

IN THE MATTER OF

NATIONAL ENERGY BOARD HEARING ORDER OH-001-2014

TRANS MOUNTAIN PIPELINE ULC

APPLICATION FOR THE TRANS MOUNTAIN EXPANSION PROJECT

File Of Fac Oil T260 2013 03 02

CITY OF VANCOUVER WRITTEN ARGUMENT

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I. INTRODUCTION

1. The City of Vancouver continues to have significant concerns about the gaps in Trans Mountain's application materials on critical issue of public health and safety, the inadequacy of Trans Mountain's emergency preparedness and response planning and the failure to properly assess the risks posed by an oil spill to the City of Vancouver and other communities situated on Burrard Inlet and the Lower Fraser River. The City of Vancouver's own assessment of these risks demonstrates that the Trans Mountain Expansion Project poses an unacceptable risk to Vancouver, its residents, businesses and the environment. The impacts of an oil spill would be devastating.
2. Further, Trans Mountain's evidence of the need for and economic benefits of the project is fundamentally flawed and overstates the benefits based on unreasonably optimistic projections of future market conditions for growth in the production of Alberta's bitumen failing, among other things, to account for global efforts to reduce carbon emissions and the introduction of policy and regulatory changes to limit the effects of climate change to 2°C or less.
3. In the event that the Board determines that it has sufficient information before it to complete the assessment that is mandated under the *Canadian Environmental Assessment Act, 2012*, consideration of the evidence must lead to the conclusion that significant adverse environmental effects are likely.
4. The Trans Mountain Expansion Project is not in the public interest and the City of Vancouver requests that the Board recommend that the project not be approved.

II. OVERVIEW OF THE CITY OF VANCOUVER

5. The City of Vancouver is internationally recognized for its extensive park lands and beaches, including Stanley Park which is a National Historic Site, most of which are

on the waterfront, and its Greenest City sustainability brand and liveability. Vancouver has 69.8 km of waterfront along Burrard Inlet, English Bay, False Creek and the Fraser River, with 18 km of beaches (ten ocean-side beaches in total) and a 22 km long seawall. There are 5.5 million visitors to Vancouver's seawall annually.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 8

6. Vancouver is one of the most densely populated cities in North America after New York City and San Francisco, with approximately 5,335 people per square kilometre. 25,000 Vancouver residents, occupying 16 million square feet of residential space, live within 300 metres of Burrard Inlet and English Bay shorelines. As of May 2015, there are 38,801 business licenses that have been issued by Vancouver to businesses located within 1,000 metres of Burrard Inlet. The daytime population for downtown Vancouver is estimated at 223,000.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 6

7. The Fraser River, which borders Vancouver to the south, is one of the largest rivers into the Pacific Ocean and one of the most ecologically important coastal marine habitats along the entire Pacific coast of North America. It is seasonally inhabited by over a million sea- and shorebirds, including more than 30% of the global population of snow geese.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 9; and

City of Vancouver Written Evidence - Appendix 3 - Jeffrey Short: Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#))

8. The Fraser River also supports significant economic activity and a number of large residential developments, including the 7.2 million square foot East Fraserlands development with an expected population of 12,500 people, elementary and high schools, four child care facilities, a community centre and nearly 25 acres of parks and open space.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 4 and 6

9. Trans Mountain Pipeline ULC (“**Trans Mountain**”) has applied for a Certificate of Public Convenience and Necessity to construct and operate an expanded pipeline, expanded oil storage facilities and an expanded marine terminal to export petroleum products extracted from the Alberta oil sands (the “**Project**” or the “**TMEP**”). The Project would increase pipeline transport capacity from about 47,700 cubic metres per day to 141,500 cubic metres per day (ie. 300,000 bbl day to 890,000 bbl day) with a corresponding seven-fold increase in tanker traffic in Burrard Inlet from five to as many as 34 vessels per month, assuming that Aframax class tankers are calling at the marine terminal.

10. The proposed pipeline would make over 700 water crossings in British Columbia, including over 80 within the Lower Fraser River Watershed.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 4

11. The risk of oil spills from the pipeline, storage facilities, marine terminal and tanker traffic raises concerns for Vancouver about both short-term and long-term impacts on Vancouver’s emergency response and other services, human health and environment, as well as the economic impacts on Vancouver, its local businesses and tourism. Vancouver has had very recent experience with an oil spill that, despite its small size, has resulted in significant impacts on Vancouver in terms of both time and resources required to respond to the oil and ongoing recovery efforts. It also provided a real-life example of the capacity limitations and emergency management gaps attributable to WCMRC and the Canadian Coast Guard, the two response agencies that Trans Mountain primarily relies on in its application to mitigate the effects of an oil spill.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 4

12. Throughout this hearing process, Vancouver has raised questions about the lack of emergency response planning and preparedness demonstrated in Trans Mountain’s application and the overly optimistic and largely unsubstantiated assessment of the mitigation measures available to Trans Mountain in the event of an oil spill. Many of

these questions have gone unanswered and the requested documentation has not been provided.

13. As the evidence presented by Vancouver makes clear, a larger oil spill in Burrard Inlet or along the Fraser River would have devastating consequences for Vancouver, its neighbouring communities and the environment. It is equally clear that mitigation of these effects is not possible and, for this reason alone, the Board should not recommend approval of the Project.

III. CHRONOLOGY OF THE HEARING PROCESS

14. On December 16, 2013, Trans Mountain Pipeline ULC, as a general partner of Trans Mountain Pipeline L.P. (together “Trans Mountain”), filed an application with the National Energy Board (the “NEB” or “Board”) pursuant to section 52 for a Certificate of Public Convenience and Necessity (the “Application”) in connection with the Trans Mountain Expansion Project (the “Trans Mountain Project”).

15. The Trans Mountain Project, if approved, would include:

- a. The construction of 987 kilometres of new pipeline and the reactivation of 192 kilometres of existing pipeline, with a combined capacity of 540,000 barrels of oil per day;
- b. The construction of twenty new storage tanks located at the Edmonton (5), Sumas (1) and Burnaby (14) Terminals;
- c. The construction of a new dock complex at the Westridge Marine Terminal (“WMT”), with a total of three Aframax-capable berths and a utility dock.

Trans Mountain Pipeline ULC - Application, Volume 1 ([A55987/A3S0Q7](#)), at
PDF pages 1-2 and 1-3

The new pipeline would run from Edmonton, Alberta to Burnaby, British Columbia, and has been designed to transport heavy crude oils extracted from the Alberta oil sands.

16. Currently, the number of oil tanker vessels loaded at the WMT is approximately five per month, with a total of approximately ten tanker trips per month through English Bay and Burrard Inlet to and from the WMT. The Trans Mountain Project would increase the number of oil tankers loaded at the WMT to thirty-five (35) per month, with a total of approximately seventy (70) tanker trips per month to and from the WMT.

Trans Mountain Pipeline ULC - Application, Volume 1, ([A55987/A3S0Q7](#)), at PDF page 1-47

17. The Board had, prior to the filing of the Application, posted on its website a list of issues to be considered during the hearing of the Application, as follows (the “List of Issues”):

1. The need for the proposed project.
2. The economic feasibility of the proposed project.
3. The potential commercial impacts of the proposed project.
4. The potential environmental and socio-economic effects of the proposed project, including any cumulative environmental effects that are likely to result from the project, including those required to be considered by the NEB’s *Filing Manual*.
5. The potential environmental and socio-economic effects of marine shipping activities that would result from the proposed project, including the potential effects of accidents or malfunctions that may occur.
6. The appropriateness of the general route and land requirements for the proposed project.
7. The suitability of the design of the proposed project.
8. The terms and conditions to be included in any approval the Board may issue.
9. Potential impacts of the project on Aboriginal interests.
10. Potential impacts of the project on landowners and land use.
11. Contingency planning for spills, accidents or malfunctions, during construction and operation of the project.

12. Safety and security during construction of the proposed project and operation of the project, including emergency response planning and third-party damage prevention.
18. The Board concluded the List of Issues by noting that it “does not intend to consider the environmental and socio-economic effects associated with upstream activities, the development of oil sands, or the downstream use of the oil transported by the pipeline.”
19. On December 18, 2013, Vancouver City Council passed a motion directing staff to apply for Intervenor status for the City of Vancouver in the National Energy Board hearings of the TMEP application and to advance the following points:
 1. The expansion of the pipeline through the Metro Vancouver region and associated increases in tanker traffic pose an unacceptable risk to the City of Vancouver, residents and businesses including, but not limited to, risks to Vancouver and the region’s vibrant economy, local environment and parks, infrastructure, financial and legal liability, public health, and our international brand as one of the world’s most liveable cities.
 2. The City of Vancouver does not agree with the NEB’s position that harms caused by the eventual combustion of the fossil fuels carried by the pipeline not be considered as part of the review of impacts on the public interest. Further that City of Vancouver views an increase in the extraction of fossil fuels intended for combustion, and the increase in greenhouse gases associated with this extraction and combustion, as posing a direct risk to the city as a result of sea level rise and extreme weather impacts associated with anthropogenic climate change.
 3. The City of Vancouver has grave concerns on the following points:
 - that no appropriate emergency response plan is in place from appropriate provincial and federal government agencies; in fact capacity has been reduced in recent years;
 - that the City of Vancouver, its residents and businesses are not indemnified against all financial loss associated with a spill from current or proposed shipments;
 - that full recovery funding is not guaranteed for all affected parties; and

- that Kinder Morgan and other responsible agencies have not invested in appropriate mitigation efforts to avoid a spill of current shipments.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 5

20. On February 10, 2014, the City of Vancouver (the “City”) filed an *Application to Participate* in the hearing of Trans Mountain’s Application before the NEB. In its *Application to Participate*, the City identified a number of direct impacts of the Trans Mountain Project, and expressly raised the issues of climate change and sustainability as follows:

- a. “Vancouver’s international reputation as one of the most liveable cities in the world and its leadership in sustainable development provides significant value to its economy, 94% of which is non-resource based. … The local economy depends on Vancouver’s reputation for sustainability to attract businesses, professionals and other workers and will be negatively impacted by the Project”; and
- b. “Vancouver has responsibility for planning and mitigating impacts of severe weather events and rising sea levels, including impacts on its infrastructure, and is collaborating with other levels of government to implement Vancouver’s Climate Change Adaptation Strategy. The Project, through its impact on global GHG emissions, will significantly increase the overall need for and costs of adaptation”.

City of Vancouver *Application to Participate* ([A57557](#)), 10 February 2014

21. The City’s *Application to Participate* also identified the City’s knowledge and expertise with respect to, among other things, identifying and assessing local conditions and risk factors and the adequacy of the Project design for climate adaptation “including projected local wave height and storm severity.”

22. By letter dated February 19, 2014, Trans Mountain filed a written submission to the Board on the Applications to Participate, proposing a restrictive approach to participation and inviting the Board to treat the List of Issues as closed.

Letter from S Energy Board *Submission Regarding Applications to Participate* ([A58948](#)),
19 February 2014

23. On March 4, 2014, the City filed a response to Trans Mountain's written submissions, requesting that the Board take a broader approach to participation and noting that the List of Issues included an expression of intention only and not a final decision with respect to the Board's consideration of upstream activities and downstream uses.

Letter from F. Connell, City of Vancouver, *Response to Trans Mountain Submission on . Denstedt, Osler, Hoskin & Harcourt LLP to National Applications to Participate* ([A3V0R9](#))

24. On April 2, 2014, the Board issued its *Completeness Determination and Hearing Order OH-001-2014*, along with its *Ruling on Participation* regarding the Application.

National Energy Board, *Completeness Determination* ([A59502](#)), 2 April 2014
National Energy Board, *Hearing Order OH-001-2014* ([A59503](#)), 2 April 2014
National Energy Board, *Ruling on Participation* ([A59504](#)), 2 April 2014

25. The *Hearing Order* includes, at Appendix I, the same list of twelve issues set out in the July 29, 2013 List of Issues and concludes with the statement that:

The Board does not intend to consider the environmental and socio-economic effects associated with upstream activities, the development of oil sands, or the downstream use of the oil transported by the pipeline.

26. The *Ruling on Participation* granted Intervenor status to 400 parties on the basis that they had demonstrated to the Board that they were either directly affected by the proposed project or are in possession of relevant information or expertise or, as is the case for the City of Vancouver, both.

27. In its *Ruling on Participation*, the Board confirmed that Intervenors would be given the opportunity to raise issues outside of the List of Issues if they could show that they had a specific and detailed interest that was "directly affected" by the granting or refusing to grant the Application.

National Energy Board, *Ruling on Participation* ([A3V6I5](#)), at PDF page 5

28. On April 14, 2014 Intervenor Robyn Allan filed a Notice of Motion requesting that the Board amend Hearing Order OH-001-2014 to include an oral cross-examination phase for the purpose of cross examining witnesses.

Robyn Allan, *Notice of Motion 1* ([A59669](#)), 14 April 2014

29. On April 17, 2014 Living Oceans Society and Raincoast Conservation Foundation filed a Notice of Motion seeking an extension of the deadline for Intervenor Round 1 information requests to Trans Mountain requesting that the Board seek approval to extend the statutory timeline pursuant to section 52(5) of the National Energy Board Act until such time as Trans Mountain filed and served final detailed Quantitative Human Health Risk Assessments. On April 18, 2014 Swinomish, Tulalip, Suquamish, Lummi Tribes filed a Notice of Motion seeking the same relief.

Living Oceans Society and Raincoast Conservation Foundation, *Notice of Motion* ([A59718](#)), 17 April 2014

Swinomish, Tulalip, Suquamish, Lummi Tribes, *Notice of Motion for Extension of Timelines* ([A59735](#)), 18 April 2014

30. On April 24, 2014 Vancouver filed a response in support of Robyn Allan's April 14th, 2014 Motion to include oral cross-examination of all witnesses on their evidence by Intervenors, the NEB, and Trans Mountain, if they choose do so.

City of Vancouver, *Response to Notice of Motion of Robyn Allan* ([A3W0R7](#)), 24 April 2014

31. On April 28, 2014 Vancouver filed a response in support of the Motions for time extensions in connection with the Quantitative Human Health Risk Assessments.

City of Vancouver, *Response to Notice of Motion to Extend Statutory Timeline* ([A3W2A6](#)), 28 April 2014

32. On May 2, 2014 the Board issued Ruling No. 12 denying the request that the Board seek the approval to extend the statutory timeline until Trans Mountain filed and served final detailed Quantitative Human Health Risk Assessments.

National Energy Board, *Ruling No. 12* ([A60025](#)), 5 May 2014

33. On May 7, 2014 the Board issued Ruling No. 14 dismissing Robyn Allan's April 24, 2014 Notice of Motion for oral cross-examination.

National Energy Board, *Ruling No.14* ([A60134](#)), 7 May 2014

34. On May 16, 2014 Vancouver filed a Motion to the Board to expand the List of Issues set out in Appendix A to the Hearing Order OH-001-2014 to include the environmental and socio-economic effects associated with upstream activities, including the development of oil sands crude, and the downstream use of the oil transported by the proposed pipeline.

City of Vancouver, *Notice of Motion* ([A60478](#)), 16 May 2014

35. On May 26, 2014 Trans Mountain filed a Response to Vancouver's Notice of Motion dated May 16, 2014.

Trans Mountain Pipeline ULC, *Letter to NEB re Response to City of Vancouver* ([A3X2Y1](#)), 26 May 2014

36. On June 23, 2014 Robyn Allan filed a Notice of Motion seeking an order from the Board that Trans Mountain:

a. remove from its Application and the NEB hearing record all evidence prepared by, conclusions drawn from, and responses related to Dr. HJ Ruitenbeek's materials, including but not limited to:

1. the entirety of Volume 7, Appendix G, Potential Cleanup and Damage Costs of a Hypothetical Oil Spill: Assessment of Trans Mountain Expansion Project, ([A3S4W8](#));
2. related Trans Mountain Pipeline ULC Responses to National Energy Board Information Request No.1 ([A60392](#));
3. related Trans Mountain Pipeline ULC Responses to Robyn Allan Information Request No.1 ([A3X5V9](#)); and

4. related Trans Mountain ULC Responses to any other Information Requests;
- b. withdraw from the hearing record Dagmar Etkin papers as submitted including Attachments 1.10 (d) ([A3W9I3](#)), 1.11 Attachment 1 ([A3W9I5](#)) and 1.11 Attachment 2 ([A3W9I6](#));
- c. file with the Board and serve all Intervenors with a clear summary outlining all information that has been withdrawn or removed from the hearing record; and
- d. undertake other relief the Board may decide is warranted under the circumstances.

Robyn Allan, *Notice of Motion 2* ([A61247](#)), 23 June 2014

37. On July 3, 2014 Vancouver filed a response in support of Robyn Allan's Notice of Motion dated June 23, 2014 seeking an order that the Board strike the report prepared by Dr. HJ Ruitenbeek (Application, Volume 7, Appendix G – [A3S4W8](#)) and all related evidence filed in connection with that report.

City of Vancouver, *Response in Support of Robyn Allan Notice of Motion* ([A3Y7X7](#)), 3 July 2015

38. On July 22, 2014 the Board issued Ruling No. 24 denying all of the orders sought in Robyn Allan's June 23, 2014 Notice of Motion.

National Energy Board, *Ruling No.24* ([A61908](#)), 22 July 2014

39. On July 23, 2014 the Board issued Ruling No. 25, dismissing the May 16th, 2014 Motion and stating “*The Board does not consider that there is a necessary connection between the Project and upstream production or downstream uses.*” However, the Board confirmed that it does consider as relevant, evidence of regulatory measures or market influences that may impact long-term supply, markets and economic feasibility outlooks.

National Energy Board, *Ruling No. 25* ([A3Z5I4](#)), 23 July 2014

40. On October 6, 2014 Vancouver applied, pursuant to section 21(1) of the NEB Act and s.44 of the National Energy Board Rules of Practice and Procedure, 1995 for an order:

- a. granting a review of the Board's decision in its letter dated October 2, 2014 to hear only from the City of Burnaby and any federal and provincial attorneys general in response to the Notice of Motion and Notice of Constitutional Question filed by Trans Mountain on September 26, 2014.
- b. varying or rescinding the October 2 Decision so that all Intervenors or, alternatively, all municipal Intervenors including the City of Vancouver are permitted to file a Response to the Trans Mountain September 26 Motions and to make submissions at the hearing on October 9, 2014.

City of Vancouver, *Notice of Motion to Review October 2 Decision* ([A4C8Y7](#)), 6 October 2014

41. On November 23, 2014, Robyn Allan filed a Notice of Motion requesting that the Board order that:

- a. Trans Mountain's application be stayed until the Board has determined, under section 74 of the National Energy Board Act, RSC 1985, c N-7 ("NEB Act") whether to grant leave for the transfer of ownership in Trans Mountain Pipeline LP, Trans Mountain Pipeline ULC, and Kinder Morgan Cochin ULC from Kinder Morgan Energy Partners LP to Kinder Morgan Inc.;
- b. section 52(5) of the NEB Act apply to exclude the time taken for the Board to consider the application for leave, and any additional applications triggered by it, from the calculation of the 15 month time limit;
- c. Trans Mountain's Hearing reconvene only if the Board determines that the change in ownership of Trans Mountain, and its related corporate entities, is in the public interest of Canadians and grants Trans Mountain leave to transfer the right of ownership in the Canadian pipeline transportation system from Kinder Morgan Energy Partners LP to Kinder Morgan Inc.;

- d. the cessation of any and all physical work and related activity on the Trans Mountain pipeline expansion route being undertaken by Kinder Morgan Canada Inc. (KMC) on behalf of Trans Mountain Pipeline ULC, until the requisite application for leave has been considered by the NEB. KMC's work only be continued if the Board determines it is in the public interest to grant leave; and
- e. other relief the Board may find appropriate under the circumstances.

Robyn Allan, *Notice of Motion 6* ([A64526](#)), 23 November 2014

42. On December 2, 2014, Vancouver filed a Response in support of the Notice of Motion by Robyn Allan dated November 23, 2014 seeking an order that the Board stay Trans Mountain's Application until the Board has determined whether to grant leave for the transfer of ownership in Trans Mountain and related entities from Kinder Morgan Energy Partners LP to Kinder Morgan Inc. pursuant to sections 74 and 52(5) of the National Energy Board Act, RSC 1985, c N-7.

City of Vancouver, *Response to Notice of Motion by Robyn Allan* ([A4F6G2](#)), 2 December 2014

43. On December 5, 2014, the Province of British Columbia filed a Notice of Motion seeking:

- a. an order that, by a fixed date, Trans Mountain file the information, identified herein, that was redacted from the Emergency Management Program documents filed on October 17, 2014;
- b. an order that Trans Mountain file the Oil Spill Response Plan of Western Canada Marine Response Corporation, by a fixed date;
- c. an order that, by a fixed date, Trans Mountain file responses to the outstanding items in Information Request No.1 of the Province of British Columbia, as committed to in its response to the Notice of Motion of the Province of British Columbia dated July 4, 2014;

- d. an extension of the deadline for filing Intervenor Round 2 Information Requests to Trans Mountain; and
- e. such other relief as the Board may consider appropriate in the circumstances.

Province of BC, *Notice of Motion #2* ([A64829](#)), 5 December 2014

44. On December 10, 2014 Robyn Allan filed a Notice of Motion 7 requesting that the National Energy Board order:

- a. Kinder Morgan Canada Inc., on behalf of Trans Mountain Pipeline ULC, cease operation of the Trans Mountain Pipeline system immediately, pending compliance with the NEB Act;
- b. Kinder Morgan Canada Inc., on behalf of Trans Mountain Pipeline ULC seek approval from the NEB, and subsequently the Government of Canada if NEB approval is granted, to transfer the Certificates' of Public Convenience and Necessity (CPCNs) from Trans Mountain Pipeline Inc. to Trans Mountain Pipeline ULC, as it should have done in February 2008 and as is required by the NEB Act;
- c. the Application be stayed until Trans Mountain has obtained the requisite approvals as required under section 21(2) and section 21.1 of the NEB Act which would permit the transfer of certificates and allow Trans Mountain Pipeline ULC—and by extension Kinder Morgan Canada Inc.—to operate the Trans Mountain pipeline system;
- d. by a fixed date, Trans Mountain file Authorizing Orders granted in 2007 to transfer the certificates from Terasen Inc. to Trans Mountain Pipeline Inc. as Trans Mountain committed to do in its response to NEB IR No. 2.001 dated July 21, 2014 and that were not included in its Follow-Up Response to NEB IR No. 2.001 dated September 4, 2014;

- e. Trans Mountain file on the Hearing record Authorizing Orders relevant to the order requested in (b) above if approval for the Amending Order is so granted by the NEB and the Government of Canada through Order in Council;
- f. section 52(5) of the NEB Act apply to exclude the time taken for (b), (d) and (e) above from the calculation of the 15 month time limit; and
- g. other relief the Board may find appropriate under the circumstances.

