC Nature and Nature Canada respectfully submit that the JRP must conclude that the Application is incomplete pursuant to the threshold requirement of s. 52(1) of the *NEB Act*, and therefore decline to forward a recommendation to the federal Minister of Natural Resources Canada. In the alternative, we submit that the JRP must recommend to the Minister of Natural Resources Canada that the Application be dismissed. We submit that these are the only courses of action open to the JRP. It follows, therefore, that we make no submissions as to potential conditions that the JRP might impose on the Project.

All respectfully submitted on May 31<sup>st</sup>, 2013



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Chris Tollefson  
Counsel for BC Nature/Nature Canada

Barrister & Solicitor  
Executive Director  
Environmental Law Centre  
University of Victoria  
Murray & Anne Fraser Building  
PO Box 2400 STN CSC  
Victoria, BC V8W 3H7  
Phone: 250.721.8188  
Email: elc@uvic.ca