Robyn Allan, *Notice of Motion 7: Trans Mountain Section 21 Violation* ([A64903](#)), 10 December 2014

45. On December 11, 2014, Vancouver filed a Response in support of the Province of British Columbia's motion on the Emergency Management Program documents and Oil Spill Response Plan.

City of Vancouver, *Response to Notice of Motion by Province of British Columbia* ([A4F9I2](#)), 11 December 2014

46. On December 19, 2014 the Board issued Ruling No. 48 dismissing Robyn Allan's November 23, 2014 Notice of Motion 6 and Notice of Motion 7.

National Energy Board, *Ruling No.48* ([A65170](#)), 19 December 2014

47. On January 1, 2015 Robyn Allan filed Notice of Motion 8 requesting that the Board order Trans Mountain Pipeline ULC to:

- a. correct and refile Exhibit B-120-2;
- b. correct and refile Exhibit B-40-1 IR 1.19 (n) through (u);
- c. correct and refile Exhibit B-239-13 IR 2.001 (b);
- d. correct and refile Exhibit B-259-33 to 34;
- e. correct and refile Exhibit B-280-2;
- f. file AO-1-OC-49 as promised August 2014;

- g. confirm whether the Minister of Aboriginal and Northern Affairs has granted indentures allowing the operation of the Trans Mountain pipeline system through First Nations reserve lands, and if so, file the documents granting the indenture(s), including an identification of which corporate entity holds the indenture(s);
- h. serve all parties who wish to be served at this Hearing with notification of the fillings in (a) through (g) above such that the information can be considered by the Board and Intervenors at this Hearing as accurate and reliable;
- i. undertake and file the corrections and missing documentation by January 31, 2015 to ensure all Intervenors have an opportunity to review and prepare Information Requests related to the corrected information and that the deadline for such information requests regarding the corrected and refiled evidence form part of the February 18, 2015 deadline currently provided for in Procedural Direction #8 for the TERMPOL Report; and
- j. other relief the Board deems necessary under the circumstances.

Robyn Allan, *Motion 8 Trans Mountain to Correct Errors and Omissions* ([A65277](#)), 5 January 2015

48. On January 15, 2015 the Board issued Ruling No. 50 dismissing the Province of BC's December 5, 2014 Motion.

National Energy Board, *Ruling No.50* ([A65390](#)), 15 January 2015

49. On February 11, 2015 the National Energy Board filed Ruling No. 52 dismissing Robyn Allan's Notice of Motion and associated requests from her January 5, 2015 Motion.

National Energy Board, *Ruling No.52* ([A66042](#)), 11 February 2015

50. On February 12, 2015 Robyn Allan filed Notice of Motion 10 seeking an order that:

- a. The Application giving rise to Hearing OH-001-2014 currently before the Board be dismissed as:
 1. there is no “company” that holds Certificate of Public Convenience and Necessity AO-2-OC-2 or AO-1-OC-49, which Kinder Morgan Canada Inc. has recently confirmed to the Board require amendments as part of the relief being sought;
 2. no “company” exists as defined and authorized by the National Energy Board Act that can support the Application. As such there is no corporate entity properly before the Board for the Board to consider the relief being requested;
 3. there is no “company” duly incorporated as per the National Energy Board Act to receive the relief requested should the Board recommend to the Government of Canada that it be granted;
 4. continuation of Hearing OH-001-2014 when it is apparent that the entity advancing the application and requesting relief from the Board is without statutory authority places all parties to this Hearing in a compromised position; and
- b. Other relief the Board may consider appropriate under the circumstances.

Robyn Allan, *Notice of Motion 10 to Dismiss* ([A66064](#)), 12 February 2015

51. On February 27, 2015 Trans Mountain filed a Notice of Motion to seek leave of the Board and file certain outstanding filings.

Trans Mountain Pipeline ULC, *Notice of Motion regarding Outstanding Filings Part 1 of 3* ([A67182](#)), 27 February 2015

Trans Mountain Pipeline ULC, *Notice of Motion regarding Outstanding Filings*
Part 2 of 3 ([A67192](#)), 27 February 2015

Trans Mountain Pipeline ULC, *Notice of Motion regarding Outstanding Filings*
Part 3 of 3 ([A67196](#)), 27 February 2015

52. On March 9, 2015, Vancouver filed a Response opposing Trans Mountain's Notice of Motion dated February 27, 2015 for leave to file three outstanding volumes of new evidence in the absence of an extension of the hearing timelines to allow for sufficient time to assess the new evidence.

City of Vancouver, *Response to Notice of Motion by Trans Mountain* ([A4J3E5](#)), 9 March 2015

53. On March 13, 2015 the Board issued Ruling No.56 granting Trans Mountain's Motion to file the Outstanding Filings and added a further round of Information Requests with a very short timeline.

National Energy Board, *Ruling No. 56* ([A68732](#)), 13 March 2015

54. On March 30, 2015 the National Energy Board filed Ruling No. 57 in response to Robyn Allan's February 12, 2015 Notice of Motion 10, where they stated they were not convinced that the relief sought to dismiss the hearing outright "*follows the alleged non-compliance, or that it is otherwise appropriate for the Board Panel to consider the substantive issue raised at this time*". The Board concludes with the Motion's dismissal is without prejudice to the right to bring the substantive issue back before the Board for consideration at the time of final argument.

National Energy Board, *Ruling No.57* ([A4K0T3](#)), 30 March 2015 at
PDF page 3

55. Intervenors, including the City of Vancouver, filed Written Evidence on May 27, 2015. The City's Written Evidence included extensive evidence prepared by independent experts as follows:

- Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and The Fraser River Estuary ([A4L7W1](#))

- Harrison, Kathryn "Review of Destination Country Policies with Potential Impact Demand for Canadian Oil Exports" ([A4L7W8](#))
- Jaccard, Mark, "Impact of National and Global GHG Targets on the Trans Mountain Project" ([A4L7X1](#))
- Kheraj, Sean, "Historical background Report: Trans Mountain Pipeline, 1947-2013" ([A4L7X6](#))
- Etkin, David, Low Probability High Consequence Events and the Risk of Oil Spills: An Evaluation of the Trans Mountain-Det Norske Veritas Risk Analysis ([A4L7Y0](#))
- Genwest Systems Inc., Oil Spill Trajectory Modeling Report in Burrard Inlet for the Trans Mountain Expansion Project ([A4L7L5](#))
- NUKA Research and Planning Group, LLC, "Technical Analysis of Oil Spill Response Capabilities and Limitations for Trans Mountain Expansion Project" ([A4L9F1](#))
- NUKA Research and Planning Group, LLC, "Oil Spill Debrief and Scenario Planning Workshop Summary" ([A4L8E8](#))
- Recovery and Relief Services Inc., "Local Government Impacts of Oils Spills – A study of potential costs for the City of Vancouver" ([A4L8E9](#))
- Sumaila R., Hotte N., and Bjarnason H., "Potential economic impacts of a tanker spill on ocean-dependent activities in Vancouver British Columbia" ([A4L9G4](#))
- Written Evidence of Edgar Baum, Brand Finance (Canada) Inc ([A4L8F0](#))
- Written Evidence of Rob Dudgeon ([A4L9F6](#))
- MacWilliam, Karen "Alternate Risk Financing Mechanisms – Trans Mountain Pipeline Application" ([A4L9H1](#))

56. Trans Mountain, the Board and other Intervenors were given the opportunity to deliver Information requests in respect of the City's Written Evidence. None of the expert evidence filed by the City was questioned by Trans Mountain.

57. On August 20, 2015, Trans Mountain filed its Written Argument together with 4,000 pages of new evidence submitted as evidence in reply. The following day, August 21, 2015, the Board issued a letter advising that it had struck the evidence of Steven J. Kelly from the record and providing for submissions to be made regarding the replacement of this evidence and the resulting changes that should be made to the hearing steps and timelines.

Trans Mountain Pipeline ULC, *Final Argument* ([A72236](#)), 20 August 2015;
National Energy Board, *Letter – Striking of Evidence Prepared by or under the direction of Mr. Steven J. Kelly* ([A4S8Y8](#)), 21 August 2015

58. On August 28, 2015 Trans Mountain responded to the Board confirming that it would replace the stricken evidence and that Muse Stancil would be preparing a "brief expert report" to address the issues and that this report would be filed with the Board on September 25, 2015.

Trans Mountain Pipeline ULC, *Response to National Energy Board Letter 21August 2015* ([A4S9W3](#))

59. On September 4, 2015, the City of Vancouver filed a motion seeking an order for oral cross-examination of Trans Mountain's expert evidence and for an order allowing the City to file evidence in sur-reply to the extensive volume of new evidence filed by Trans Mountain in reply.

City of Vancouver – *Notice of Motion* ([A4T1Q7](#)), 4 September 2015

60. On September 24, 2015, the Board issued Procedural Direction No. 18, which allowed Trans Mountain to file replacement evidence on or before September 25, 2015, and which provided one additional round of Information Requests in connection with this replacement evidence together with the opportunity for Intervenors to file new evidence in response.

National Energy Board, *Procedural Directive No. 18* ([A4T5R5](#)), 24 September 2015

61. On September 24, 2015 in Ruling 92 the NEB implemented a second excluded period under section 52(5) of the NEB Act from September 17, 2015 to January 8, 2016, to allow time for Trans Mountain to replace the Stricken Evidence and for intervenors to file evidence in response to Trans Mountain's evidence.

National Energy Board – *Ruling No. 92* ([A4T5R2](#)) 24 September 2015

62. On September 25, 2015, Trans Mountain filed the Muse Stancil Report "Market Prospects and Benefits Analysis of the Trans Mountain Expansion Project for Trans Mountain Pipeline (ULC)" together with amended reports from the Canada Conference Board and the evidence of Mr. Reid.

Trans Mountain Pipeline ULC, *Evidence to Replace the Direct Evidence Prepared by Mr. Steven Kelly for the Project* ([A72774](#)), 25 September 2015

63. On October 8, 2015 in Ruling 96 the NEB ruled on notices of motion raised by a number of Intervenors (Metro Vancouver, Upper Nicola, Tsawout and Tsleil-Wauthuth Nation) including the City of Vancouver regarding the reply evidence filed by Trans Mountain on August 20, 2015. The NEB dismissed the City's notice of motion and, instead, amended the hearing schedule to allow for one limited round of information requests (IRs) on Trans Mountain's reply evidence. None of the relief sought by the City of Vancouver was granted.

National Energy Board, *Ruling No. 96* ([A4U2A4](#)), 8 October 2015

64. On December 1, 2015, the City of Vancouver filed supplementary Written Evidence, included a report from Kathryn Harrison (November 2015) in response to the Muse Stancil Report.

City of Vancouver, *Supplemental Written Evidence* ([A74402](#) / [A74406](#)),
1 December 2015

Harrison, Kathryn "Review of 'Market Prospects and Benefits Analysis of the Trans Mountain Expansion Project for Trans Mountain Pipeline (ULC)'" ([A4W0J5](#))

65. On December 2, 2015 the City filed a request to file an amended report from Nuka Research and Planning Group LLC (Nuka) that corrected a typographical error, which request was granted by the Board on December 10, 2015.

City of Vancouver – Request to file revised evidence – Appendix 68 to written evidence of the City of Vancouver ([A4W1L3](#)) 1 December 2015

National Energy Board – Letter – Request to File Revised Reply Evidence – Attachment 1.10 to Written Evidence of Trans Mountain ([A4W4H5](#)) 10 December 2015

66. On December 15, 2015 Trans Mountain Pipeline ULC filed its revised final argument.

Trans Mountain Pipeline ULC, Final Argument of Trans Mountain ([A4W6L8](#)), 15 December 2015

67. On December 17, 2015 Trans Mountain Pipeline ULC presented its oral summary.

National Energy Board – Trans Mountain Pipeline ULC/Trans Mountain Expansion Project: Volume 25 ([A4X0Z5](#)), 17 December 2015

The Information Request Process was wholly inadequate

68. There were two rounds of Information Requests where the City had the opportunity to ask Trans Mountain questions on their entire application. There were also four additional opportunities to ask questions related to specific documents that were submitted after the application. The first was related to the TERMPOL report, the second related to Geotechnical reports, the third related to Trans Mountain's Reply Evidence and the fourth related to the Muse Stancil Report.

69. Due to the constraints of the Information Request process and the inability to ask follow-up question, hundreds of the City's questions remained unanswered. The City of Vancouver submitted motions to the NEB to compel Trans Mountain to answer a total of 423 questions. The Board compelled Trans Mountain to answer only 14 of the 423 questions. The City's motions on the other 409 questions were denied. Additional details of the IR process are set out below.

70. On May 12, 2014 the City of Vancouver filed its first round of Information Requests to Trans Mountain.

City of Vancouver, *Information Request No.1 to Trans Mountain* ([A60323](#)), 12 May 2014

71. On June 18, 2014 Trans Mountain filed their Responses to City of Vancouver's Information Request.

Trans Mountain Pipeline ULC, *Response to Information Requests from City of Vancouver Round 1 Part 2* ([A61124](#)), 18 June 2014

72. On July 4, 2014 Vancouver submitted a Notice of Motion requesting an order to compel Trans Mountain to answer 145 of the 394 questions asked by the City, together with:

- a. An order that the time required for Trans Mountain to provide the requisite information is not counted in the calculation of the time limit for the issuance of the National Energy Board Report for the Trans Mountain Application, pursuant to ss. 52(4) and 52(5) of the *National Energy Board Act*;
- b. An order that the Hearing Order OH-001-2014 be amended to set new and reasonable deadlines for the submission of Intervenors' written evidence, and oral argument, consistent with the fixed dates ordered in (a) above; and
- c. Such other relief as the Board may consider appropriate in the circumstances.

City of Vancouver, *Notice of Motion to Compel Full and Adequate IR Responses* ([A3Y8Q1](#)), 4 July 2014

73. On September 8, 2014 Trans Mountain filed additional information from Transport Canada, the Pacific Pilotage Association, and Canadian Coast Guard as requested in City of Vancouver's Information Request No. 1. Subsequently, on October 30, 2014, Trans Mountain filed some limited information from WCMRC.

Trans Mountain Pipeline ULC, *Follow-up Information from Transport Canada* ([A62675](#)), 8 September 2014

Trans Mountain Pipeline ULC, *Follow-up Information from the Pacific Pilotage Association* ([A62676](#)), 8 September 2014

Trans Mountain Pipeline ULC, *Follow-up Information from Canadian Coast Guard* ([A62678](#)), 8 September 2014

Trans Mountain Pipeline ULC - *Follow-Up Information from Western Canada Marine Response Corporation* ([A64054](#)), 30 October 2014

74. On September 26, 2014 the Board issued Ruling No. 33 on Motions to compel full and adequate responses to the first round of Intervenor information requests. With respect to the City of Vancouver's motion to compel, the Board ordered Trans Mountain to provide answers to only 3 of the outstanding requests.

National Energy Board, *Ruling No. 33* ([A63066](#)), 26 September 2014

75. On January 16, 2015 Vancouver submitted its second round of Information Requests to Trans Mountain with an additional 597 questions.

City of Vancouver, *Information Request No. 2 to Trans Mountain* ([A65435](#)), 16 January 2015

76. On February 18, 2015 Vancouver submitted its Information Request on the TERMPOL Report to Trans Mountain.

City of Vancouver, *Information Request No. 3 to Trans Mountain (TERMPOL)* ([A66289](#)), 18 February 2015

77. On February 18, 2015 Trans Mountain responded to Vancouver's Information Request No. 2, failing to adequately respond to a substantial number of questions.

Trans Mountain Pipeline ULC, *Responses to Intervenor Information Request No.2 – Part 2 of 6* ([A66278](#)), 18 February 2015

Trans Mountain Pipeline ULC, *Responses to Intervenor Information Request No.2 – Part 3 of 6* ([A66280](#)), 18 February 2015

78. On February 26, 2015 Vancouver filed a Notice of Motion requesting an order that Trans Mountain provide full and adequate responses to 117 of the City of Vancouver's Information Request No. 2 together with;

- a. An order that the time required for Trans Mountain to provide the requested information is not counted in the calculation of the time limit for the issuance of the National Energy Board Report for the Trans Mountain Application pursuant to ss. 52(4) and 52(5) of the *National Energy Board Act*;
- b. An order that the Hearing Order OH-001-2014 be amended to set new and reasonable deadlines for the submission of Intervenors' written evidence, and oral argument, consistent with the fixed dates ordered in (a) above; and
- c. Such other relief as the Board may consider appropriate in the circumstances.

City of Vancouver, *Notice of Motion to Compel Full and Adequate Responses to IR No. 2* ([A66992](#)), 26 February 2015

79. On March 17, 2015 Trans Mountain responded to Vancouver's TERMPOL Information Requests.

Trans Mountain Pipeline ULC, TERMPOL IR Response ([A68933](#)), 17 March 2015

80. On March 24, 2015 Vancouver filed a Notice of Motion requesting an order that Trans Mountain provide the outstanding information requested in 36 of the 165 questions in the City of Vancouver's TERMPOL Information Requests.

City of Vancouver, *Notice of Motion to Compel Full and Adequate Responses to IR No. 3 (TERMPOL)* ([A69118](#)), 24 March 2015

81. On April 7, 2015 Vancouver filed Information Request No. 2(c) to Trans Mountain regarding the new Geotechnical evidence filed by Trans Mountain.

City of Vancouver, Information Request No. 2(c) ([A69407](#)), 7 April 2015

82. On April 17, 2015 Trans Mountain filed responses Vancouver's Information Request round 2(c).

Trans Mountain Pipeline ULC, *Responses to Intervenor Information Request 2C* ([A69477](#)), 13 April 2015

83. On April 17, 2015 Vancouver filed a Notice of Motion requesting an order that Trans Mountain provide the outstanding information requested in 17 of the 96 questions in the City of Vancouver's Information Request No. 2(c).

City of Vancouver, *Notice of Motion to Compel Full and Adequate Responses to IR No.2(c)* ([A69555](#)), 17 April 2015

84. On April 27, 2015 the Board issued Ruling No. 63 on Vancouver's Motion to compel full and adequate responses to Information Request No. 2, ordering Trans Mountain to answer only 8 of the 117 questions that were the subject of Vancouver's motion.

National Energy Board, *Ruling No.63* ([A69687](#)), 27 April 2015

85. On May 1, 2015 the Board issued Ruling No. 67 on Vancouver's Motion to compel full and adequate responses to Intervenor information requests on the TERMPOL report. The Board did not require Trans Mountain to provide the outstanding information requested in any of the 36 questions identified by the City of Vancouver in its motion to compel.

National Energy Board, *Ruling No.67* ([A69796](#)), 1 May 2015

86. On May 8, 2015 the Board issued Ruling No. 69 on Vancouver's Motion to compel full and adequate responses to Intervenor round 2(c) information requests, ordering Trans Mountain to provide the outstanding information requested in only 1 of the 17 questions identified by the City of Vancouver in its motion to compel.

National Energy Board, *Ruling No.69* ([A69925](#)), 8 May 2015

87. On September 25, 2015, Trans Mountain filed the Muse Stancil Report "Market Prospects and Benefits Analysis of the Trans Mountain Expansion Project for Trans Mountain Pipeline (ULC)" together with amended reports from the Canada Conference Board and the evidence of Mr. Reid.

Trans Mountain Pipeline ULC, *Evidence to Replace the Direct Evidence Prepared by Mr. Steven Kelly for the Project* ([A72774](#)), 25 September 2015

88. On October 20, 2015 the City of Vancouver filed 145 information requests about the Muse Stancil Report and related replacement evidence.

City of Vancouver – *Information Request No. 4 Trans Mountain New Evidence*
[\(A4U4Z2\)](#), 20 October 2015

89. On October 29, 2015 the City of Vancouver filed a notice of motion to compel adequate responses to its Information Requests from Trans Mountain Pipeline ULC.

City of Vancouver – *Notice of Motion* ([A4U8R3](#)), 29 October 2015

90. On November 17, 2015 the NEB in Ruling No. 99 ruled that Trans Mountain was required to answer only three of the 29 Information Requests that City of Vancouver sought from Trans Mountain.

National Energy Board – *Ruling No. 99* ([A4V5K8](#) / [A4V5L0](#)), 17 November 2015

IV. NEED FOR THE TMEP and THE PUBLIC INTEREST ASSESSMENT UNDER SECTION 52 OF THE NEB ACT

A. LEGAL FRAMEWORK FOR ANALYSIS

91. The Trans Mountain Project is subject to the requirements of the *National Energy Board Act* (the *NEB Act*) and, as such, the Board is the responsible authority for both the section 52 Application for a Certificate of Public Convenience and Necessity and the environmental assessment of the Trans Mountain Project in accordance with the provisions of the *Canadian Environmental Assessment Act 2012 (CEAA)*.

Canadian Environmental Assessment Act 2012 (S.C. 2012, c.19 s.52), section 15(b)

92. Pursuant to section 52(1) of the NEB Act, the Board, prepare a report to the Minister regarding TMEP which includes the Board's recommendation as to whether or not the Minister should issue a certificate of public convenience and necessity for the Project, taking into account "whether the pipeline is and will be required by the present and future public convenience and necessity."

National Energy Board Act (R.S.C., 1985, c. N-7), s. 52(1)

93. In making its recommendation, the Board may have regard to the following factors:

- a. the availability of oil, gas or any other commodity to the pipeline;
- b. the existence of markets, actual or potential;
- c. the economic feasibility of the pipeline;
- d. the financial responsibility and financial structure of the applicant, the methods of financing the pipeline and the extent to which Canadians will have an opportunity of participating in the financing, engineering and construction of the pipeline; and
- e. any public interest that in the Board's opinion may be affected by the granting or the refusing of the application.

National Energy Board Act (R.S.C., 1985, c. N-7), s. 52(2)

94. The Board defines the public interest as follows:

“The public interest is inclusive of all Canadians and refers to a balance of economic environmental and social interests that change as society’s values and preferences evolve over time. As a regulator, the Board must estimate the overall public good a project may create and its potential negative aspects, weigh its various impacts and make a decision.”

National Energy Board, *Reasons for Decision: Emera Brunswick Pipeline Company Ltd., GH-1 -2006* (May 2007), ([A0Z1F4](#)) Ch. 8 at page 84 ("Emera")

95. This approach is consistent with prior decisions of the Board and with Federal Court of Appeal decisions that have considered the Board's obligation to make a public interest determination based on all classes and categories of interests. The Board must identify and weigh all relevant evidence on the record and come to a determination, whether, overall, the project is in the public interest and whether the project meets the test

for present and future public convenience and necessity. This requires that the Board balance both the benefits and burdens of the TMEP before coming to a final determination.

Emera, at p. 94

96. The Board adopted the following definition of the public interest in its Reasons for Decision in Sumas Energy 2, Inc. EH-1-2000:

“[I]n order to establish whether the project is in the public interest, the Panel must understand its potential economic, social, and other benefits and then determine whether these balance or outweigh the project's costs and negative impacts on the environment, public health, and safety and other social and economic matters.”

Sumas Energy 2, Inc. EH-1-2000, Reasons for Decision (March 2004) [A0J8V7](#) (“*Sumas Decision*”) at PDF page 10

97. The balancing of project benefits and impacts was also discussed by the Federal Court of Appeal in *Nakina (Township) v. Canadian National Railway Co.*, concluding that it would be an error in law for the administrative body to exclude from consideration any class or category of interest forming part of the totality of the general public interest.

Nakina (Township) v. Canadian National Railway Co. (1986), 69 N.R. 124 (F.C.A.) (“*Nakina*”)

98. The City of Vancouver submits that the TMEP is not in the overall Canadian public interest even when focussing solely on the economic factors as identified in the first four issues in the Board’s list of Issues: (1) the need for the proposed project; (2) the economic feasibility of the proposed project; and (3) the potential commercial impacts of the proposed project; and (4) the potential socio-economic effects of the proposed project.

B. DISCUSSION OF EVIDENCE AND ANALYSIS

i. *The Muse Stancil Report is fundamentally flawed*

99. On September 25, 2015, Trans Mountain filed a report prepared by Muse Stancil entitled, “Market Prospects and Benefits Analysis of the Trans Mountain Expansion Project for Trans Mountain Pipeline (ULC)” (the “**Muse Stancil Report**”) which

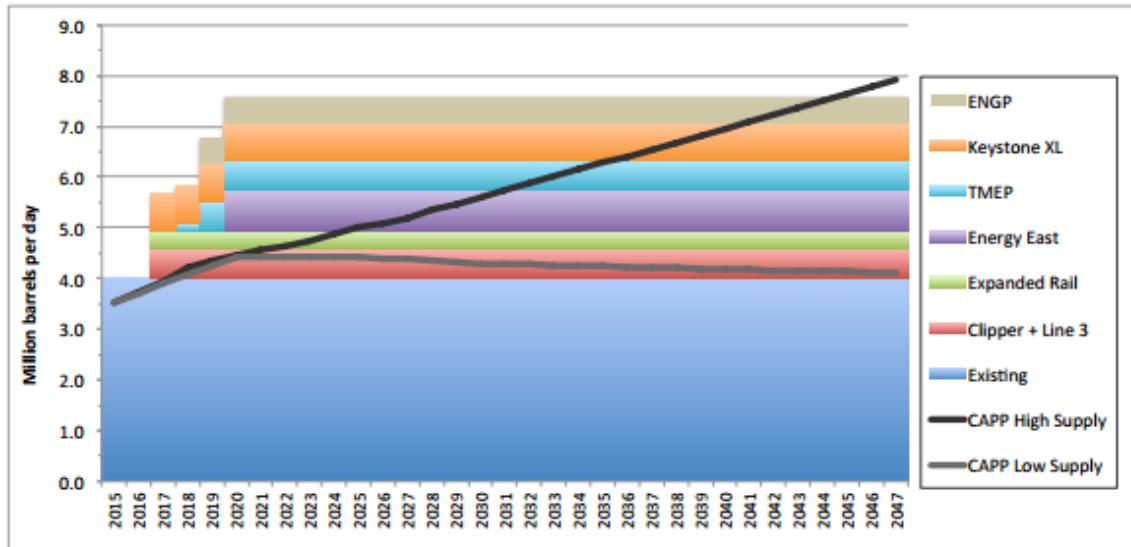
replaced the expert evidence of Mr. Kelly that previously formed the basis of Trans Mountain's justification for the TMEP.¹

100. The Muse Stancil Report concludes that over a 20-year period the Trans Mountain Expansion Project (TMEP) "will be highly utilized" and "provide significant benefits for Western Canadian crude oil producers, by providing access to the markets in the Pacific Basin," and thus higher prices for Canadian oil. Muse Stancil arrives at this conclusion using a proprietary model that inputs assumptions concerning oil supply, overseas crude oil demand, and transportation capacity, directs the flow of oil to export terminals and refineries to maximize the prices received, and outputs crude oil flows and prices.

101. It is worth noting at the outset that the Muse Stancil Report relies on the overly optimistic CAPP 2015 high growth forecast in its market analysis. The Muse Stancil Report fails to consider, or even acknowledge, that CAPP also provided a low growth forecast in its 2015 report due to the high degree of uncertainty in oil markets. The difference between CAPP's high and low growth forecasts is significant, amounting to over 1 million fewer barrels per day by 2030, as illustrated below.

¹ Muse Stancil Report, Exhibit No. B427-2, Filing ID [A4T6E8](#).

Figure ES-1. Estimates of Western Canadian Oil Supply and Transportation Capacity



Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al – ([A4W0R4](#))* at PDF page 4

102. The implication of low supply CAPP forecast for Trans Mountain's argument regarding the future need for the TMEP is obvious. As Figure ES-1 illustrates, under a low supply scenario there is absolutely no need whatsoever for the increased pipeline capacity that the TMEP would provide. The analysis shows that under both CAPP's high and low growth forecast, some additional capacity is required by 2018, which will consist of completion of the Enbridge Clipper project (230 kbpd) that involves adding pumping capacity to the existing Enbridge Clipper Line and the replacement of Enbridge Line 3, which adds 370 kbpd of capacity. Both of these projects are expected to be in service by 2017. With completion of these two projects, no additional projects are required either during the forecast period or beyond under CAPP's low growth forecast.

103. The failure by Trans Mountain to consider this low growth scenario in its evidence is, in the City of Vancouver's submission, fatal and it would be an error for the Board to accept the Muse Stencil Report, and the related economic analysis of the Canada Conference Board and John Reed, as reliable evidence of the need for and economic benefits of the TMEP.

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al - A4W0R4* at PDF page 10, 11 and 42

104. A second key failing of the analysis in the Muse Stancil Report is that it does not account for the impact of future changes in public policy on either supply or demand for Western Canadian crude oil. This is a significant shortcoming given the growing pace of change in climate policies globally in recent years, not least when projecting demand more than two decades into the future.² Recent developments in Chinese climate policy, including a commitment to a national emissions trading program and tightening of motor vehicle standards to match the most stringent ones globally, are particularly noteworthy given the Muse Stancil Report’s projection that almost all of TMEP’s capacity, roughly 500 kb/d, will be exported to that country from 2025 on.

City of Vancouver Supplemental Written Evidence – *Appendix S-1 Report of Professor Kathryn Harrison November 2015 – (A4W0J5)*

105. The Muse Stancil Report (at page 16) remarks favorably that its projections are consistent with International Energy Agency’s (“IEA”) 2014 New Policies Scenario, describing it as IEA’s “central scenario.” While that is true in the sense that IEA also offers scenarios with higher and lower oil demand, the implication is not that the New Policies Scenario is “central” in the statistical sense of “most likely.” Rather, the New Policies Scenario represents IEA’s best estimate of future energy demand and greenhouse gas emissions in the absence of significant policy change.

106. In IEA’s (WEO 2015, p. 34) own words:

“[W]e devote most attention to the results of the New Policies Scenario in order to provide the clearest picture possible of the outcome of continuing with the policies that are in place and those that are currently planned. The results however, do not constitute a forecast. New policies, as yet unformulated, will certainly be adopted over the course of the next twenty-

² Direct Written Evidence of Kathryn Harrison prepared for the City of Vancouver,” May 2015; Exhibit No. C77-27-11, Filing ID [A4L7W8](#)

five years. Indeed, one purpose in projecting the future is to demonstrate the need for their adoption.

107. Elsewhere in the same report, IEA (WEO 2015, p. 3) asks,

“What is the value of describing how the global energy economy will evolve under the influence of different sets of policies, if it is not going to turn out that way in practice? ... the reason that we look into the future is to trigger key policy changes in the present.”

108. World Energy Outlook 2014 (p. 87-8) offers the “sobering news” that the emissions projection of the New Policies Scenario would be expected to yield a global average of 3.6 to 4C climate change, and a world in which “severe and widespread changes are expected in human and natural systems, including substantial species extinction and large risks to global and regional food security.” In other words, the projections under the New Policies Scenario that oil demand remains high well into the future is not intended as a best estimate of future demand, but as an urgent warning.

109. The fact is that significant policy change has continued to occur even in the last year since the IEA’s 2014 report, which Muse Stancil relies on, was prepared such that the IEA’s future oil price scenarios fall well below the price of \$100 US per barrel that Muse Stancil has assumed in its analysis.

110. In 2015, IEA significantly revised its New Policies Scenario relative to 2014 to incorporate Individual Determined National Contribution (INDC) targets and other policy measures announced in advance of COP21 in Paris. The current pace of policy change underscores the implausibility of the Muse Stancil Report’s assumption of policy stasis in destination countries for more than 20 years.

111. The IEA 2015 World Energy Outlook Report also recognizes the possibility that lower oil prices represent a persistent “new normal.” World Energy Outlook 2015 (WEO 2015) thus includes a “Low Oil Price Scenario,” which assumes that oil prices remain in the \$50-\$60 range per barrel into the 2020s, increasing only to \$85/bbl by 2040. The implications of persistent low oil prices are pronounced for “projects toward

the top of the cost curve,” including Canada’s oil sands (WEO 2015, p. 167.) WEO 2015 (p. 165) notes that “production of extra-heavy oil and bitumen, largely Canadian oil sands, takes a larger hit” under the Low Oil Price Scenario. Figure 4.9 of World Energy Outlook 2015 (p. 167) projects that growth in Canadian production would be 60% less, with expansion of only 1 Mb/d projected between 2014 and 2040.

112. WEO 2015 (p. 153) notes that, “Views will differ on the feasibility of the individual [public policy and market] assumptions” underlying the Low Oil Price scenario, but “in our judgment, each of them is reasonable and plausible.”

113. The large impact of persistent low oil prices on projected Western Canadian oil production underscores the importance of analyzing the sensitivity of the business case for the TMEP under alternative scenarios, something which Trans Mountain and its expert, Muse Stancil, have failed to do.

114. Policy change is also emerging at the production end. Canada’s newly-elected Liberal government has committed to reducing emissions to at least 30% below 2005 levels by 2030, to be achieved via a national carbon price. On 22 November 2015, the government of Alberta announced a commitment to an economy-wide fixed carbon price, starting at \$30/tonne in 2018 with potential for increases in step with other jurisdictions. While neither the federal nor provincial government has yet projected what Canadian prices would need to be in 2030 (and beyond), Carbon Management Canada has projected that Canada’s INDC would demand an economy-wide price of CDNS\$50/tonne CO₂ by 2020, with a still higher price for industrial emissions. Muse does not consider the implications of Canada’s own changing policies for the costs of production and competitiveness of Canadian crude oil from the oil sands.

115. For its part, IEA projects a global carbon price of \$140 US/tonne in 2040 in order to maintain even a 50% chance of limiting climate change to the globally-agreed target of 2C (IEA’s “450 Scenario”). The Muse Stancil Report mentions the IEA 450 Scenario, as well as IEA’s less aggressive “Bridge Scenario,” but does not factor either into their model nor attempt to quantify the implications for the market prospects for Canadian unconventional crude oil or the TMEP.

116. Experts have analyzed the likely extraction of oil should countries succeed in meeting the internationally agreed-upon target of 2C, concluding that “open-pit mining of natural bitumen in Canada soon drops to negligible levels after 2020 in all scenarios because it is considerably less economic than other methods of production.” This reveals just how sensitive the market for Canadian bitumen could be to climate policy decisions in destination countries, which would be expected to limit demand and thus resulted in a lower price for oil imports.

City of Vancouver Supplemental Written Evidence – *Appendix S-1 Report of Professor Kathryn Harrison November 2015* – ([A4W0J5](#)), at PDF page 6;

City of Vancouver Written Evidence – *Appendix 12 Article published in Journal Nature entitled The geographical distribution of fossil fuels unused when limiting global warming to 20C*” – ([A4L7X0](#)), at PDF page 5

117. In summary, the Muse Stancil Report makes the case only that TMEP would thrive economically in a world in which no further global efforts are made to abate climate change and which fails even to account for recent, significant policy changes that have been made since 2014 and the impact of those changes on future markets for Canadian bitumen. The business case offered for the TMEP is predicated on unsustainable climate change in excess of 2C, an outcome that the Government of Canada itself has committed to avoid.

118. In addition to this key failing of the Muse Stancil Report, the City of Vancouver submits that the Board should reject Trans Mountain’s evidence concerning the need for and economic benefits of the TMEP for the reasons which follow.

ii. Additional Factors Contributing to the Unreliability of Trans Mountain’s Replacement Evidence

119. Mr. Kelly’s evidence has been on the record since December 16, 2013 and was relied on by Trans Mountain and two expert witnesses—Mr. Hodgson and Mr. Reed—in the preparation of their evidence. This material was subject to multiple rounds of Information Requests by the Panel, two rounds of Information Requests by Intervenors, and Notices of Motions to compel better responses to those Information Requests.

120. In place of Mr. Kelly's report is the report prepared by Neil Earnest of Muse Stancil, amendments to the Conference Board of Canada report prepared by Glen Hodgson and amendments to the written evidence of John Reed (the "**Replacement Evidence**"). The Replacement Evidence was filed on September 25, 2015 and has been subject to only one round of Information Requests.

121. The City of Vancouver has registered its concerns over the absence of cross examination and a reliance on only written Information Requests to test Trans Mountain's evidence and the credibility of its witnesses, both in connection with the evidence originally filed in support of the TMEP Application and voluminous reply evidence subsequently filed by Trans Mountain in August 2015.

122. Similarly, with respect to limiting the Replacement Evidence to one round of written information requests is woefully inadequate. However, one round of Information Requests has been sufficient, in the City of Vancouver's submission, to demonstrate the unreliability of the Replacement Evidence and to challenge the credibility of Trans Mountain's new expert witness, identifying numerous errors and inconsistencies in Mr. Earnest's evidence.

123. A long time consultant for pipeline company Enbridge Pipeline Inc., Mr. Earnest appeared as Enbridge's witness at numerous NEB regulatory hearings, including Northern Gateway, but has never before appeared as an expert witness for Trans Mountain.

Mountain Pipeline ULC - Response to City of Vancouver Replacement Evidence IR –
[\(A4U6X4\)](#), at PDF page 13

124. Mr. Earnest failed to include Trans Mountain's Expansion Project in any of the assessments he undertook for Enbridge, confirming his lack of familiarity with the Trans Mountain Expansion Project. In contrast, Mr. Earnest included Energy East, Keystone XL, and Northern Gateway as potential future projects in other reports he has produced on behalf of Enbridge.

125. As recently as April 2015, Mr. Earnest prepared a report for Enbridge's Line 3 proposal. Energy East, Keystone XL and Northern Gateway were all included as projects that were likely to proceed, but Trans Mountain's expansion was excluded from that analysis even though, at that time, the Board's review of Trans Mountain's expansion application was well underway. Until Mr. Earnest was hired by Trans Mountain in August, he did not consider Trans Mountain's Expansion, let alone as one that was likely to proceed.

City of Vancouver Supplemental Written Evidence – *Appendix S-2 Enbridge Line 3 Replacement Project Market Analysis* – ([A4W0K7](#)), at PDF page 3-7

126. Further, despite the fact that market conditions, along with the supply and demand for crude oil, have fundamentally changed since the Northern Gateway hearings, Mr. Earnest's conclusions as set out in the Muse Stancil Report are remarkably similar to the conclusions he reached in reports he has prepared on behalf of Enbridge for the Northern Gateway Hearing.

City of Burnaby – *Supplemental Written Evidence – 4. Market Prospects and Benefits Analysis, January 2010* – ([A4W1I2](#))

City of Burnaby – *Supplemental Written Evidence – 3. Update of Market Prospects and Benefits Analysis for NGP* – ([A4W1I1](#))

127. Sections of the Muse Stancil Report are virtual carbon copies of Mr. Earnest's earlier reports prepared for Enbridge's use in the Northern Gateway hearings, going so far as to include in the Muse Stancil Report on the TMEP a scenario of market distribution of crude oil from the 2012 Northern Gateway report. For example, page 21 of the Muse Stancil Report (pdf page 23), under the heading "Northeast Asia Overview" contains the exact wording as page 12 (at pdf page 60) of the Northern Gateway report under the heading "Northeast Asia Overview", except that "Westridge" is substituted for "Kitimat".

Trans Mountain Pipeline ULC - *Response to City of Vancouver Replacement Evidence IR* – ([A4U6X4](#)), at PDF page 32

128. Table A-13 at page 76 of the Muse Stancil Report entitled “Disposition of Canadian Heavy Base Case (Northern Gateway)” was erroneously reproduced from Mr. Earnest’s report for Enbridge.

Trans Mountain Pipeline ULC – Response to City of Vancouver Replacement Evidence IR – ([A4U6X4](#)), at PDF page 6

129. There are also inconsistencies between the Muse Stancil Report which Mr. Earnest prepared for Trans Mountain and other expert reports that he has prepared for Enbridge and which have been filed as evidence in other regulatory proceedings. In particular, Mr. Earnest would have the Board accept the unreasonable assumption that there will be no new crude interprovincial oil pipelines built in Canada between 2015 and 2038, but for Trans Mountain’s current proposed TMEP.

Trans Mountain Pipeline ULC – Replacement Evidence - 2a Muse Stancil, Market Prospects and Benefits Analysis of the TMEP, September 2015 – ([A4T6E8](#)), at PDF 39-43

130. When asked by the City of Vancouver to advise whether Mr. Earnest believes his assumption that the TMEP is the only likely new pipeline capacity for more than two decades is a reasonable one, Trans Mountain responded that, “Mr. Earnest provided no professional opinions regarding the completion prospects for the various potential Canadian pipeline projects.”

Trans Mountain Pipeline ULC - Response to City of Vancouver Replacement Evidence IR – ([A4U6X4](#)), at PDF page 5

131. Given the opinions that Mr. Earnest expressed in the various reports that he prepared for Enbridge on other projects, which included identification of other potential projects that he considered likely to proceed, it is reasonable to conclude that Mr. Earnest would also express the opinion, if asked, that TMEP is only one of several projects that could result in expanded pipeline capacity within Canada. For example, in his report prepared for the Line 3 Replacement Project, Trans Mountain’s expansion is noticeably absent. However, Mr. Earnest expresses the opinion that Northern Gateway, Keystone XL and Energy East are all likely to proceed.

City of Burnaby Supplemental Written Evidence – 3. *Update of Market Prospects and Benefits Analysis for NGP* – ([A4W1I1](#)), at PDF page 21-24;

City of Vancouver Supplemental Written Evidence – *Appendix S-2 Enbridge Line 3 Replacement Project Market Analysis* – ([A4W0K7](#)), at PDF page 3-7

132. Mr. Earnest's decision to exclude all other transportation capacity but the TMEP from his analysis raises serious doubt about the reliability of the other opinions and conclusions expressed in the Muse Stancil Report. Mr. Earnest's approach is also inconsistent with the Board's decision in *Ruling No. 25* in this hearing.

133. In response to the City of Vancouver's application in May 2014 to expand the list of issues to include upstream and downstream impacts of the TMEP, the Board issued *Ruling No. 25* dismissing the City of Vancouver's application on the basis that oil sands production would continue along its predestined path regardless of whether or not the TMEP were approved. In *Ruling No. 25*, the Board found that:

- No particular upstream development is dependent on the Project;
- The apportionment of oil shipments between various transportation alternatives has existed for many years, during which time oil sands production has continued to increase with oil being carried on other pipelines, by rail, and by truck to meet the demand for it; and
- Oil, whether from Canada or from elsewhere in the world, will go to where the demand is, whether or not the Project proceeds.

National Energy Board, *Ruling No. 25* ([A3Z5I4](#)), 23 July 2014 at PDF page 3-4

134. The Board has very clearly and unequivocally determined, firstly, that upstream development will proceed regardless of whether the TMEP is approved or not and, secondly, that the Western Canadian crude oil production will be delivered to the target markets identified by Trans Mountain in its application even if the TMEP does not proceed.

135. The assumption in the Muse Stancil Report that the TMEP will be the only new

transportation capacity available to shippers for delivering Western Canadian crude oil to overseas markets is entirely inconsistent with the Board's finding that increased transportation capacity will be available through pipeline or rail alternatives that do not include the TMEP. The analysis and conclusions in the Muse Stancil Report must be rejected.

136. The Boards finding that Western Canadian oil sands production will go to where the demand is, whether or not the TMEP proceeds, is determinative. There is no basis on which Trans Mountain can claim that the economic benefits from increased access to overseas markets are solely, or even directly, attributable to the TMEP. The Board has found that there is no direct connection to the TMEP.

137. Finally, had the Muse Stancil Report been in evidence at the time that the City of Vancouver brought its motion to expand the List of Issues, this report would have provided further support for the City of Vancouver's position on its motion that there is a direct connection between the TMEP and upstream and downstream impacts. Any decision by the Board to reverse or otherwise review its findings in *Ruling No. 25* on the question of the direct connection between the TMEP and upstream production or downstream market access would be highly prejudicial to the City of Vancouver.

iii. Errors in the Methodology regarding the Estimated Price Lift benefits of the TMEP

138. Leaving aside the fundamental flaws in the Muse Stancil Report identified above, and in the event that the Board is not satisfied that these flaws require it to wholly reject Trans Mountain's evidence of the need for and economic benefits of the TMEP, it is necessary to consider the additional methodological inconsistencies and deficiencies in the Muse Stancil Report that result in erroneous and unreliable conclusions regarding the price lift benefits attributable to the TMEP. The accuracy and reliability of the price lift benefits calculated in the Muse Stancil Report also have implications for the overall fiscal benefits calculated by Mr. Hodgson in the Conference Board of Canada report as the Muse Stancil price lift calculations account for a full 84% of the total fiscal benefits calculated by Mr. Hodgson.

139. The following methodological errors are discussed in more detail below:

- a. a failure to recognize that a decrease in the supply of crude oil from the North American market—which Mr. Earnest postulates will cause a rise in Western Canadian crude oil prices—has market consequences that would erode these same price lift benefits as markets naturally adjust;
- b. the erroneous assumption that price lift benefits attributable to Trans Mountain exist after the Trans Mountain pipeline is operating at full capacity;
- c. the erroneous premise that all crude oil prices are determined in the spot market;
- d. inaccurate price forecasts; and
- e. failure to account for the large cost that the unused pipeline capacity created by the TMEP would impose on Canada's oil transportation sector, oil producers and the Canadian public.

a. Failure to properly account for the market consequences of a decreased supply of Western Canadian crude oil to North American markets

140. Mr. Earnest bases his price lift benefit calculation on two assumptions:

- a. it will lessen the amount of Western Canadian crude oil that otherwise will make its way into the North American crude oil market, thereby generating a price lift for all barrels produced; and
- b. in the initial years, the need for rail is largely eliminated and the transportation savings flow back to the Canadian crude oil producers in the form of higher prices.

Trans Mountain Pipeline ULC – *Replacement Evidence - 2a Muse Stancil, Market Prospects and Benefits Analysis of the TMEP, September 2015 – (A4T6E8)*, at PDF page 18

141. Mr. Earnest states in his report that: “It is a fundamental economic principle that reducing the supply of a commodity, all else equal, will increase its price.” This is the

economic principle upon which he bases the primary reason for the price lift in North America for Western Canadian crude.

Trans Mountain Pipeline ULC – *Replacement Evidence - 2a Muse Stancil, Market Prospects and Benefits Analysis of the TMEP, September 2015* – ([A4T6E8](#)), at PDF page 12

142. Mr. Earnest also explains that Canadian crude and US crude compete in the North American market. “North American refiners are almost totally indifferent about the country origin of the crude oil grades that they process and will readily replace Canadian crude oil grades with US grades and vice versa.”

Trans Mountain Pipeline ULC – *Response to NEB Replacement Evidence IR* – ([A4U6X2](#)), at PDF page 35

143. Mr. Earnest maintains that when the volume of oil shipped via the TMEP makes its way to Northeast Asia instead of the North American market that this reduced supply will increase the price in North America. However, he fails to account for the market’s response to the reallocation of the supply of Western Canadian Crude to Northeast Asia. Having acknowledged that “it is a fundamental economic principle that increasing the supply of a commodity, all else equal, will reduce its price”, Mr. Earnest must also acknowledge and account for that fact that when the crude oil arrives in Northeast Asia the price it attracts will be expected to fall.

Trans Mountain Pipeline ULC – *Response to City of Burnaby Replacement Evidence IR* – ([A4U6X3](#)), at PDF page 42

144. Instead, Mr. Earnest states that: “TMEP does not change the global supply of crude oil. If TMEP enables 500 kb/d of crude to be shipped to Northeast Asia, rather than into the North American crude oil market, then 500 kb/d of non-Canadian crude oil is backed out of the Northeast Asia markets, and 500 kb/d of non-Canadian crude oil is shipped into the North American market. Total crude oil supply in both the Northeast Asian and the North American markets remains unchanged.”

Trans Mountain Pipeline ULC – *Response to City of Burnaby Replacement Evidence IR* – ([A4U6X3](#)), at PDF page 42

145. If this is indeed the case, then there is no change in the volume of crude oil in North America because market volumes adjust. Canadian oil displaces non-Canadian oil in Northeast Asia and non-Canadian oil is shipped to North America where it replaces Canadian oil that left for Northeast Asia via the TMEP. Based on the logical extension of how supply affects market price, the price lift Mr. Earnest has predicted will disappear. There is no change to the supply of oil in world markets and there is no change to price, particularly since North American markets are indifferent, according to Mr. Earnest, to which country they source their oil from.

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al* – ([A4W0R4](#)), at PDF page 28

b. When a Pipeline is Full There are no Price Lift Benefits

146. The price lifts predicted by Mr. Earnest do not exist once the TMEP is operating at full capacity. Mr. Earnest knows that when a pipeline is full it is not acting as the price-setting mechanism and it is not moving the incremental or marginal barrel to market. Once the pipeline is full, price discounts (the opposite of price lifts), return.

147. Mr. Earnest explained his understanding to the Board at the Northern Gateway hearing as follows:

“Once Northern Gateway is full, higher Asian crude prices cannot further increase shipments on Northern Gateway (although the shippers may benefit), and Northern Gateway is no longer acting as the price-setting mechanism for Western Canadian crude. If Northern Gateway is full, some other transportation mode and perhaps market must be acting as the price-setting mechanism for Western Canadian crudes.”

City of Burnaby Supplemental Written Evidence – *3. Update of Market Prospects and Benefits Analysis for NGP* – ([A4W1I1](#)), at PDF page 34

148. Mr. Earnest provided the following example of how, when a pipeline is full, it leads to a removal of price lifts that develop from excess pipeline capacity:

“A current example of this dynamic is the Pegasus Pipeline, which connects Western Canada via the Patoka hub with the U.S. Gulf Coast. This pipeline has been operating at capacity for a number of

years. The current delivery cost (tolls plus loss allowance) for a Canadian heavy crude to the Gulf Coast via Pegasus is about \$6.90/bbl, which would mean that, if Pegasus was the current price-setting mechanism, Canadian heavy crude should be trading at about \$7.00/bbl under the price of a similar heavy crude on the Gulf Coast. The industry regards Maya, a Mexican heavy sour crude, as the benchmark heavy sour grade for the U.S. Gulf Coast. Year-to-date, the Maya-WCS differential has averaged about \$31.50/bbl. Clearly, the Pegasus pipeline, although it is shipping Canadian crude to the Gulf Coast, is not acting as the price-setting mechanism for Canadian heavy crude, no more than Northern Gateway would be if it was operating at its capacity.”

City of Burnaby Supplemental Written Evidence – 3. Update of Market Prospects and Benefits Analysis for NGP – ([A4W1I1](#)), at PDF page 34

149. In the Muse Stancil Report for Trans Mountain, Mr. Earnest is not nearly as forthcoming about the relationship between TMEP as the price-setting mechanism and what happens to price lifts when pipelines operate at full capacity. He states that, “Once TMEP is full, higher Asian crude oil prices cannot further increase shipments on TMEP, and TMEP is no longer acting as the price-setting mechanism for Western Canadian crude oil. In the TMEP Scenario, TMEP is always full, and some other transportation mode and perhaps market must be acting as the price-setting mechanism for Western Canadian crude oils.”

Trans Mountain Pipeline ULC – Replacement Evidence - 2a Muse Stancil, Market Prospects and Benefits Analysis of the TMEP, September 2015 – ([A4T6E8](#)), at PDF page 54

150. What Mr. Earnest doesn’t say is that the price lifts will disappear when pipelines are full. Instead he offers an estimate of aggregated benefits based on price lifts each year for a twenty year period. Even if Mr. Earnest’s price lift benefits were correct, the only year he should be counting them is 2018. Every other year he includes is inappropriate double counting.

151. Once a pipeline ceases to be the price-setting mechanism, it cannot be responsible for crude oil prices. Mr. Earnest is claiming benefits related to the TMEP that he knows do not belong to the expansion.

152. Mr. Earnest's methodological error was confirmed by the Government of Alberta. According to Dr. Harold York, author of the Government of Alberta evidence submitted at the Northern Gateway hearing, an oil pipeline provides a one-time, short term solution to improving netbacks.

2000. [MS. CHAHLEY:] ... is it fair for me to understand that what you're saying here is, really, the only solution to this problem [an \$8 discount] would be to have a far greater West Coast option, that Northern Gateway isn't sufficient by itself to be a solution to this problem, except that we've identified for one year.

2001. DR. HAROLD YORK: That's correct

Transcript, Volume 83, Northern Gateway, Dr. York, lines 1999-2004

153. According to Mr. Earnest's analysis in the Muse Stancil Report, Trans Mountain is always full. Therefore, the marginal barrel must be transported by an alternative system that is not full and the price lift benefits cannot properly be attributed to the TMEP.

c. Crude Oil Prices Determined by Spot Markets are Not Reflective of Market Realities

154. Mr. Earnest's assumptions regarding the determination of prices, and thus price lifts, are also in direct contradiction with Mr. Kelly's evidence provided during Trans Mountain's application for approval of the Toll Methodology. Mr. Kelly's evidence from RH-001-2012 has not been struck from the record.

City of Vancouver Written Evidence – *Appendix 15 – Written Reply Evidence of Steven Kelly – (A4L7X3)*

155. Mr. Kelly's evidence explains the limitations of the netback analysis. According to Mr. Kelly:

"the commercial terms associated with term deliveries and spot deliveries are likely to differ significantly. Term delivery commitments are more likely to be made in conjunction with long term supply agreements between producers and refiners, or to supply integrated refining operations. These deliveries are normally considered to proceed without consideration of the realized price to the producer ("the netback price"). In contrast, spot shipments are likely to be directed to markets offering the highest marginal netback price at a specific point in time."

156. However, Mr. Earnest does not include potential term arrangements between shippers and refineries, but treats all crude oil as if it is purchased in the spot market at a spot price.

157. Mr. Earnest suggests the use and usefulness of TMEP is purely a function of its ability to provide access to markets that provide the highest netback prices. This is the output predicted from Mr. Earnest's Crude Optimization Model. This is how Mr. Earnest determines capacity utilization on transportation systems, including capacity allocation on the TMEP.

158. Mr. Earnest's narrow view of how the market functions further undermines the credibility of the outputs from his model. If incentives other than the highest netback price drive producer pipeline capacity utilization, as Mr. Kelly states in his evidence, then the distribution of crude oil and price lifts predicted by Mr. Earnest are not reliable or credible.

d. Inaccurate Price Forecasts

159. The Muse Stancil proprietary model requires forecasting a series of input and output refinery products based on several inputs including crude oil prices, natural gas prices, contribution margins at refineries, and price differentials. Accurately forecasting petroleum product prices represents a significant challenge and is one reason why such forecasts typically include a sensitivity analysis that reflects different pricing scenarios. In this case, Mr. Earnest has failed to include any sensitivity analysis in the Muse Stancil Report. Having presented only one scenario, any forecasting errors will necessarily invalidate the model results and the conclusions in the Muse Stancil Report estimating the alleged price benefit of the TMEP.

160. The evidence before the Board demonstrates that Mr. Earnest's forecasting of crude oil prices is unreliable. In 2012, Mr. Earnest predicted WTI at Cushing for 2015 at \$96.71 (real 2012 US\$) per barrel. Adjusting for inflation, this would mean a WTI at

Cushing price above \$100 US per barrel in 2015. However, actual crude prices for 2015 averaged roughly \$50 per barrel US.

Trans Mountain Pipeline ULC - *Response to City of Vancouver Replacement Evidence IR – ([A4U6X4](#))*, at PDF page 24;

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al – ([A4W0R4](#))*, at PDF page 30

161. The forecast used in the Muse Stancil Report for Mr. Earnest's market analysis of the TMEP is also out dated. The Muse Stancil Report relies on the 2014 IEA forecast that estimates oil prices will remain above \$100 per barrel throughout the forecast period. However, the IEA has since lowered its crude oil price forecast in its most recent 2015 report. IEA(2015) provides two oil price forecasts: one that assumes that oil prices will remain below \$80 US until 2020 and gradually rise thereafter and a second, lower scenario, that assumes oil prices will remain in the \$50- \$60 US range until 2020 and then gradually rise to \$85 US by 2048. Both the IEA scenarios are well below the forecasts used by MS.

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al – ([A4W0R4](#))*, at PDF page 31

162. Finally, any potential price benefit to Canadian oil producers will increase the cost of oil in Canada for Canadian refineries. While a price increase paid by non-Canadian purchasers of Canadian oil can be considered a benefit to Canada, price increases paid by Canadian refineries are not a benefit and should be deducted to determine the net benefit to Canada. Mr. Earnest has deducted the oil price increase to Canadian refineries in previous studies but has failed, without explanation, to deduct them in the Muse Stancil Report prepared for Trans Mountain.

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al - ([A4W0R4](#))*, at PDF page 32

f. The costs of unused pipeline capacity must be offset against any price lift benefits

163. The report of Dr. Gunton prepared for Living Oceans calculates that the unused pipeline capacity that would result from the operation of the TMEP results in a net cost to Canada of \$4.4 billion.

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al – ([A4W0R4](#))*, at PDF page 5

164. Dr. Gunton's supply and demand assessment is summarized in Figure ES-1 reproduced in paragraph 97 above. The analysis shows that under both CAPP's high and low growth forecast, some additional capacity is required by 2018, which will consist of completion of the Enbridge Clipper project(230 kbpd) that involves adding pumping capacity to the existing Enbridge Clipper Line and the replacement of Enbridge Line 3, which adds 370 kbpd of capacity. Both of these projects are expected to be in service by 2017. With completion of these two projects, no additional projects are required under CAPP's low growth forecast.

165. Under the higher growth forecast completion of these two projects plus CAPP's forecast rail expansion to 550 kbpd assuming Keystone XL is not built provides sufficient capacity to 2023. In 2023, one new pipeline project (TMEP or Energy East) is required under the higher growth forecast and a second new project will be required around 2029. The analysis shows that the TMEP is not needed until 2023 under the higher growth forecast. If Energy East is built, the TMEP is not needed until 2029. Under the low growth forecast, the TMEP is not required at all during the forecast period to 2048.

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al – ([A4W0R4](#))*, at PDF page 42

166. Dr. Gunton estimated surplus capacity under CAPP's low and high growth forecast assuming both Energy East and TMEP are approved and built as planned. Under the low growth forecast, surplus capacity increases from 1. 6 million bpd in 2020 to over 1. 9 million bpd by 2047, which is equivalent to almost four Northern Gateway's worth of empty pipeline space. Under the high growth forecast, surplus

capacity peaks at 1.6 million bpd in 2020 and remains until 2034. These estimates of surplus capacity do not include pipeline capacity from ENGP and Keystone XL. If Keystone XL is built, surplus capacity will peak at over 2.0 million bpd in 2020, and surplus capacity will remain under the high growth forecast until 2037.

Living Oceans Supplemental Written Evidence – Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al – ([A4W0R4](#)), at PDF page 43

167. Dr. Gunton calculates the unused capacity costs as follows: “The net present value of these scenarios ranges from \$2.2 to \$6.2 billion in unused capacity costs. Unused capacity costs incurred by non-Canadians should be omitted as a cost just as increased netback benefits accruing to non-Canadians should be omitted as a benefit. We have not omitted either of these non-Canadian benefits and costs in our analysis due to data limitations. Nonetheless, the base case estimate of \$4.4 billion is a conservative estimate of unused capacity costs because it assumes diverted shipments from Chicago instead of the USGC and is based on the CAPP high growth supply forecast.”

Living Oceans Supplemental Written Evidence – Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al – ([A4W0R4](#)), at PDF page 58

iv. Errors in Assessment of Future Market for Canadian Bitumen

168. According to the Muse Stancil Report, China is expected to absorb more than 500,000 barrels a day of Western Canadian bitumen by 2018, virtually all of the expanded pipeline capacity that would be provided by the TMEP. However, when Mr. Kelly was questioned during the Toll Hearing about the viability of China as a substantial and immediate market for Western Canadian bitumen, he was less than encouraging. His evidence is recorded in the hearing transcript as follows:

4439 MR. KELLY: And the point of all of our work -- and I did get a small chance to talk to you about it this morning, but I did want to elaborate -- this is far from simple and, ***if we're going to take China as a good example, I think it has to be recognized that there's not a pot of gold at the end of this rainbow.***

And the client, my clients -- many of my clients who come to me for that kind of work -- many of the same companies are shippers, potential shippers on the Trans Mountain Pipeline -- recognize

that ***development of markets in Asia will be a many-year process. This is not going to occur the minute the pipeline is connected to a terminal. It's going to take many years of hard work***

[Emphasis added]

4500 MR. ZALMANOWITZ: Right. Now, in -- just giving me the answer that you just gave me, did you have in mind -- you were here throughout these proceedings when Mr. Anderson was being cross-examined by Mr. Roth and there was the transcription of a presentation and Mr. Anderson says: "Where's the market, where's the market, where's the market? It's in Asia." (As read)

So were you aware -- did you have that in your mind when you just answered the question asked you?

MR. KELLY: Well, Mr. Anderson can say what he will say to his investors. I did not say it.

4510 MR. KELLY: We can talk about Asia in more detail if you like and I will give you my views. I think they, with all due respect to Mr. Anderson, would be a little more nuanced in terms of the company -- sorry, the countries we were talking about, the future outlook for refinery demand, for crude demand by type in each of the countries of Asia if you'd like to go there. But I would not be prone to using the same phrase that Mr. Anderson used, that's -- that's his phrase.

City of Vancouver Supplemental Written Evidence – *Appendix S-8 Transcript of Hearing held February 14, 2013* – ([A4W0L3](#)), at PDF page 10, 15 - 16

169. The Muse Stancil Report identifies the Northeast Asia market as the most prospective one for Canadian crude oil producers due to its size, the installed capability of the regional refineries, and its physical proximity to the west coast of Canada, claiming that “refiners in this region are very interested in diversifying their supply sources so as to reduce their heavy reliance upon Middle East crude supply.” However, when asked to supply independent source documents in support of this claim, Mr. Earnest was unable to provide a single example of documented evidence. This comment is arguably inconsistent with the subsequent evidence provided by Trans Mountain that North American refiners are almost totally indifferent about the country origin of the crude oil that they process.

Trans Mountain Pipeline ULC – *Replacement Evidence - 2a Muse Stancil, Market Prospects and Benefits Analysis of the TMEP, September 2015* – ([A4T6E8](#)), at PDF page 23;

Trans Mountain Pipeline ULC - *Response to City of Vancouver Replacement Evidence IR* – ([A4U6X4](#)), at PDF page 35;

Trans Mountain Pipeline ULC – *Response to NEB Replacement Evidence IR* – ([A4U6X2](#)), at PDF page 35

170. The Muse Stancil Report also claims that Japan represents a strong potential market for Western Canadian bitumen yet the Muse Stancil model predicts that zero volumes of crude oil will be shipped to Japan during the forecast period.

Trans Mountain Pipeline ULC – *Replacement Evidence - 2a Muse Stancil, Market Prospects and Benefits Analysis of the TMEP, September 2015* – ([A4T6E8](#)), at PDF page 27, Figure 27

171. In 2011, Trans Mountain applied to the Board for approval for Firm Service to Westridge Marine Terminal (the “Firm 50 Application”), arguing that the allocation of spot capacity to firm capacity and an increase in overall capacity at the WMT was necessary to develop overseas markets. However, the promised development of overseas markets has not materialized to date.

172. Since reaching an historical peak of 11,000 barrels a day in 2012, demand from overseas markets, most notably China, for Western Canadian crude oil has declined significantly.

TABLE 8c.1

CANADIAN CRUDE OIL SHIPMENTS TO PACIFIC BASIN MARKETS
(Thousands of Barrels per Day)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
California	14	7	14	24	35	42	29	39	47	43
Hawaii	-	-	-	-	-	-	-	-	-	1
Washington	74	97	110	123	110	141	144	145	150	166
Japan	-	1	-	-	-	-	-	-	-	-
South Korea	-	-	-	-	-	1	-	-	-	1
Asia	0	-	4	0	5	2	-	-	2	3
China	-	-	6	1	6	5	10	11	5	4

Trans Mountain Pipeline ULC - *Response to City of Vancouver Replacement Evidence IR*
– ([A4U6X4](#))

173. As noted previously, the analysis in the Muse Stancil Report erroneously assumes that the demand for crude oil is a function of spot market prices (net of transportation costs), and spot market prices only. The underlying assumption is that markets will develop wherever the market is willing to pay the highest prices and, according to Mr. Earnest, the prices in Asian markets are “structurally higher”.

174. This approach is wholly inconsistent with Mr. Kelly’s evidence during the Part IV Toll hearing that the market doesn’t work that way, and certainly can’t be expected to work that way in China. Mr. Kelly gave the following evidence:

PARAGRAPH 4467 MR. KELLY: Let me say that -- and I think I did hint at it before -- the refining capacity that is currently available to process Canadian bitumen -- and I think that's in the main what we're talking about -- in China, which is arguably where most of the growth is, is actually at the moment relatively modest.

In future, there can be many commercial arrangements that result in additional capacity to process Canadian heavy crude, but I would argue that those arrangements would not be backstopped by spot barrels coming off of the west coast in a -- in a tanker.

It would be backstopped more likely by a term arrangement between possibly an integrated party, refiner -- and by that, I mean a refiner and producer within the same corporate family, or a long-term supply arrangement by which both parties achieve their objectives.

City of Vancouver Supplemental Written Evidence – Appendix S-8 Transcript of Hearing held February 14, 2013 – ([A4W0L3](#)), at PDF page 12

175. China’s loans for oil program provides financial assistance to various countries in exchange for securing access to crude oil. China has loaned Petrobras in Brazil \$10 billion to access 200,000 barrels a day of crude, loaned \$4 billion to Venezuela to increase access from 350,000 barrels a day to 1 million barrels a day, and entered into two loan agreements with Russia to ship 300,000 barrels a day via the East Siberia Pacific Ocean pipeline.

City of Vancouver Supplemental Written Evidence – *Appendix S-10 The Battle for China's Oil Market* – ([A4W0L5](#)), at PDF page 1;

City of Vancouver Supplemental Written Evidence – *Appendix S-11 Iran Gets Ready to Sell to the World* – ([A4W0L6](#)), at PDF page 1

176. Notably, however, when the Board requested that Mr. Earnest “identify any projects (completed or planned) related to the production or transportation of crude oil to the identified target markets from traditional or potentially new supply sources”, Mr. Earnest responded that he was not aware of any potential or planned projects. Mr. Earnest appears to have no working knowledge of projects that would impact the market in China for Canadian bitumen and that have been the subject of recent news reports, including:

- a. The China-Myanmar oil pipeline which would move 440,000 barrels a day from Myanmar’s western coastal port of Kyaukphyu, across China to Kunming. This pipeline represents the first overland access between China and the Middle East, reducing the transport time of oil shipments from Saudi Arabia to Shanghai by two weeks;
- b. The agreements signed by Pakistan and China to spend \$46 billion on infrastructure projects to be built along an economic corridor between Kashgar in China’s western province of Xinjiang and Pakistan’s Gwadar Port. The project would provide China with the shortest possible route for importing oil from the Gulf;
- c. China Petro Chemical Corporation (SINOPEC) and China National Petroleum Corporation (CNCP) are set to develop two projects in Southwestern Iran for a combined 160,000 barrels per day. The project is intended to contribute to the Iranian government’s plan to increase production ahead of the nuclear sanctions being lifted. Iran’s Oil Minister has stated that oil output will be increased by 500,000 barrels a day within two months of sanctions being lifted and by as much as 1 million barrels per day within six to seven months;

- d. China and Russia's energy relationship has been growing with Russian crude oil exports to China increasing 35% in 2014, displacing other sources. A subsidiary of CNPC has gained a 10% stake in a Russian oil field which could generate 1 million barrels a day by 2020;
- e. Iraq recently became China's second largest oil supplier. More than 800,000 barrels a day are imported into China from Iraq.

Trans Mountain Pipeline ULC – Response to NEB Replacement Evidence IR – ([A4U6X2](#));

City of Vancouver Supplemental Written Evidence – Appendix S-12 This Project Changes the Global Oil Market – ([A4W0L7](#)), at PDF page 1;

City of Vancouver Supplemental Written Evidence – Appendix S-13 China is investing \$46 billion to carve out a route through one of the world's most dangerous regions – ([A4W0L8](#)), at PDF page 1;

City of Vancouver Supplemental Written Evidence – Appendix S-14 China state firms to start pumping new oil in Iran – sources – ([A4W0L9](#)), at PDF page 1;

City of Vancouver Supplemental Written Evidence – Appendix S-16 Russia and China's Growing Energy Relationship – ([A4W0Q1](#)), at PDF page 1;

City of Vancouver Supplemental Written Evidence – Appendix S-17 Iraq takes second spot among China Oil Sellers as Russia Cedes – ([A4W0Q2](#)), at PDF page 1

177. In summary, the Muse Stancil Report contains significant deficiencies and inaccuracies such that Mr. Earnest's analysis is not a reliable indicator of the likely impact of the TMEP on producer prices or the use and usefulness of the proposed Project. Mr. Earnest misunderstands the factors that drive market development, the relative importance of higher crude prices as compared to market access, and the distortion of the netback analysis when term and spot deliveries are involved.

178. It follows that Trans Mountain's evidence that relies on the Muse Stancil Report, including Mr. Hodgson's fiscal impact assessment, Mr. Reed's written evidence, and Trans Mountain's written evidence should also be given no weight.

v. Other errors in Trans Mountain's assessment of Project benefits

a) Taxes

179. Appendix B of Volume 2 of the TMP Application is a report prepared by The Conference Board of Canada titled “The Trans Mountain Expansion Project: Understanding the Economic Benefits for Canada and its Regions.” This report was amended and resubmitted on September 21, 2015

180. Page 27 of the Conference Board report states that the \$4.6 billion in spending associated with the development of the TMEP is expected to generate \$1.2 billion in federal and provincial revenues between 2012 and 2018. The largest fiscal gains are stated to be found in personal and corporate income taxes, with corporate income tax revenues calculated based on an estimated \$1.4 billion in corporate profits. The Conference Board of Canada also estimates that over the first 20 years of operations, corporate income tax revenues from Trans Mountain alone would account for approximately \$965 million in total (\$48 million per year), or 63% of the total Canadian corporate income tax revenues estimated for the 20-year operational phase.

Trans Mountain Pipeline ULC – *Response to City of Vancouver IR No. 2 – (A4H8I9)*, at PDF page 150-151

181. The remaining 37% of the corporate taxes are accounted for by businesses in Trans Mountain’s supply chain and those that are affected by the related consumer spending.

182. The Conference Board of Canada acknowledges that the estimates of corporate taxes to be paid by Trans Mountain reflect the average corporate taxes paid by the Canadian oil pipeline industry and are not based on company specific factors that may be unique to Trans Mountain. This is a significant qualification of CBC’s opinion evidence.

Trans Mountain Pipeline ULC – *Response to City of Vancouver IR No. 2 – (A4H8I9)*, at PDF page 151

183. The Written Evidence of the City of Burnaby includes evidence that Trans Mountain has contributed combined federal and provincial corporate taxes that averaged

just \$1.5 million per year from 2009-13, with refunds in 2 of those years. These revenues were generated from the operation of the existing pipeline with a capacity of 300,000 barrels per day at a time of peak oil prices. The actual annual corporate taxes paid by Trans Mountain, averaging \$1.5 million per year, is a small fraction (only 3%) of the CBC estimated \$48 million per year. When these numbers are adjusted to reflect the number of barrels per day transported by the existing pipeline as compared to the number of barrels per day that would be transported by the TMEP, the actual annual corporate taxes paid by Trans Mountain on a comparable volume of oil averages only \$3 million per year (based on proposed new volume equivalent to 2 times existing volume).

184. Burnaby's Written evidence also references accounting information that Trans Mountain filed with the National Energy Board that shows that Trans Mountain forecast to the regulator that it would pay \$7 million in taxes in 2013 and, instead, received a tax refund for 2013 of more than half a million dollars on its regulated pipeline assets.

City of Burnaby Written Evidence - Economic Evidence – *Robyn Allan, Trans Mountain Pipeline Big Bucks for US Investors, Peanuts for US (The Tyee, Nov 17, 2014)* - ([A4L8H3](#)), at PDF page 6

185. Through the information request process, the City of Vancouver sought further clarification of the calculation and payment of income taxes with respect to the current Trans Mountain pipeline operations to better understand what the actual taxes will be under the proposed expansion. Trans Mountain did not provide the requested information.

186. Trans Mountain did confirm that the toll rate to ship oil on the TMEP will increase by 2.5% annually regardless of the price of oil. Further, Trans Mountain's evidence is that the majority of the fiscal benefits associated with the project are expected to come from the higher netbacks that upstream oil producers would receive as a result of the market access that the TMEP would provide and the alleviation of oil transportation constraints in Western Canada.

Trans Mountain Pipeline ULC – *Response to City of Vancouver IR No. 2 – (A4H8I9)*, at PDF page 8-151

187. However, if oil prices remain below the prices forecast in Trans Mountain's

application, and the evidence before the Board is that they will, and the toll rate to ship the oil on Trans Mountain is increasing by 2.5% per year, the profits to oil producers will be reduced so as to offset any benefit from higher netbacks. The result is that corporate tax revenues will be much lower than estimated. The estimated indirect and induced benefits would also be reduced because oil companies will look to cut expenditures, just as they are currently doing in the face of oil prices in the \$40 to \$50 US range, particularly if they are locked into an annual increase of 2.5% per year pipeline transportation costs.

b) Input/Output models

188. The Conference Board of Canada relies on an Input/Output model to calculate the economic benefits of the TMEP. In its report, the CBC acknowledges that there are a number of major assumptions that impact the reliability of the model results. One of these assumptions is that Trans Mountain's operations and business practices are the same as other oil pipeline operators such as Enbridge or TransCanada. If, however, Trans Mountain's production structure is significantly different from the industry average, the CBC has confirmed that the economic impact results may also be different.

189. The CBC has identified another key risk with the Input/Output model that it used. This is the risk that Trans Mountain's purchasing patterns during the development and operational phases of the project may not align with industry averages. The example provided in Trans Mountain's evidence is that Trans Mountain may purchase more of its inputs from out-of-country sources than would be typical, which would reduce the estimated indirect and induced impacts.

Trans Mountain Pipeline ULC - *Conference Board of Canada, TMEP Understanding the Economic Benefits for Canada and its Regions, September 21, 2015 Clean – (A4T6F0)*, at PDF page 51; Trans Mountain Pipeline ULC - *Response to City of Vancouver IR No. 2 Notice of Motion – (A4J5D2)*, at PDF page 5

190. The ownership of the proposed TMEP is unique in that the Trans Mountain Pipeline LP registered in Alberta is itself owned by a number of Unlimited Liability Companies ("ULCs") registered in Nova Scotia, Alberta and British Columbia. These

ULCs receive special treatment under the US-Canada Income Tax Treaty, providing tax minimization opportunities to the US parent company.

City of Burnaby Written Evidence - Economic Evidence –*Robyn Allan, How Trans Mountain Project Will Pump Profits to Its Texas Owners (The Tyee, Jan. 12, 2015)* – ([A4L8H4](#)), at PDF page 4

191. According to the Houston-based parent company, Kinder Morgan Inc. (“**Kinder Morgan (US)**”), an average of \$172 million USD is removed from the Canadian economy each year and distributed to the US parent. In addition to the \$172 million that is taken out of the Canadian economy each year, Kinder Morgan (US) also charges Kinder Morgan Canada Inc. for corporate services such as in-house legal, human resources, tax advice, auditing, information technology, procurement and insurance. Further, Kinder Morgan (US) is the sole source financing for all activities in Canada, including the \$5.4 billion TMEP, which means that all interest and fees related to project financing flow to the US.

City of Burnaby Written Evidence - Economic Evidence –*Robyn Allan, How Trans Mountain Project Will Pump Profits to Its Texas Owners (The Tyee, Jan. 12, 2015)* – ([A4L8H4](#)), at PDF page at 5

192. None of this activity is a benefit to the Canadian economy and, to the extent that the CBC includes this activity in its economic impact results, those results must be discounted.

193. Furthermore, the Alberta Treasury Board and Finance has cautioned that the structure and limitations of Input/Output models lend themselves to measuring the impacts of projects that are shorter term in nature and that for longer term time series analysis general equilibrium models are more appropriate.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 19

vi. City Of Vancouver's Evidence On The Future Market For Canadian Bitumen

194. Having failed to provide the Board with any reliable evidence of the need for and benefits of the TMEP, the City of Vancouver submits that the evidence of its experts as to the future market for Canadian bitumen, which properly takes into account the impact of global efforts to meet the 2°C target, together with the expert evidence of Intervenors Living Oceans, Tsawout First Nations, and Tsleil-Waututh Nation set out in the report of Dr. Gunton should be preferred and the conclusion reached that:

- a. There is no need for the TMEP as there is sufficient transportation capacity for the modest increase in of Canadian bitumen that is likely to occur during the forecast period; and
- b. The economic benefits of the TMEP are marginal at best and the TMEP may, in fact, be a burden on the Canadian economy when the costs associated with stranded assets are taken into account.

195. This evidence is discussed below under the following headings:

1. Limited International Market for Oil Sands bitumen as Countries will continue to take steps to meet 2°C commitment
2. Regulatory action by Canada's Federal and Provincial Government's to reduce GHG emissions in order to meet its International commitments will result in production levels below those forecast by Trans Mountain
3. Contribution of the TMEP to GHG Emissions means that additional regulatory action will be required

a) Limited International Market for Oil Sands bitumen as Countries will continue to take steps to meet 2°C commitment

196. Policymakers have generally agreed that the average global temperature rise caused by greenhouse gas emissions should not exceed 2°C above the average global temperature of pre-industrial times. It has been estimated that to have at least a 50 per

cent chance of keeping warming below 2°C throughout the twenty first century, the cumulative carbon emissions between 2011 and 2050 need to be limited to around 1,100 gigatonnes of carbon dioxide (Gt CO₂). However, the greenhouse gas emissions contained in present estimates of global fossil fuel reserves are around three times higher than this, and so the unabated use of all current fossil fuel reserves is incompatible with a warming limit of 2°C.

City of Vancouver Written Evidence - *Appendix 12 - the geographical distribution of fossil fuels unused – (A4L7X0)*, at PDF page 2

197. The insurance industry has recognized climate change as a real phenomenon with significant economic and social impacts. As an industry whose business model is based on assessing and managing risk, it is significant that they have recognized the economic impact of climate change and the effect that the increase in the frequency, intensity, duration and timing of extreme weather events will have to their industry (in the form of increased insurance claims and the factoring of climate change risks into insurance rates) and the economy in general.

City of Vancouver Written Evidence – *Appendix 9 - Affidavit of Robert Bartlett – (A4L7W7)*, paras. 4-5 at PDF page 2-3

198. A 2014 report prepared by Swiss Re, a recognized leader in the insurance market, notes, at page 17, that "climate change exposes local populations to mounting challenges and costs of protecting assets, including human lives, against weather related risks". The report further states that:

Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions. Indeed, *if left unchecked, it is estimated that the overall costs of the effects of climate change could amount to 20% of global gross domestic product by the end of this century.*

(Emphasis added)

City of Vancouver Written Evidence – *Appendix 9 - Swiss Re Sigma Report Natural Catastrophes and Manmade Disasters in 2013*"(the "**Swiss Re Report**"), *Bartlett Affidavit, - (A4L7W7)*, at para. 5 and Ex." A ", PDF page 7 and 9

199. The Swiss Re report also discusses the need to limit the global average temperature rise to no more than 2°C by 2050, as follows:

In terms of overall social and economic impact, the point at which climate change becomes dangerous is difficult to assess and is ultimately a societal value judgment. The consensus is that the rise in global average temperatures should be limited to no more than 2°C by 2050. In terms of global carbon emissions, limiting the warming to 2°C corresponds to a global carbon budget - cumulative amount of greenhouse gases that can be released into the atmosphere - of 1200 GtC, with 550 GtC already emitted. This substantial emission reduction, it is hoped, will prevent worst case climate change impacts and still allow societies to cope with the consequences.

City of Vancouver Written Evidence – *Appendix 9 - Swiss Re Report, Bartlett Affidavit, -* ([A4L7W7](#)), para. 5 and Ex." A", at PDF page 10

200. Vancouver has been concerned about climate change and has been taking action to address sustainability issues since the 1990's. Vancouver's geographic location makes it particularly vulnerable to climate change impacts such as rising sea levels, increased frequency and severity of extreme weather events and changing precipitation patterns.

201. The work of Vancouver's Sustainability group, as well as other operational parts of the organization, is dedicated to climate change mitigation and adaptation, renewable energy, air quality protection and supporting other environmental sustainability initiatives within Vancouver's operations and throughout the community. However, the increasing severity of climate change impacts caused by increases in greenhouse gas ("GHG") emissions from projects such as the TMEP will reduce Vancouver's ability to respond adequately to, or prepare for, extreme events. It will also increase the costs to Vancouver of efforts to mitigate the impacts.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 13

202. The local economy depends on Vancouver's reputation for sustainability to attract businesses, professionals and other workers as well as tourists and students. Vancouver's leadership in sustainable development and the Vancouver Greenest City initiative provide significant value to the economy, 94% of which is non-resource based.

203. In 2012, the tourism industry in Metro Vancouver generated \$3.6 billion in revenue. Over 666,000 cruise ship passengers visited Vancouver, contributing \$167 million to the economy.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 11

b) Regulatory / Policy Evidence

204. Vancouver has taken regulatory action to reduce GHG emissions through its Greenhouse Gas Emission Reduction Official Development Plan By-law and through land use and transportation planning which promotes the reduction of GHG emissions by creating compact, mixed-use, walkable neighbourhoods, supported by public transit and walking and cycling infrastructure.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 14

205. Vancouver is not alone in its efforts to reduce GHG emissions. Global political leaders recognize that regulatory and other measures must be put in place to reduce GHG emissions in order to prevent the earth's average global temperature from rising by more than 2°C from pre-industrial levels, often referred to as the “2°C Cap”. The global commitment to a 2°C Cap was recently affirmed at the United Nations Conference on Climate Change (COP21) in Paris. The Paris Agreement, reached December 12, 2015, holds 195 countries accountable for their GHG emissions. Core elements of the agreement include commitments on emissions, adaptation, finance and transparency, and steps to promote carbon trading.

206. The expert report of Kathryn Harrison entitled *Review of Destination Country Policies with Potential to Impact Demand for Canadian Oil Exports* (the "**Harrison Report**") provides a detailed review of existing or planned government policies and regulations in jurisdictions other than Canada to limit or reduce GHG emissions, and concludes that these policies will result in a substantial reduction in oil consumption over the lifetime of the TMEP. Further, demand for Alberta's oil sands bitumen will

experience a greater decline than light crudes due to the bitumen's greater production cost and higher emissions. Cold Lake bitumen is one of the highest GHG-emitting oils on a lifecycle basis and one of the most expensive to produce.

City of Vancouver Written Evidence - *Appendix 10 – Kathryn Harrison Report* –
[\(A4L7W8\)](#); City of Vancouver Written Evidence - *Appendix 11- Know your Oil Report*
– [\(A4L7W9\)](#)

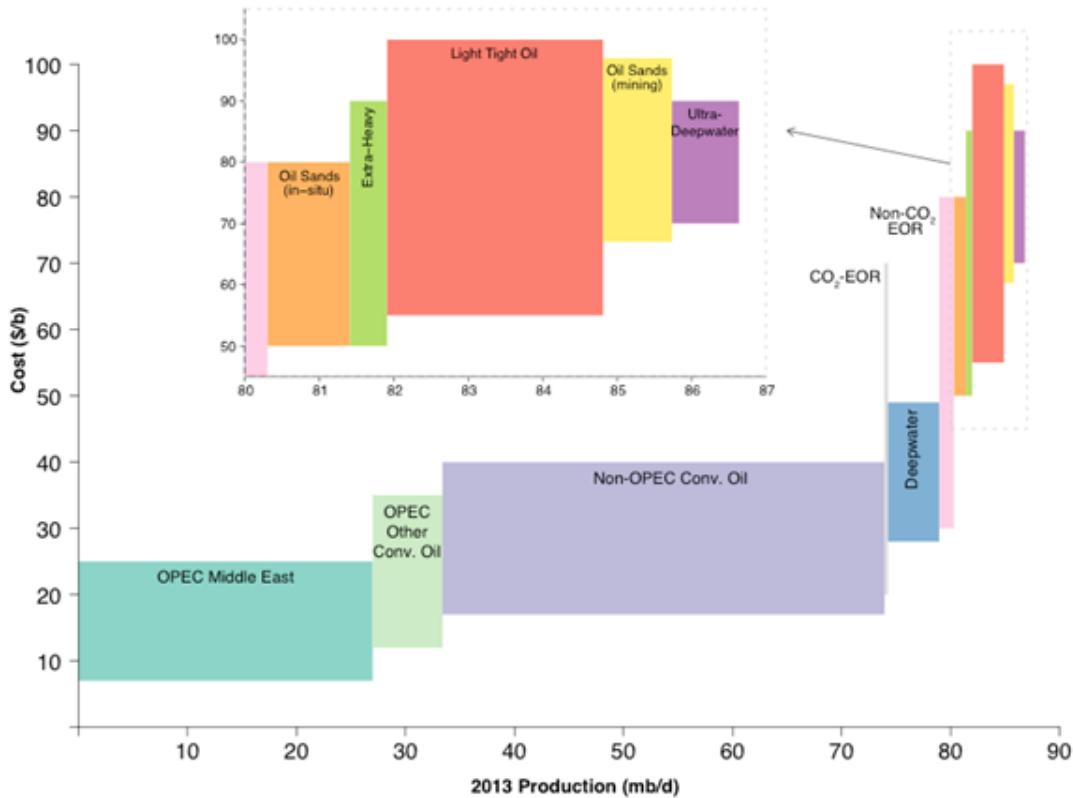
207. The high production cost of oil sands bitumen, as compared to conventional oil products, based on 2013 costs and production levels is illustrated in the figure below. The figure includes an exploded view of the high cost unconventional oil supplies, two of which are oil sands bitumen extracted *in situ* and oil sands bitumen extracted by mining, which supplied a total of 6 mbd in 2013.³

³ Conventional oil production is separated into several resource categories. OPEC countries in the Middle East are the least costly source of oil and produced 27 mbd in 2013. Other OPEC countries in Africa and South America produced 6.4 mbd of conventional oil and non OPEC countries produced another 40 mbd. Production of conventional oil from non-OPEC countries costs \$12-\$40 per barrel.

Heavy oil production (oil sands and extra heavy oil) was about 2.6 mbd in 2013. Oil sands supply costs from *in situ* extraction methods range from \$50-\$80/b while the cost range for oil sands from mining is estimated to be about \$17 higher with lower carbon intensities. Production in 2013 of about 2 mbd from the oil sands was equally split between *in situ* and mining.

City of Vancouver - Appendix 13 - *Mark Jaccard* - [A4L7X1](#) at PDF page 50

Figure 7 Daily snapshot of global oil production in 2013



City of Vancouver - Appendix 13 - *Mark Jaccard* – ([A4L7X1](#)), at PDF page 18

208. The Harrison Report focuses on government action to reduce carbon emissions in countries that were originally identified by Trans Mountain in its application materials as the target markets for the increased volume of oil sands bitumen that would be transported by the pipeline and exported by tanker from the Westridge Marine Terminal. At the time of the filing of the TMEP application on December 16, 2013 and throughout the two years that followed, Trans Mountain's application and its evidence was premised on the assumption that five countries would provide the necessary demand for Alberta oil sands crude to justify the need for the TMEP:

a. USA/California

b. Japan

c. South Korea

d. China

e. India

209. The Muse Stancil Report significantly alters the market assumptions upon which the need for the TMEP was previously based and assumes, without any factual foundation, that China will provide an immediate and substantial market for Alberta oil sands crude shipped on the TMEP. This assumption is wholly unreasonable and the entire analysis in the Muse Stancil Report as to the economic feasibility of and need for the TMEP should be rejected for the reasons outlined above [paras. 164 to 172].

New Climate Policies are Inevitable

210. A number of proactive measures have already been put in place by governments outside of Canada including: demands for greater fuel economy from motor vehicles; regulating the life cycle emissions of transportation fuels; actively promoting alternate transportation fuels and vehicle technologies; and pricing of carbon emissions. In addition to these existing measures, Professor Harrison concludes that fuel and vehicle standards in place today in the USA, Japan and South Korea will be regularly strengthened in years to come and that carbon pricing regimes will be extended with a steadily increasing price. This will result in a decrease in the demand for oil in the US, Japan and South Korea.

City of Vancouver Written Evidence - Appendix 10 - *Kathryn Harrison Report –*
(A4L7W8), at PDF page 11

211. While greater uncertainty exists in China and India with respect to the implications of public policy change for petroleum consumption in those countries, in the last decade both China and India have matched the strictest global standards for fuel efficiency, and these countries are also actively pursuing low-carbon economic opportunities.

*City of Vancouver Written Evidence - Appendix 10 - Kathryn Harrison Report -
[\(A4L7W8\)](#), at PDF page 11*

212. China has announced that it will cap its GHG emissions by 2030 at the latest, which will mean rapid policy changes in that country over the next two decades in order to meet that target. China's commitment to reduce GHG emissions also provides reassurance to developed and developing countries alike, and contributed significantly to the Paris Climate Agreement reached at the 21st Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in Paris 2015.

*City of Vancouver Written Evidence - Appendix 10 - Kathryn Harrison Report –
[\(A4L7W8\)](#), at PDF page 12*

"Past experience suggests that the next three decades will bring dramatic changes in the environmental laws of both developed and developing countries. A period of less than two decades in the late twentieth century saw developed countries such as Canada, the US and Japan pass numerous environmental laws, establish new regulatory bodies, and promulgate regulations for a broad range of industrial sectors and product categories with resulting dramatic reduction of air and water pollution. These countries are now turning their attention to climate change and it is likely that a similar pace of policy change with respect to fossil fuels and greenhouse gas emissions will occur in the decades to come.

"The rate of policy change can be expected to be even greater in developing countries which are just beginning to turn serious attention to pollution control. While these countries have a great deal of catching up to do in establishing their environmental policy regimes, it is striking that rapidly developing countries such as China and India are increasingly matching environmental standards of their wealthier counterparts."

*City of Vancouver Written Evidence - Appendix 10 - Kathryn
Harrison Report – [\(A4L7W8\)](#), at PDF page 11*

213. Professor Harrison concludes that the decade from 2015 to 2025 will see a 50% improvement in fuel economy limits and an overall reduction in fuel consumption.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report -*
[A4L7W8](#) at PDF page 18

214. The governments in the USA, Japan, China, South Korea, and India have plans to introduce or strengthen policies that will have the effect of reducing demand for oil between 2015 and 2030. For example, in 2006, California passed Assembly Bill 32 (AB32), also known as the Global Warming Solutions Act, which requires that the state reduce its GHG emissions to approximately 15% below 1990 levels by 2020, and 80% below 1990 levels by 2050. In pursuit of the longer-term goal, in April 2015 Governor Brown directed state officials to devise additional strategies to achieve a target of a 40% reduction below 1990 levels by 2030. The Harrison Report concludes that, with transportation accounting for 40% of California's GHG emissions, policies to curb petroleum consumption have been and will continue to be central to California's emission control strategies.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report -*
[A4L7W8](#) at PDF page 24

215. Another example is the fuel economy standards recently established in the US. Standards introduced in 2010 are being phased in from 2012 to 2016, at which point fuel economy is expected to be 29% higher and CO2 emissions 26% less than in 2009. In 2012, the US established follow-on standards covering the years 2017 to 2025. These new standards will achieve an additional 45% increase in fuel economy and 35% reduction in GHG emissions.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report -*
[A4L7W8](#) at PDF page 25

216. Finally, the California Low Carbon Fuel Standard (LCFS) adopted in 2009 is the first fuel standard globally to limit carbon emissions from transportation fuels on a "well to wheels" basis. The regulation establishes carbon-intensity scores for various transportation fuels, with lower scores for biofuels and higher scores for unconventional oil, such as that derived from Alberta oil sands production. While the LCFS allows fuel retailers flexibility, for instance to offset higher-intensity petroleum with lower-intensity biofuels, the Harrison Report concludes that the combination of higher scores for

Alberta's oil sands bitumen (with three or more times greater production related emissions than many conventional crudes) and the mandate to reduce carbon-intensity of the blend over time will tend to deter reliance on higher-intensity sources such as Alberta's oil sands bitumen. Following the mandate of AB32 to achieve an 80% reduction below 1990 emissions by 2050, California is planning for deeper reductions in carbon intensity of transportation fuels after 2020⁴.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report* – ([A4L7W8](#)), at PDF page 27

217. The California LCFS mandate on carbon intensity of fuels was upheld in 2013 by a US Appeals Court and in 2014 the Supreme Court denied leave to appeal. Following these rulings, the states of Oregon, Washington, and Massachusetts are now moving to follow California's lead.

218. While the Muse Stancil Report has assumed that the US market for oil sands crude will shift from California to Hawaii, it is reasonable to expect that the carbon emissions reduction initiatives that have been successfully advanced in California will also be adopted in other US states, including Hawaii. These efforts will further reduce the demand in the US market for Alberta oil sands bitumen.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report* – ([A4L7W8](#)), at PDF page 28

219. The Harrison Report summarizes the impact of the US regulatory regime and policies to reduce GHG emissions, some of which are identified above, noting that demand for oil in California is expected to fall by 9 to 13% in the six-year period from 2014 to 2020. This estimated decline in demand does not include projections for the

⁴ Alberta's oil sands bitumen yields life cycle emissions of between 720 and 810 kg CO₂eq/bbl compared to many conventional crude oils with life cycle emissions below 500 kg CO₂eq/bbl. To the extent that the assumptions underlying California's low carbon fuel standard reflect these further differences the competitiveness of Alberta oil sand's bitumen will be even more negatively affected relative to conventional oil sources: City of Vancouver Written Evidence - Appendix 10 - *Kathryn Harrison Report* - [A4L7W8](#) at PDF page 28

continued tightening of each of these policies post-2020, which can be expected based on both the national 2025 target and California's longer term goals in AB32.

Other Examples – China and South Korea

220. China first adopted fuel efficiency standards in 2005, specifying a maximum fuel use for each of 16 categories based on vehicle weight. Since then new targets have been introduced every 3 years, in 2008, 2011, and the most recent (still draft) phase 4 standards which were released in 2014 specifying a schedule extending to 2020. There is every expectation that fuel efficiency standards will continue to be tightened after 2020.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report –*
[\(A4L7W8\)](#), at PDF page 42

221. In September 2014, China's State Council approved the National Plan for Addressing Climate Change, 2014 to 2020, which includes the target to reduce emissions intensity by 40 to 45% by 2020 relative to 2005, and to increase the non-fossil fuel share of primary energy to 15% by 2020. This plan is expected to dictate energy and emissions related targets in the next 5-year plan.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report –*
[\(A4L7W8\)](#), at PDF page 42

222. China has also begun to phase out fossil fuel subsidies and it is projected that these subsidies will be completely eliminated within 10 years.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report –*
[\(A4L7W8\)](#), at PDF page 43

223. China's Energy Saving and New Energy Automotive Industry Development Plan, finalized in 2012, seeks to promote a *full* transition to electric vehicles, with interim production goals of 500,000 electric and hybrid vehicles by 2015 and 5 million by 2020. A subsequent 2014 transportation action plan committed to scrap 6 million dirty vehicles by the end of the year and 5 million more by the end of 2015.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report –*
[\(A4L7W8\)](#), at PDF page 44

224. China's commitment in the 2011 to 2015 5-year plan to increase national reliance on natural gas to 8% of total energy, combined with pressure to improve air quality, also has indirectly prompted local governments to create their own policies to increase reliance on natural gas vehicles. In response, the number of natural gas vehicles has grown dramatically in recent years including a jump from 1 to 1.5 million vehicles from 2011 to 2012 alone. Efforts are also underway to promote alternative modes of transportation, including piloting of low carbon transportation systems in 26 Chinese cities.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report –*
[\(A4L7W8\)](#), at PDF page 44

225. In addition to these fuel efficiency and energy alternative initiatives, China has adopted a 5-year plan which expressly encourages the use of market mechanisms to achieve GHG emission reduction goals. In response to this 5-year plan, 7 provinces and cities (Beijing, Chongqing, Guangdong, Hubei, Shanghai, Shenzhen and Tianjin), which together account for 18% of China's population and 27% of GDP, are piloting CO2 emissions trading. As well, in August 2014, it was announced that China will launch a national emissions trading market by 2016. Further details emerging in 2015 indicate that the initial target sectors will be power generation, metallurgical industries, nonferrous metals, building materials, chemicals and aviation.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report –*
[\(A4L7W8\)](#), at PDF page 45

South Korea

226. South Korea has demonstrated leadership in Asia on both climate change broadly and transportation emissions more specifically:

- The government has committed to spending 2% of national GDP on the transition to a low carbon economy.
- The National Strategy for Green Growth, 2009-2030, seeks increased energy independence through reduced reliance on imported fossil fuels. This strategy became law with the adoption of the Framework Act on Low Carbon Green

Growth in 2010. The national goals include a 27 to 30% reduction below the 2005 business as usual projection for 2030 and matching the energy efficiency performance of OECD countries.

- The first National Energy Master Plan, for 2008 to 2030, set complementary goals to reduce energy intensity by 47% relative to 2006 by 2030 and to reduce dependence on oil imports by 2030 by 33%.
- The 5-year growth plan for 2009- 2013 included some 600 projects related to green growth.
- The 2009 Sustainable Transportation Logistics Development Act, amended in 2013, directs state and local authorities to develop 10-year implementation plans to reduce GHG emissions from transportation consistent with national targets concerning mass transit, traffic management, and promotion of carbon-free transportation options

City of Vancouver Written Evidence - Appendix 10 - Kathryn Harrison Report – ([A4L7W8](#)), at PDF page 36 and 37

227. South Korea's oil consumption was relatively stable in the first decade of the 21st century and is projected to decline in coming decades. Similarly, the Harrison Report finds that Japan's tightening fuel economy standards, which are reinforced by a host of fiscal measures, incentives for development of electric vehicles, and investments in transit and urban design to promote alternative modes of transport, are all expected to yield a decline in petroleum consumption going forward.

City of Vancouver Written Evidence - Appendix 10 - Kathryn Harrison Report – ([A4L7W8](#)), at PDF page 31 and 36

228. The Harrison Report also notes that, in the event that Canada takes little or no action to reduce emissions, other countries may also apply border measures that would disadvantage high-emitting oil products such as the Alberta oil sands bitumen. The potential impact of border taxes on Canadian imports will, of course, depend on the comparative stringency of Canada's regulation of GHG emissions from oil production

and transport. However, the effect of border taxes in destination countries could be significant in decreasing the competitiveness of Canada's relatively carbon intensive oil exports.

City of Vancouver Written Evidence - *Appendix 10 - Kathryn Harrison Report* – ([A4L7W8](#)), at PDF page 17

229. Whether or not border tax adjustment tariffs are introduced, the point is that policy decisions to reduce emissions and oil consumption internationally are and will continue to be taken independently of the policy choices made by the Canadian government, with significant impacts on the demand for Alberta oil sands bitumen.

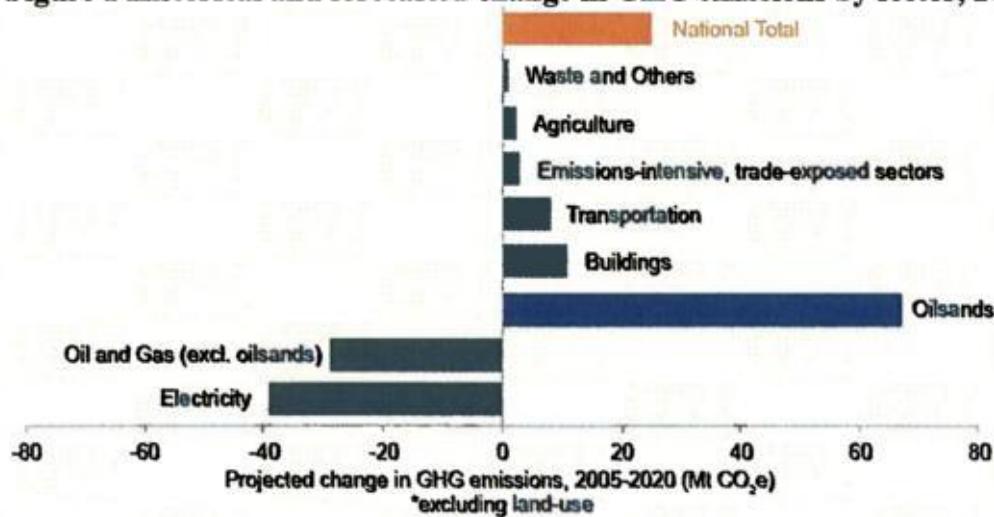
c) Economic Evidence

230. The findings in the Harrison Report are consistent with the work of the leading economists that have researched the impacts of the global commitment to limit global warming to 2°C on demand for oil and, more specifically, unconventional oil products such as oil sands bitumen. One such analysis concludes that 74% of Canadian oil reserves will remain unused as a result of global regulatory measures to limit global warming.

City of Vancouver Written Evidence – *Appendix 12 – The geographical distribution of fossil fuels unused when limiting global warming to 2C* – ([A4L7X0](#)), at PDF page 4

231. The disproportionate contribution of oilsands bitumen production to Canada's total GHG emissions is illustrated in the figure below. While Canada's target for annual GHG emissions in 2020 is 612 megatonnes (Mt) of CO₂e, a decrease of 125 Mt CO₂e from 2005 emissions, actual emissions are instead forecast to be 760 Mt annually by 2020. This is an *increase* of 23 Mt over 2005 GHG emissions, the majority of which is attributable to oilsands production.

Figure 1 Historical and forecasted change in GHG emissions by sector, 2005-2020



City of Vancouver Written Evidence - *Appendix 13 - Mark Jaccard – ([A4L7X1](#))*, at PDF page 9

232. The implementation of climate policies internationally to meet the 2°C cap, such as those identified in the Harrison Report, is projected to have the effect of lowering global oil demand from almost 90 million barrels per day in 2013 to 63 million barrels per day in 2050.

City of Vancouver Written Evidence - *Appendix 13 - Mark Jaccard – ([A4L7X1](#))*, at PDF page 8

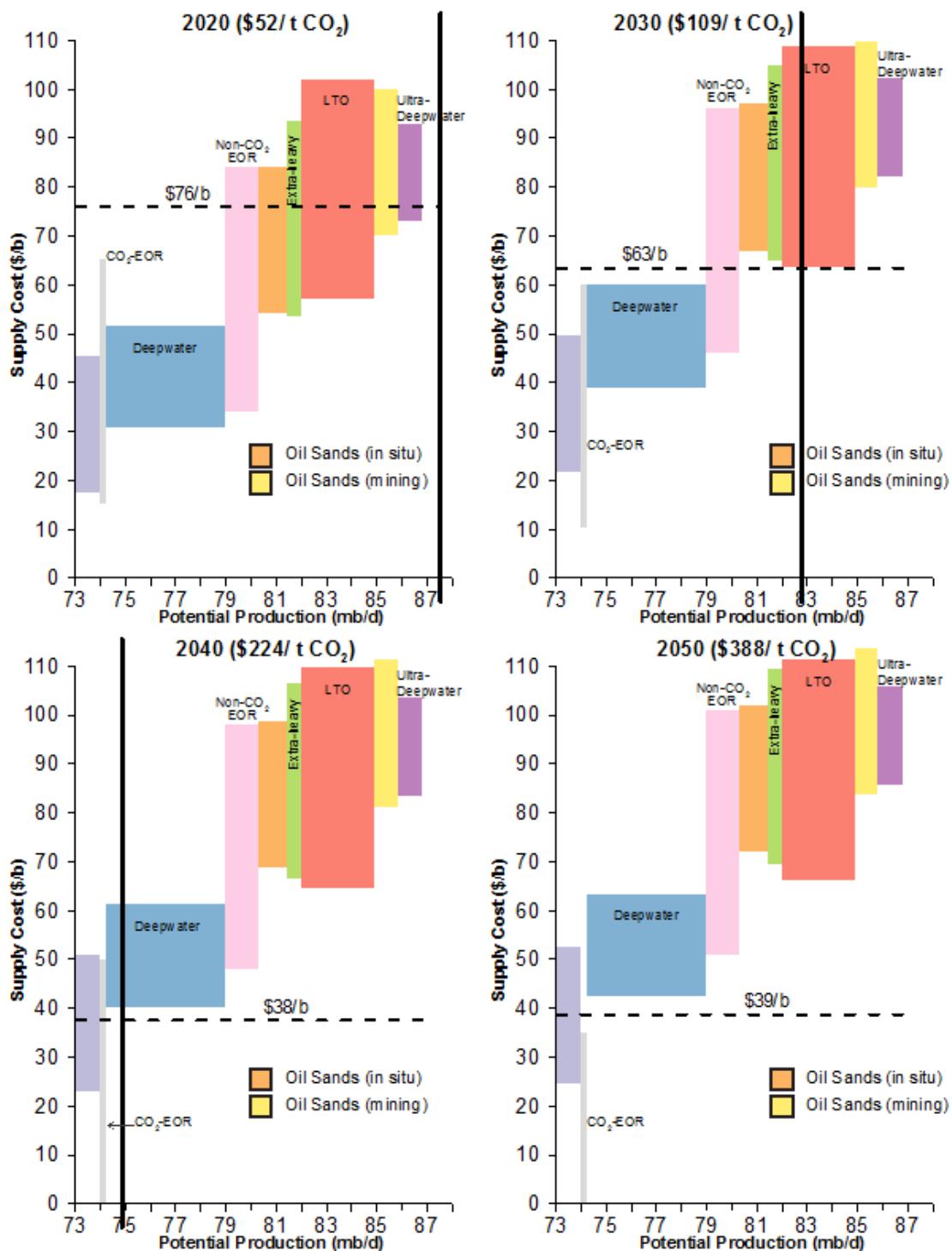
233. As a result of this falling demand, the average world oil price would also fall significantly below current projections. As Dr. Jaccard explains in his written evidence, the falling demand and corresponding drop in oil prices is the result of three related developments:

- a. the effective global carbon price representing the regulatory measures required to meet the 2°C cap will rise over time from \$52/tC02e in 2020 to \$388/tC02e in 2050 ;
- b. this rising carbon price will reduce the annual demand for oil from 87.5 mbd in 2020 to 62.7 mbd in 2050 (demand is represented by the solid black vertical line in the figure below); and

- c. this decreasing demand creates a buyer's market in which the oil price falls to an average of the production cost of the marginal producers of \$76 per barrel in 2020, \$63 per barrel in 2030, and \$39 per barrel in 2040 and 2050.

City of Vancouver Written Evidence - *Appendix 13 - Mark Jaccard –*
(A4L7X1), at PDF pages 16 and 50

Figure 9 Daily snapshot of oil resources, oil demand, carbon price and oil price from 2020 to 2050 for high cost resources in Figure 8.



234. In reality, the measures taken to meet the 2°C cap will not be restricted to a single carbon pricing mechanism. Emission reduction occurs through improvements in energy

efficiency, substitution toward low-emission sources of energy, and the adoption of carbon capture and storage whenever using fossil fuels. As the Harrison Report makes clear, many of the markets that Trans Mountain relies on in its evidence as the basis for its assessment of the need for and economic benefits of the TMEP have begun to implement regulations and policies which include a combination of carbon pricing and fuel efficiency measures to reduce emissions. However, both of these approaches ultimately result in reductions in demand for oil products generally and, as Professor Harrison points out, in many cases the resulting decline in demand for the high-emissions producing Alberta oil sands bitumen will be even more pronounced.

235. Dr. Jaccard's economic analysis, which is supported by the actual emissions-reducing measures identified in the Harrison Report, demonstrates that oil sands bitumen, one of the most expensive oil products to produce, will be uncompetitive long before 2040. The lower oil prices and the falling demand for unconventional oil means that production levels for oil sands bitumen will peak in the near future and then will begin to decline over time. There will be no need for the expanded pipeline capacity created by the proposed TMEP.

236. Dr. Jaccard's evidence is that, even in the immediate future, the combination of low oil prices and high production costs for oil sands will render uneconomic new investment in oil sands production. In fact, a number of oil sands producers have already announced significant cuts to their capital expenditures in response to the drop in oil prices experienced since the beginning of 2014. Suncor announced cuts of 13%, Cenovus Energy announced cuts of 27% and NEG Energy announced cuts of 75%.

City of Vancouver Written Evidence - *Appendix 13 - Mark Jaccard –*
[\(A4L7X1\)](#), at PDF page 45;

City of Vancouver Written Evidence – *Appendix 14 – HSBC Report –*[\(A4L7X2\)](#), at PDF
page 23

237. Thus, even without taking into account the future impact of regulatory measures to reduce GHG emissions on oil sands production, the need for new pipeline capacity serving oil sands producers has already been vastly reduced by existing and planned cuts to capital expenditures by these same producers.

238. It is important to bear in mind that Dr. Jaccard's analysis does not take into account the significant drop in oil prices that has been experienced since the beginning of 2014, and which is projected to continue until 2020 and, under the IEA's Low Oil Price scenario, will remain below \$85 US per barrel well past the forecast period. The drop in oil prices that Dr. Jaccard forecasts is based solely on the impacts of regulatory measures required to meet a 2°C cap.

239. As previously noted, the Muse Stancil report relies on an outdated 2014 forecast from the IEA that estimates prices will remain above \$100 per barrel throughout the forecast period. The more recent 2015 report from the IEA provides two forecast scenarios, one that assumes oil prices will remain below \$80 until 2020 and gradually rise after that, and one that assumes oil prices will remain in the \$50-\$60 range until 2020 and gradually rise to \$85 by 2048. Wolak (2015) recently forecasted oil prices to stay in the range of \$50 to \$70 per barrel for the next 10 - 20 years. Trans Mountain has failed to provide any analysis of the need for or the economic feasibility of the TMEP in the event that prices remain well below \$100 per barrel for the next 20 years. In the absence of this evidence, the Board cannot find that the TMEP is in the public interest and must recommend against approval of the project.

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al* – ([A4W0R4](#)), at PDF page 46

Wolak, Frank (March 2015) SIEPR Policy Brief – The End of Expensive Oil – March 2015 - http://web.stanford.edu/group/fwolak/cgi-bin/sites/default/files/Policy%20Brief%2003_15_wolak.pdf

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al* – ([A4W0R4](#)), at PDF page 31

240. Finally, even if the Board were to accept Trans Mountain's forecast for a rebound in oil prices, Dr. Jaccard's analysis, illustrated in the figure above, demonstrates that global GHG regulations will gradually erode oil prices so that, by as early as 2020 the price of oil will be too low for economic extraction of bitumen by mining. Mining of bitumen represents close to half of the total volume of Alberta's oil sands production. The extraction of bitumen in situ will become uneconomic by 2030.

d) Regulatory action by Canada's Federal and Provincial Governments to reduce GHG emissions in order to meet its International commitments will result in production levels below those forecast by Trans Mountain

241. The Auditor General of Canada's Commissioner of the Environment and Sustainable Development released a report in 2012 ("Meeting Canada's 2020 Climate Change Commitments") which concluded that Canada is on a path to be 74% above its 2005 level of GHG emissions instead of the targeted 17% below. The report noted that because the government had done little in terms of implementing its promised regulatory policies, such as regulations on oil and gas, it is unlikely that enough time is left to develop and establish GHG regulations to meet the 2020 target.

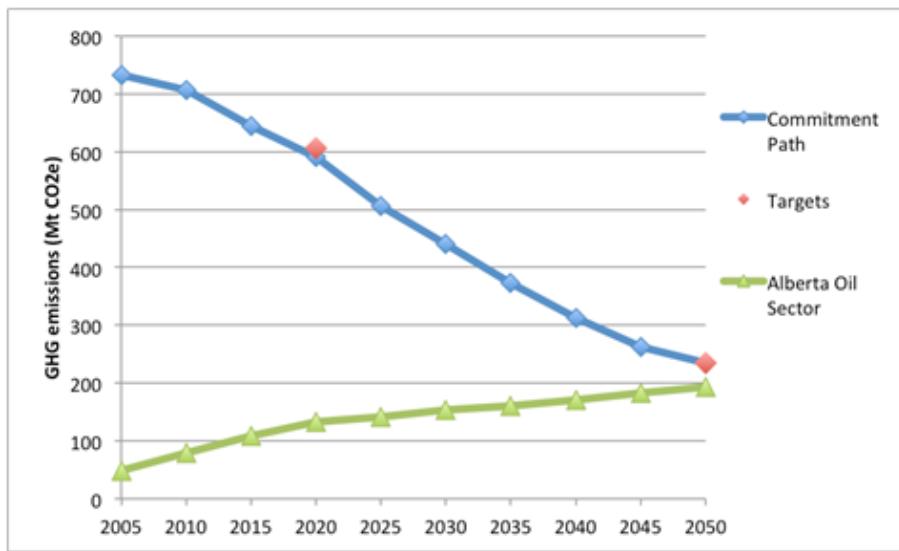
City of Vancouver Written Evidence – *Appendix 13 – Mark Jaccard –*
[\(A4L7X1\)](#), at PDF pages 40 and 66;
City of Vancouver Written Evidence – *Appendix 13 – Mark Jaccard –* ([\(A4L7X1\)](#), at PDF
page 8

242. Absent the introduction of new climate policies, Canada will also not meet its 2050 commitment to reduce GHG emissions to 235 MtCO₂e, a 65% reduction below 2005 levels. Before the federal government eliminated the National Round Table on the Environment and the Economy (NRTEE), that consultative body was asked by the government to produce two reports, "Getting to 2050" in 2007 and "Achieving 2050" in 2009, both of which showed how carbon pricing alongside complementary regulations could achieve Canada's 2050 commitment. The NRTEE estimated business-as-usual (BAU) GHG emissions in 2050 at 868 Mt, almost four times Canada's targeted GHG commitment.

243. Since the NRTEE studies, Canada has implemented very few climate policies. The Jaccard Report calculates the impacts of these policies on the business-as-usual estimate for 2050 to arrive at a forecast of 778 Mt of GHG emissions in 2050, which still exceeds the 2050 target emissions by 543 Mt.

244. Using the long-term forecast from the Canadian Energy Research Institute to estimate Canadian oil production in 2050, which does not take into account the impact of international regulatory action to meet the 2°C discussed above, the Jaccard Report forecasts the amount of GHG emissions that would be generated from Alberta's oil sector on an annual basis by 2050, concluding that of the 235 Mt that Canada has committed to for 2050, GHG emissions would make up 193 Mt or 80% of total allowable national emissions. This would mean that virtually all other emissions in Canada would have to be eliminated in order for Canada to meet its 2050 target.

Figure 3 Canadian government commitment and oil sands emissions



245. The Jaccard Report modelled regulations and a carbon pricing policy over the period 2015 to 2050 which would achieve the reduction of Canadian emissions to the 2050 target emissions of 235 Mt CO₂e. The costs in Table 5 below are the sum of: (1)

normal costs of oil sands production; (2) costs per barrel for any amount of carbon capture and storage that becomes economic at each level of the rising carbon price; and (3) the carbon fees paid for any residual CO₂ emissions. These values exclude the cost of oil upgrading.

City of Vancouver Written Evidence – *Appendix 13 – Mark Jaccard* – ([A4L7X1](#)), at PDF page 13

Table 5 Permit price effect on oil sands production costs (\$/b)

Technology	2010	2015	2020	2025	2030	2035	2040	2045	2050
In situ	57	68	69	75	78	80	82	82	82
Mining	74	82	83	87	90	91	92	92	92

From Kniewasser (see reference at footnote 4)

246. With these increased production costs, plus additional upgrading and transport costs that are not included in the table above, the price of oil would need to be sustained at a much higher level than is currently available in the market for the next three to four decades to attract investment that would expand oil sands output. Vancouver's evidence of the impact of international regulatory measures on oil demand and oil prices going forward demonstrates that these higher prices simply are not achievable.

City of Vancouver Written Evidence - *Appendix 13 - Mark Jaccard* – ([A4L7X1](#)), at PDF page 14

247. Studies by the Canadian Energy Research Institute (CERI 2014) estimate the WTI prices (2013 USD) needed to justify oil sands expansion are \$85 for in situ projects and \$105 for mining projects

Living Oceans Supplemental Written Evidence – *Replacement for Attachment F: Public Interest Evaluation, Dr. Gunton et al* – ([A4W0R4](#)), at PDF page 46

248. A recent report from HSBC also highlights the impact of new climate change regulations on the economic viability of fossil fuel production. The report notes, for

example, that the European Union has a target of 20% renewables in the energy mix by 2020. Further a number of countries have announced their intentions to achieve emission reductions through national legislation in preparation for a universal climate agreement at the World Climate Summit this year.

City of Vancouver Written Evidence - Appendix 14 - HSBC report - stranded assets: what next – ([A4L7X2](#)), at PDF page 12

Table 1 lists INDCs released to date.

Table 1: INDC summary					
Country	Pledge	Reduction by	Base year	Long term pledge	Comments
Switzerland	50%	2030	1990	Reduce emissions by 70-85% by 2050 compared to 1990. Reduce per capita emissions in Switzerland to 1.5 t CO ₂ eq.	Carbon credits from international mechanisms will partly be used
EU	40%	2030	1990	Reduce its emissions by 80-95% by 2050 compared to 1990.	No contribution from international credits
Norway	40%	2030	1990	Achieve a low emission society by 2050.	Target is to be met through collective delivery with the EU International market credits will not be used to achieve the target, however it will continue to use CDM and JI
Mexico	25%	2030	2013	Reduce emissions by 50% by 2050 compared to 2000.	Net emissions peak starting around 2026, thereby reducing GHG intensity of GDP by 40% by 2030. Reduction ambition could increase up to a 40% subject to a global agreement. Adaptation goals mentioned.
USA	26-28%	2025	2005	Reductions of 80% or more by 2050.	Aim to reduce emissions by 28%. No contribution from international credits.
Russia	25-30%	2030	1990	Russia aims to use the 2030 target as a stepping stone towards developing a low-carbon long-term objective.	Commitment to the INDC will be based on the outcome of Paris. Emission reduction includes the absorption capacity of the Russian boreal forests.
Gabon	50%	2025	2000	Emergent Strategic plan 2010-2025 is to be extended to 2030, 2050, prior to COP21.	Includes land management, gas flaring reductions, energy efficiency and hydro power growth.

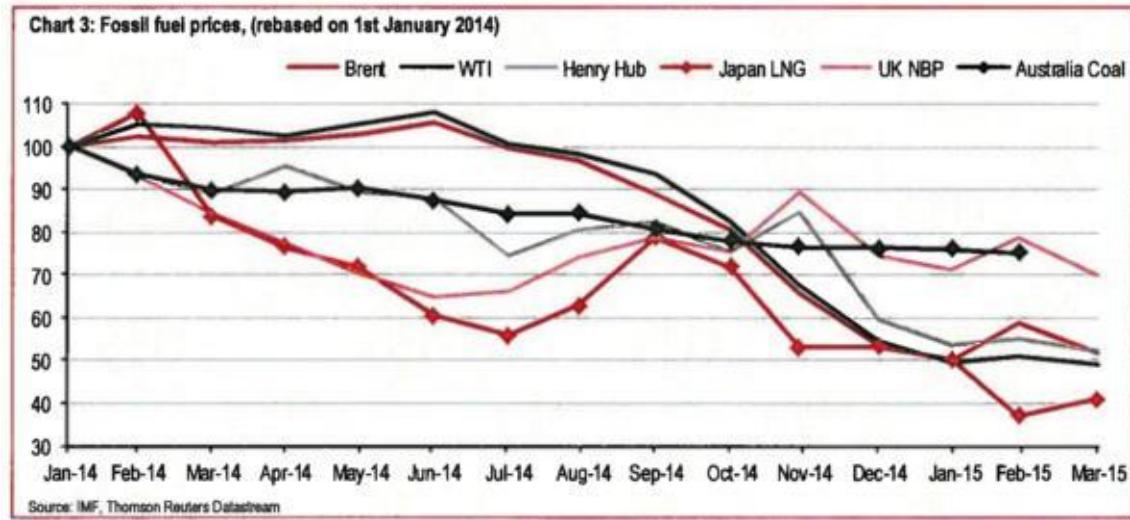
Source: UNFCCC

City of Vancouver Written Evidence - Appendix 14 - HSBC report - stranded assets: what next – ([A4L7X2](#)), at PDF page 8 and 9

249. HSBC concludes in its report that new climate change regulation will continue to increase the cost of emitting GHGs through taxes and emissions trading schemes, thereby posing further downside risks to more carbon intensive projects.

City of Vancouver Written Evidence - Appendix 14 - HSBC report - stranded assets: what next – ([A4L7X2](#)), at PDF page 8

250. In addition to the impact of new climate change regulations on the economic viability of fossil fuel production, HSBC identifies the dramatic drop in oil prices since the beginning of 2014 as a significant risk for stranded assets both in the short term and permanently. The chart below shows the drop in oil prices in the period January 2014 through to March 2015.



City of Vancouver Written Evidence - *Appendix 14 - HSBC report - stranded assets: what next* – ([A4L7X2](#)), at PDF page 10

251. Between August 2014 and April 2015, the global market value of oil and gas companies had dropped by over USD \$580 billion. Since that time the price of oil has continued to fall and, with it the market value of oil and gas companies. For example, the market capitalisation of Trans Mountain's parent company, Kinder Morgan Inc. was \$94 billion USD in April 2015 and dropped to \$33.74 billion in December 2015.

City of Vancouver Written Evidence - *Appendix 14 - HSBC report - stranded assets: what next* – ([A4L7X2](#)), at PDF page 2

252. The third factor identified in the HSBC Report as contributing to the stranding of assets is the ongoing innovation in energy sector including innovation in energy efficiency and technologies. These innovations will result in lower demand for energy use generally and an economically driven “decarbonisation” of the energy sector, meaning that high carbon and high cost fossil fuels, such as oil sands bitumen, will be further stranded.

City of Vancouver Written Evidence - *Appendix 14 - HSBC report - stranded assets: what next* – ([A4L7X2](#)), at PDF page 10-13

e) Contribution of the TMEP to GHG Emissions

253. TMEP will substantially increase pipeline operating emissions and marine operating emissions. The existing land-based emissions are reported as 169,100 tCO₂e / year, which are comprised of all existing Trans Mountain Assets, including direct combustion, fleet and fugitive emissions, and indirect electricity emissions. The existing marine GHG emissions are reported as 13,410 tCO₂e/year. The Project will result in projected increases of 1,083,000 tCO₂e/year and 72,081 tCO₂e/yr for the land- and marine-based operations respectively.

Trans Mountain Pipeline ULC - *Response to City of Vancouver IR No. 1* ([A3Y2G6](#)), at PDF page 63

254. The TMEP therefore results in a seven-fold increase in the operating GHG emissions for the pipeline, an increase that is disproportionately higher than increase in throughput (seven-fold increase in operating emissions, tripling of oil throughput).

TABLE 1.04.04A-1

A COMPARISON OF TRANS MOUNTAIN'S CURRENT (EXISTING CASE) AND PROJECT'S LAND-BASED GHG EMISSIONS (IN TONNES CO₂E/Y)

Existing Emissions	Project Emissions	Emissions (Application Case)
169,100 ¹	1,083,000 ²	1,252,000 ³

Notes: 1. Table 4.38 of Technical Report 5C-4 in Volume 5C, Air Quality and Greenhouse Gas Technical Report (RWDI December 2013).
2. Table 6.8 of Technical Report 5C-4 in Volume 5C.
3. Table 8.1 of Technical Report 5C-4 in Volume 5C.

TABLE 1.04.04A-2

A COMPARISON OF TRANS MOUNTAIN'S CURRENT (EXISTING CASE) AND PROJECT'S MARINE GHG EMISSIONS (IN TONNES CO₂E/Y)

Existing Emissions	Project Emissions	Emissions (Application Case)
13,410 ¹	72,081 ²	85,491

Notes: 1. Table 4.8 of Technical Report 8B-3 in Volume 8B, Marine Air Quality and Greenhouse Gas – Marine Transportation Technical Report (RWDI December 2013).
2. Table 6.1 of Technical Report 8B-3 in Volume 8B.

Trans Mountain Pipeline ULC - *Response to City of Vancouver IR No. 1* ([A3Y2G6](#)), at PDF page 63

255. However, during its sixth round of information requests, the Board requested that TMP discuss the contributions of the total GHG emissions generated during Project construction and operations to the GHG emissions generated by the Pipelines transmission subsector for the Provinces of Alberta and British Columbia. In response, TMP provided the somewhat surprising answer of a reduction of 3,880 tCO₂e per year as the direct emissions from the TMP.

Trans Mountain Response to NEB IR No. 6 – ([A4R6I4](#)) at PDF page 9

256. Based on the City of Vancouver's calculations, Trans Mountain's emissions show a discrepancy of approximately 800,000 tonnes CO₂e per year between the application and responses to the City of Vancouver during the IR process, and what was stated to the NEB in IR6.

257. It is highly questionable that an additional 590,000 barrels of oil per day could result in reduced emissions, considering that emissions are in many cases influenced by throughput.

Trans Mountain Response to NEB IR No. 4 – ([A4K4W3](#)) at PDF page 28

Trans Mountain Response to City of Vancouver IR No. 2 – ([A4H8I9](#)) at PDF
page 167

258. Further, the response provided by Trans Mountain to the Board is misleading for two reasons. The first is that Trans Mountain's statement of Project emissions does not account for indirect emissions as a result of increased electricity use by the Project. The Board requested total emissions, not just direct emissions.

259. Total emissions are significant under any of the scenarios, with total TMEP emissions (existing plus project) ranging from approximately 530,000 tCO₂e/y to approximately 1.3 MtCO₂e / y. This is a three to seven-fold increase over the currently operating pipeline.

260. During the IR process, Trans Mountain noted that it "will continue to explore opportunities to reduce GHG and other air emissions during the operation of its facilities". However, the reliability of this claim is brought into question as in its response to the third round of information requests by the Board Trans Mountain noted a significant emission reduction strategy: to put the Vapour Combustion Unit on standby, which will ostensibly reduce emissions at the Westridge Marine Terminal by 12,000 tCO₂e/y. In this information request, no equipment changes are noted, suggesting that opportunity is available under existing operating conditions.

Trans Mountain Response to City of Vancouver IR No. 2 – ([A4H8I9](#)) at PDF page 166

Trans Mountain Response to NEB IR No. 3 – ([A4H1V2](#)) at PDF page 176

261. This discussion of operation and construction related GHG emissions also does not take into account the increased GHG emissions from the upstream production of the volume of oil sands crude that would be transported on the TMEP or the downstream use of the oil. The Board ruled against Vancouver's application for consideration of the upstream production activities and downstream uses in the list of issues. However, there can be no dispute that, if these increased GHG emissions were taken into account, the Board's public interest analysis, taking into account as it must the detrimental impacts of the proposed project, would weigh even more heavily in favour of rejection of the TMEP.

V. SUMMARY OF EVIDENCE and ANALYSIS: RISK AND IMPACTS OF AN OIL SPILL (Issues 4, 5, 6, 7, 9, 10, 11 and 12)

262. The City Council resolution on December 18, 2013 directed staff to apply to intervene in the NEB hearing of the TMEP and identified as a major concern the unacceptable risk associated with the expansion of the pipeline facilities and increased tanker traffic to Vancouver, residents and businesses including, but not limited to, risks to Vancouver and the region's vibrant economy, local environment and parks, infrastructure, financial and legal liability, public health, and Vancouver's international brand as one of the world's most liveable cities.

263. The City of Vancouver has a responsibility to assess risk and hazards to the City and its residents. Marine-based oil spills fall under a federal planning and response regime that is different from the emergency planning and response regime in place under the provincial regime (Emergency Management British Columbia) for all other types of hazards. Nonetheless, the consequences of a spill will impact local governments and communities in many ways and require local governments to act to protect the public. This role carries even greater importance in cases where responding agencies do not have the skills, jurisdiction, or capacity to respond effectively and appropriately to an oil spill.

264. The City of Vancouver recognized that many concerns about the Trans Mountain project had not been adequately addressed in the TMEP Application, or subsequently in responses from Trans Mountain during the information request process. This, together with the lack of information provided by Trans Mountain in connection with its emergency response plans and the capacity of Trans Mountain and its contractors to respond to an oil spill, led Vancouver to undertake its own independent assessment of the Project and its impacts.

265. The evidence that Vancouver has put before the Board demonstrates the following:

- a. Pipeline, tank farm and marine-based oil spills have happened in the past and will continue to happen.
- b. The risk of oil spills into Burrard Inlet and the Fraser River are sufficiently high to require an assessment of the impacts of an oil spill on the City of Vancouver, something which Trans Mountain has failed to do. In particular:
 1. the Vancouver Harbour has been identified by Trans Mountain's own expert as an area with an above average hazard rating "due to draft and tidal restriction obstructions from the first and second narrows and the high density traffic within the harbor area";

2. based on Trans Mountain's own evidence, the risk of a tanker spill in Vancouver Harbour is significant, with a 65.5% risk of a terminal or tanker spill in Vancouver Harbour within the first 30 years, increasing to 83% over a 50-year period;
3. The independent risk assessment prepared by Gunton and Broadbent calculates the risk of a marine-based oil spill in Vancouver Harbour with a volume greater than 1,000 barrels to be 87.4% based on the OSRA model; and
4. It is virtually guaranteed (99.9% probability) that there will be an oil spill from the pipeline itself during operations, and it is likely that there will be multiple spills over the lifetime of the Project.

Table 5.15. Comparison of Return Periods and Spill Probabilities for TMEP Terminal and Inner Harbour Spills

Method	Size and Type of Spill	Return Period (in years)	Spill Probability (%)	
			30 Years	50 Years
TMEP Application	Any size tanker spill (Inner Harbour)	580	5.0	8.3
	Terminal spill < 63 bbl	34	58.6	77.0
	Terminal spill < 629 bbl	234	11.6	18.6
	Spill in Inner Harbour (terminal or tanker)	29	65.5	83.0
OSRA Model (International)	Tanker spill in port \geq 1,000 bbl	25	71.1	87.4
	Tanker spill in port \geq 10,000 bbl	109	24.1	36.9

Note: Spill probabilities for TMEP application computed based on return periods from TM (2013, Termpol 3.15) and Trans Mountain (2015). The Inner Harbour in the TMEP application represents segments 1 and 2 in the Termpol 3.15 study; this corresponds to the geographic region between English Bay and Westridge Terminal. The category Spill in Inner Harbour estimated based on the TMEP application represents a terminal spill < 63 bbl, a terminal spill < 629 bbl, and any size tanker spill that occurs in the Inner Harbour. Spill probabilities for OSRA model computed from Anderson et al. (2012).

Tsleil-Waututh Nation Written Evidence - Volume 5 Tab 4A Appendix 1 - Assessment of Spill Risk Report – ([A4L6A6](#)), at PDF pages 114 and 117

- c. A reasonable worst-case oil spill in the Vancouver Harbour or into the Fraser River will have devastating consequences for Vancouver, its residents and businesses and for the environment.
- d. The consequences of a marine-based oil spill into Burrard Inlet or a spill from the pipeline into the Fraser River cannot be sufficiently mitigated. In particular:
 - i. Proposed mitigation measures are not clearly explained, have many gaps, and do not include training and exercising. There is no evidence that Trans Mountain, its contractors (WCMRC) and the government agencies that it relies on, including the Canadian Coast Guard, Environment Canada, and Transport Canada, have developed appropriate plans or programs to minimize the impacts of an oil spill on the City of Vancouver. The evidence before the Board is that existing plans and programs are undergoing revisions, but there is no evidence on which the Board can conclude that any future plans or programs will sufficiently mitigate the impacts of a spill of diluted bitumen from a tanker on the City, the public, the environment and the economy.
 - ii. Regardless of the investment in preparedness, there are conditions under which no response will be possible.
 - iii. Even under the most optimal conditions for oil spill response and recovery, only a small percentage of oil spilled can be contained and recovered. In the case of an oil spill in Burrard Inlet, oil will quickly strand on Vancouver's beaches and shoreline, resulting in much more difficult and costly clean-up efforts. Further, diluted bitumen can be expected to submerge within a short period of time, as little as 24 hours after the spill, and, given the current lack of recovery technology for submerged oil, has the potential to remain in the marine environment indefinitely.

266. The City of Vancouver asks the Board to find that:

- a. The evidence demonstrates that the TMEP is likely to cause significant adverse environmental effects, including significant adverse socio-economic impacts on the City of Vancouver, its residents, businesses and environment; and
- b. The TMEP is not in the Public Interest because these adverse impacts far outweigh any possible benefits.

A. Spills have happened in the Past and will continue to happen

267. Throughout Trans Mountain’s application for the TMEP, reference is made to the existing pipeline (Line 1) which, according to Trans Mountain, has “been operating safely for more than 60 years.” It is important to note at the outset that the original pipeline approval process for what is now Line 1 did not involve a public hearing and no environmental assessment occurred. The Line 1 operations are of no assistance to Trans Mountain in the assessment of the proposed TMEP, particularly given the history of oil spills and other incidents from the existing facilities (discussed below).

City of Vancouver Written Evidence - *Appendix 18 – Sean Kheraj Report* – ([A4L7X6](#)), at
PDF page 14

268. Further, with respect to tanker traffic from the WMT, the shipment of large volumes of diluted bitumen by tanker is a relatively recent development. For the first 30 years of Trans Mountain’s pipeline operations, crude oil tanker shipments operated out of the WMT in only ten years and in eight of those ten years, the total annual volume of oil shipped was less than 4 million barrels (equivalent to approximately 10,000 barrels per day).

City of Vancouver Written Evidence - *Appendix 18 – Sean Kheraj Report* – ([A4L7X6](#)), at
PDF page 27

269. Vancouver commissioned an independent expert to conduct a review of the historical operations of the Trans Mountain Pipeline and provide an assessment of the oil spills and other incidents relating to the existing facilities.

270. Professor Kheraj’s report makes the following findings:

1. Between the years 1961 and 2013, Trans Mountain reported 81 oil spill incidents to the NEB, an average annual rate of 1.53 spills per year.
2. The total “uncontained spillage” reported by Trans Mountain in this timeframe is approximately 5,799,700 litres.
3. Oil spills on the Trans Mountain pipeline have occurred in a random and sporadic fashion, often the result of accidents, hardware failures, material failures or unforeseen causes.
4. The causes of the most environmentally disastrous oil spills included human error and forces of nature.
5. Nearly 57% of the total oil spill volume since 1961 occurred in three years 1966, 1977 and 1985, a pattern of one spill per decade. However, there have been three substantial oil spills on the Trans Mountain Pipeline in the recent past all of which occurred in or around the lower mainland:
 - a. In July 2005, 210,000 litres of crude oil, affecting 14,300 square metres of land, spilled into Kilgard Creek near Abbotsford, B.C. The Transport Safety Board found that *“delays in emergency response, as well as the time taken to identify the leak increased, the severity of the accident.”* A resident had complained about acrid odours just outside the Sumas tank farm on July 8 2005 but it was not until one week later, on July 15, that a Trans Mountain employee discovered the oil spill.
 - b. On July 24, 2007, approximately 234,000 litres of crude oil spilled from the Westridge Dock Transfer Line, with crude oil spraying twelve to fifteen metres into the air for a period of twenty-five minutes. The spill drained into Burrard Inlet through storm sewers.
 - c. On May 6, 2009, 277,000 litres of light sweet crude oil spilled from one of the tanks at the Burnaby Terminal as a result of the failure of the fitting on the suction pump.

City of Vancouver Written Evidence – ([A4L7K6](#)), at page 21-22; and City of Vancouver Written Evidence - *Appendix 18 – Sean Kheraj Report* – ([A4L7X6](#))

271. Vancouver has also had recent experience with a bunker fuel oil spill from a vessel anchored in Vancouver’s English Bay, situated in Burrard Inlet. The vessel responsible for the incident was the *M/V Marathassa*, was a Panamax-sized bulk grain carrier. The details of the incident are set out in Vancouver’s Written Evidence and are summarized as follows:

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 36 – 44

April 8, 2015

Unknown Bunker C fuel oil begins leaking from the *M/V Marathassa*

4:45 – 5:05 p.m. The first report of the oil spill came from a recreational boater who happened to be out on the water at approximately 4:45 on the afternoon of April 8, 2015.

5:58 p.m. Port Metro Vancouver (PMV) reports to the CCG that there appears to be recoverable pollutant in the area and requested a recovery vessel.

5:58 – 7:55 p.m. A series of miscommunications occurs between the CCG, PMV and WCMRC, delaying activation of response organization. According to the independent report prepared for the CCG:

“A combination of these factors caused a delay in the response. Initially, the lack of clarity on the respective roles and responsibilities followed by a miscommunication between WCMRC and the PMV vessel and then connectivity issues. The earliest possible activation time of PMV was at 18:08h when the CCG provided a notification to WCMRC, the actual activation occurred at 19:57h by the CCG, 1 hour and 49 minutes later.”

Trans Mountain Pipeline ULC – *Reply Evidence – Canadian Coast Guard: Independent Review of the M/V Marathassa Fuel Oil Spill* ([A4S7J6](#)), at PDF page 29

8:00 p.m. The Canadian Coast Guard (“CCG”) directs Western Canada Marine Response Corporation (“WCMRC”) to respond to the spill.

9:25 p.m. First WCMRC crews arrive on-scene.

Trans Mountain Pipeline ULC – *Reply Evidence – Canadian Coast Guard: Independent Review of the M/V Marathassa Fuel Oil Spill – Annex B: Chronology of Events* ([A4S7J6](#)), at PDF page 48-51

April 9, 2015

3:25 a.m. CCG and WCMRC identify *M/V Marathassa* as likely source, after indications of fresh fuel oil being discharged.

4:36 a.m. WCMRC begins deploying boom around *M/V Marathassa*.

5:06 a.m. City of Vancouver informally notified by WCMRC of the spill.

6:00 a.m. WCMRC finishes deploying containment boom around the leaking vessel and skimming operations underway.

10:23 a.m. CCG overflight of area estimates that there is still at least 2,700 litres of oil remaining on the surface of the water covering an estimated area of 6.1 square kilometres.

11:00 a.m. The source of the leak has not yet been established and oil continues to leak from the vessel for several more hours.

Evening Owner of the *M/V Marathassa* acknowledges that its vessel is the source of the leak.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 36 - 38

272. The CCG's estimate that 2,700 litres of oil covered an area of 6.1 square kilometres within the first 18 hours of the spill demonstrates how quickly even a very small oil spill in Burrard Inlet will spread.

273. Further, during the first 24 hours of response, only an estimated 1,000 litres of oil was successfully skimmed from the water. By April 16th, eight days after the spill occurred, a total of only 1,400 litres of oil was recovered. The total volume of oil spilled remains unknown to Vancouver. The Responsible Party has not provided an estimate of how much oil was released from the *M/V Marathassa* and Vancouver has been advised that information about the total volume of oil released calculated through sounding of the vessel tanks cannot be provided as there is an ongoing investigation.

274. However, it is clear from the information that Vancouver does have, that the total volume of oil released from the vessel was well in excess of the 2,700 litres estimated during the overflight at 10:23 a.m. on the morning of April 9, 2015. This must be so for a number of reasons. First, skimming operations had already been underway for some time before the overflight occurred. Second, oil continued to leak from the vessel for several

hours after the overflight. Third, the on-water estimate from the overflight does not account for the volume of oil that was trapped underneath the vessel and was subsequently recovered, or the oil that adhered to the sides of the vessel hull and had to be cleaned off. Fourth, the on-water estimate does not account for the oil that had already stranded on the shoreline.

275. Given that a total of only 1,400 litres of oil was recovered from the spill, it is clear that the actual oil spill recovery rate was only a small fraction of the spill size, likely in the range of 30% or less.

276. Even using a spill size of 2,700 litres, the actual recovery of only 1,400 litres of oil spill represent a 52% recovery rate under average weather and sea-state conditions and with no evidence of any equipment or other malfunctions that would have impeded recovery. This recovery rate is far below the estimates that Trans Mountain (78% recovery for a spill at Haro Strait) relies on in support of its Application for approval of the TMEP.

277. In terms of the conditions for response, there were several occasions during the response where the cleaning of vessel hulls anchored in English Bay was halted due to weather and safety concerns. Operations were halted for vessel cleaning for part of the day on April 13 and most of the day on April 14. The conditions on these days reflected fairly average conditions in the area, with rain on April 13 and winds gusting up to 50 km/hr on April 14.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 37

278. In addition to the delays in reporting, notification and responding to the incident identified in the chronology above, there were also a number of gaps in policy, plans and resources that were observed during the *Marathassa* incident.

279. Trans Mountain relies on Canada's Oil Spill Preparedness and Response Regime to prevent and mitigate spills from tankers transiting to and from Westridge Terminal. However, deficiencies in Canada's Oil Spill Preparedness and Response Regime highlighted during the *M/V Marathassa* spill demonstrate that the system is not capable

of dealing adequately with current risk and relatively smaller sized spills, let alone the increase in risk of large spills from the proposed expansion project. These gaps will be discussed in more detail below on the question of the limitations of the oil spill mitigation measures relied on in the TMEP Application.

B. The risk of oil spills into Burrard Inlet and the Fraser River are sufficiently high to require the Board to assess the impacts of an oil spill on the City of Vancouver.

i. Trans Mountain has not properly assessed the risk of an oil spill in Burrard Inlet

280. Trans Mountain's risk assessment of marine-based oil spills was prepared by Det Norske Veritas ("DNV") and filed as part of the Application to the Board. The DNV risk assessment was also submitted by Trans Mountain to the TERMPOL Review Committee as part of its review process.

281. There are a number of weaknesses in the DNV risk assessment that have been identified in the report entitled "An Assessment of Spill Risk for the Trans Mountain Expansion Project" prepared for Tsleil-Waututh Nation, Tsawout First Nation, and Upper Nicola Band by Professors Gunton and Broadbent⁵, and which are discussed below. However, there is one glaring omission that calls into question both the overall reliability of the DNV risk assessment and the utility of the recommendations/conclusions in the TERMPOL Report. That is the failure to assess the socio-economic impacts of a spill into Burrard Inlet, including the impacts of a spill on the City of Vancouver and the other communities situated in Burrard Inlet.

282. First, the DNV risk assessment entirely omitted, without explanation, study Segment 2 (that part of Burrard Inlet situated between First and Second narrows) from the list of oil spill locations that were even considered by DNV for spill modelling and risk assessment. That is to say that Trans Mountain's expert did not exercise its own

⁵ Tsleil-Waututh Nation Written Evidence - *Volume 5 – Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent* ([A4L6A6](#))

judgment as to whether or not Segment 2 should be included in the spill modelling and risk assessment exercise that it was tasked with. Segment 2 was simply removed from DNV's consideration, presumably at the direction of Trans Mountain. Second, Trans Mountain relied solely on considerations of probability of an oil spill to justify its failure to assess the socio-economic impacts of a spill into Burrard Inlet.

1. Failure to Consider Segment 2 for Risk Assessment

283. For the purposes of DNV's risk assessment, the tanker route for tankers calling at the WMT is divided into seven segments. Segment 1 is the WMT to a point east of Second Narrows, Segment 2 is stretch of Burrard Inlet between First and Second Narrows, Segment 3 is English Bay, Segment 4 includes Roberts Bank and the Main ferry route crossing, Segment 5 includes the Arachne Reef, Segment 6 includes Race Rocks and Segment 7 is Buoy Juliet. Every one of these segments except for Segment 2 was at least considered for spill modelling and risk assessment, and sometimes more than one location within a segment was considered. Following this consideration, Segment 3 was also excluded from the list of locations selected for spill modelling and risk assessment on the basis that it was "*Not considered as viable spill location due to relatively low frequency for an accidental oil cargo spill.*" However, because Segment 2 was never even included in the list of locations to be considered, no explanation at all is given for its omission from DNV's risk assessment.

Trans Mountain Pipeline ULC - *Application Volume 8C - TERMPOL 3.13 General Risk Analysis and Intended Methods of Reducing Risks, DNV Report, (A3S5F4)*, at PDF page 15

Trans Mountain Pipeline ULC - *Application Volume 8A, Section 5.2.4 Potential Locations for a Spill in the Marine Environment Related to the Project*, page 8A-524 – ([A3S4Y3](#)), at PDF page 294

Trans Mountain Pipeline ULC - *Application Volume 8C - TERMPOL 3.13 General Risk Analysis and Intended Methods of Reducing Risks, DNV Report, (A3S5F4)*, at PDF page 17 – 22 and ([A3S5F6](#)), at PDF page 44 - 45

284. Further, when Vancouver made requests for information about who, as between DNV and Trans Mountain, made the decision not to include Segment 2 in the list of

locations considered for assessment, the question was not answered and the Board did not compel a response.

National Energy Board - *Ruling No. 67* – ([A69796](#)), 1 May 2015

City of Vancouver – *Reply on the Motion to Compel Full and Adequate Responses to the TERMPOL IRs* – ([A4K5D9](#)), at PDF page 20

285. The DNV Report describes Segment 2 as the “Vancouver Harbour Area” and notes that, in Segment 2, “*the route goes through the Second Narrows, harbour area and through the First Narrows out to the English Bay. ... There are seven designated anchorage locations between the First and Second Narrows ... Two bridges cross the channel at Second Narrow; a fixed road bridge (Iron Workers Memorial Bridge) and a lifting railway bridge operated by Canadian National Railway. The Lion’s Gate Bridge, which is a fixed road bridge, crosses the First Narrows.*”

Trans Mountain Pipeline ULC - *Application Volume 8C - TERMPOL 3.13 General Risk Analysis and Intended Methods of Reducing Risks, DNV Report*, ([A3S5F4](#)), at PDF page 17

286. Appendix 2 of the DNV Report sets out the conclusions reached by DNV following its Hazard Identification Study. The HAZID Conclusions, at page 12 of the Appendix, specify a hazard rating for Segment 2 of “***Above average due to draft and tidal restriction obstructions from the first and second narrows and the high density traffic within the harbour area.***” This overall above average classification included a higher-than-average rating for collision and grounding, a higher-than-average rating for collision with a fixed object, a higher-than-average rating for collision due to congestion of traffic, a higher-than-average rating for collision with small craft and a higher-than-average rating for collision with a vessel at anchorage within the harbour.

Trans Mountain Pipeline ULC - *Application Volume 8C - TERMPOL 3.15 General Risk Analysis and Intended Methods of Reducing Risks, DNV Report*, ([A3S5F6](#)), PDF page 97

287. Despite the overall classification of Segment 2 as an “*above average*” hazard, DNV did not include Segment 2 in the table of locations (Table 31)⁶ to be considered for oil spill modelling and risk assessment. Further, DNV gave no explanation whatsoever for not at least considering Segment 2 for assessment. By way of contrast, the majority of the HAZID study results for Segment 1 were all below average and none were above average, yet Segment 1 was included in Table 31 for consideration and, ultimately, selected for assessment. Similarly, Segment 6 and Segment 7 were both classified as “*Average – benign navigational challenges overall*” but were included in Table 31 for consideration and selected for assessment. Segment 3, which was not classified in the HAZID study as an above average hazard, was included in Table 31 but was subsequently determined unsuitable for assessment on the basis of “*relatively low frequency for an accidental oil cargo spill.*”

288. The fact that Trans Mountain refused to disclose who, as between Trans Mountain and DNV, made the decision to exclude Segment 2 from consideration leads to the obvious inference that it was Trans Mountain who instructed DNV as to which of the segments it could and could not consider for the purposes of its report. These instructions are reflected in Table 31 of the report which simply lists various study locations in all six remaining segments for consideration. Segment 2 is excluded without explanation. DNV was then able to take Table 31 and exercise its judgment as to which of the remaining six segments it would assess without ever having to provide an explanation for failing to carry out an assessment of Segment 2.

289. Vancouver submits that it is no mere coincidence that Segment 2, which did not even make it into Table 31 for consideration, is also closest in proximity to the most densely populated urban centre along the entire tanker route. With Segment 2 and Segment 3 excluded from the selected locations for spill modelling and risk assessment, Trans Mountain avoided any assessment at all of the impacts of an oil spill on Vancouver, its residents and businesses, and the extensive beach, park and waterfront resources on Burrard Inlet. The single most distinguishing feature of the TMEP is the fact that it will

⁶ Trans Mountain Pipeline ULC - *Application Volume 8C - TERMPOL 3.15 General Risk Analysis and Intended Methods of Reducing Risks, DNV Report, (A3S5F6)*, PDF page 45

result in a 700 per cent increase in the number of tankers and the volume of diluted bitumen that will be transported through Burrard Inlet, a narrow channel with three bridge crossings (2 vehicle bridges and a rail bridge) and which is surrounded on all sides by densely populated communities, including the largest urban centre in Western Canada.

290. Trans Mountain's reliance on the Exxon Valdez oil spill as benchmark for its impact assessment is further evidence that Trans Mountain would have this Board proceed with its assessment of the Project as though the proposed pipeline were being built in an isolated region of Canada. Trans Mountain thought that it could simply ignore the fact that the Project tanker route must pass through the Vancouver Harbour in order to reach the Asia-Pacific markets that form the basis of its economic model.

2. *Decision Not to Assess Segment 2 and 3 Based on Probability Alone*

291. The *CEAA 2012* evaluation criterion requires assessment of two separate components to define risk:

1. the severity of an adverse impact, often referred to as a consequence or impact assessment; and
2. the likelihood of an adverse impact occurring.

Tsleil-Waututh Nation Written Evidence - *Volume 5 Tab 4A Appendix 1 Assessment of Spill Risk Report* – ([A4L6A6](#)), at PDF page 8;
CEAA 2012, section 52

292. Public Safety Canada's *Federal Policy for Emergency Management* also defines risk as a combination of likelihood and consequence.⁷

⁷ Federal Policy for Emergency Management, *Definitions related to hazard and risk assessment*:

Risk: The combination of the likelihood and the consequence of a specified hazard being realized; refers to the vulnerability proximity or exposure to hazards which affects the likelihood of adverse impact.

293. The City of Vancouver commissioned Professor David Etkin to provide independent expert evidence to evaluate the risk assessment methodology used by DNV in their report to Trans Mountain. In his report, Professor Etkin confirms that risk can only be properly evaluated using both likelihood (hazard probability) and consequence (severity of impact) as follows:

The most commonly used definition of risk in disaster studies presents risk as a function of hazard including probability severity and consequences a result of exposure vulnerability. It is usually framed as Risk Hazard x Consequences.

Any risk assessment must incorporate consequence no matter how risk is specifically defined.

City of Vancouver Written Evidence - Appendix 22 - David Etkin – ([A4L7Y0](#)) at PDF page 5

294. Professor Etkin concludes that the Trans Mountain DNV risk assessment incorrectly uses hazard probability in lieu of risk and this has resulted in an improper exclusion of a large range of low probability high consequence (LPHC) events from the DNV risk assessment, including the assessment of Segments 2 and 3.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 26; City of Vancouver Written Evidence - Appendix 22 – David Etkin – ([A4L7Y0](#))

Risk-Based: The concept that sound emergency management decision making will be based on an understanding and evaluation of hazards, risks, and vulnerabilities.

Risk Management: The use of policies practices and resources to analyze, assess and control risks to health, safety, environment and the economy.

Sustainable: A sustainable approach is one that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Threat: The presence of a hazard and an exposure pathway; threats may be natural or human induced either accidental or intentional.

Vulnerability: The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. It is a measure of how well prepared and equipped a community is to minimize the impact of or cope with hazards.

295. Professor Etkin also highlights the fact that the Trans Mountain DNV risk analysis does not include consideration of the local population's view of what is an acceptable level of risk and therefore does not meet TERMPOL standards for risk assessment.

DNV risk analysis does not meet TERMPOL standards to include consequences, especially the risk perception of local communities. The DNV report uses only hazard probability as delimiter of risk, and therefore fails to meet the TERMPOL standards, as well as best practice within the risk assessment industry.

City of Vancouver Written Evidence - Appendix 22 – David Etkin – ([A4L7Y0](#)) at PDF page 17

296. In section 3.15 of the TERMPOL report where risk analysis is discussed, the proper approach is describe as follows:

“Analysis should not be limited to a mathematical index (probability of an incident) but should also include perceived risks to:

- i. populations within coastal zones along the intended route;*
- ii. the terminal berth and surrounding area; and*
- iii. the marine environment, fish and wildlife habitat.”*

City of Vancouver Written Evidence – Appendix 79 Transport Canada’s TERMPOL Review Process – ([A4L8E7](#))

297. Professor Etkin’s conclusion that an assessment of the risk of a diluted bitumen spill to Vancouver requires an assessment of both the likelihood of a spill occurring and the impact of a spill on Vancouver is consistent with the approach to risk assessment promoted by DNV in an online publication titled *Time to Rethink Risk*. As DNV states in that article:

Good and traditional risk management includes ranking risks according to consequence and probability of occurrence, and giving most attention to management of those that score high on both ...

However, our traditional risk management methods have a weak spot. Following this approach strictly may result in little attention given to those few risks with a very high loss potential and very

low probability of happening. *The most dramatic consequences are typically a result of a combination of many factors, each with their own risk picture. This can be said about such shocking events as the earthquake and tsunami that violently struck Japan, the global financial meltdown and the Macondo well blowout disaster in the Gulf of Mexico. The occurrence and consequences of these events were not impossible to foresee, they were just highly improbable - and managing the risks effectively up front would come at a cost.*

... it is time for us to focus of [sic] our attention technical skill and research and development on the low probability high consequence events.

(Emphasis Added.)

Further DNV in its online publication *Oil Spill Risk Management* states:

Understanding the risk of a major oil leak or a blowout gives half the oil spill risk picture. *The probability of impacting personnel and the environment and the potential consequences of this must also be included in the overall risk picture . . . **The risk is calculated by combining the potential impact with the probability of the spill and the probability of oil pollution of the sensitive environmental resources.***

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 26 and 27

298. Thus, a comprehensive risk assessment requires both an assessment of the severity of the impact of an oil spill *and* the likelihood of the impact occurring. It is not enough to assess likelihood on its own, as Trans Mountain has done, and then disregard the impact assessment on the basis that the likelihood is too low.

299. Regulatory guidance documents from the NEB and the Federal Environmental Assessment Review Office (FEARO) define a framework for determining whether a project is likely to cause significant adverse environmental effects that consists of the following sequential steps:

1. Deciding whether the environmental effects are adverse;
2. Deciding whether the adverse environmental effects are significant; and

3. Deciding whether the significant adverse environmental effects are likely.

Tsleil-Waututh Nation Written Evidence - *Volume 5 Tab 4A Appendix 1 Assessment of Spill Risk Report* - [A4L6A6](#) at PDF page 62;

National Energy Board, *Filing Manual*, p. 4A-38

FEARO (1994), *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*, Hull, QC: Federal Environmental Assessment Review Office, at PDF page 7 – Retrieved from http://www.ceaa-acee.gc.ca/Content/D/2/1/D213D286-2512-47F4-B9C3-08B5C01E5005/Determining_Whether_a_Project_is_Likely_to_Cause_Significant_Adverse_Environmental_Effects.pdf

300. Although Trans Mountain applied this mandated framework to assess its routine operations, it failed to do so for its assessment of risk of an oil spill. Instead, the Trans Mountain risk assessment for oil spills proceeds on the basis of likelihood of a spill alone.

301. In its application, Trans Mountain states (Vol. 1, p. 1-59) “*Potential effects of credible worst case and smaller spills discussed in Volume 7 and 8A are not evaluated for significance because these represent low probability hypothetical events.*” This approach evaluates the likelihood of significant adverse environmental effects **prior to** determining the significance of these adverse effects, contravening existing regulatory guidance from the Canadian Environmental Assessment Agency. The result is that Board is left without the necessary information to assess the environmental and socio-economic impacts of malfunctions or accidents as required under *CEAA 2012* and for the purposes of the public interest assessment under section 52 of the *NEB Act*.

Tsleil-Waututh Nation Written Evidence - *Volume 5 Tab 4A Appendix 1 Assessment of Spill Risk Report* – ([A4L6A6](#)), at PDF page 61

302. In Reply Evidence filed August 20, 2015, Trans Mountain argues that for evaluating the significance of accidents and malfunctions, “[l]ikelihood was evaluated as one of several significance criteria (referred to as the combined step approach by the NEB). The combined-step approach to significance determination represents both

current accepted practice, and the most practical and defensible alternative to fulfill requirements of the *CEA Act, 2012*".⁸

303. In support of its position, Trans Mountain cites its response to NEB Information Request No. 3.020 in which the Board questioned Trans Mountain's use of an approach that combined the evaluation of the significance of an adverse effect and determining the likelihood of the significant adverse effect in the same step.

304. The combined-step approach relied on by Trans Mountain in its response to NEB Information Request No. 3.020 is not, in the City of Vancouver's submission, supported by any of the authorities Trans Mountain seeks to rely upon – namely, the NEB Filing Manual, FEARO guide, CEAA's "Operational Policy Statement: Addressing cumulative environmental effects under the *Canadian Environmental Assessment Act*" (2007) and the report of the Joint Review Panel on the Enbridge Northern Gateway Project. These authorities all reflect a sequential step approach to determining whether a project is likely to cause significant adverse environmental effects, and demonstrate that an applicant is required to consider the significance of adverse environmental effects regardless of whether they are subsequently determined to be unlikely. Moreover, as Gunton and Broadbent point out, Trans Mountain itself uses the sequential step approach for evaluating the significance of adverse environmental effects from the routine operation of the project, undermining any rationale for using the combined-step approach for evaluating whether an oil spill is likely to cause significant adverse environmental effects.⁹

NEB Filing Manual

305. The NEB Filing Manual clearly contemplates a sequential approach to determining whether a project is likely to cause significant adverse environmental effects. The manual sets out a numbered list and provides as follows:

⁸ Trans Mountain Pipeline ULC - Reply Evidence - August 2015 ([A4S7E9](#)), at PDF page 304

⁹ *Ibid*, at p. 39; Tsleil-Waututh Nation Written Evidence - Volume 5 - *Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent* ([A4L6A6](#))

A.2.6.3 Evaluation of Significance

Filing Requirements - Evaluation of Significance

1. After taking into account any appropriate mitigation measures, identify any remaining residual effects from the project.
2. Describe the methods and criteria used to determine the significance of adverse effects, including defining the point at which any particular effect on a valued component is considered "significant".
3. Evaluate the significance of residual adverse environmental and socio-economic effects against the defined criteria.
4. Evaluate the likelihood of significant, residual adverse environmental and socio-economic effects occurring and substantiate the conclusions made.

Guidance - Applicant's Evaluation of Significance

Evaluating environmental and socio-economic effects consists of assessing:

- whether the effects are adverse;
- whether the adverse effects are significant; and
- whether the significant adverse effects are likely.

A common way for an applicant to assess project effects is to compare the quality of the existing environment with the predicted quality of the environment if the project is approved and built. The direction of change to the environment may be adverse, neutral or beneficial.

The following criteria may be useful in assessing the significance of a project's adverse effects:

- magnitude;
- duration;
- frequency;
- geographic extent;
- ecological context; and
- reversibility or degree of permanence.

In applying these criteria to each residual effect, an applicant must define each criteria and the range considered within each criteria. To help evaluate the significance of a particular effect and define the point at which it becomes "significant", consider providing rating attributes (e.g., low / moderate / high) for each significance criteria and defining the range of each attribute. An applicant must also describe how each criterion or combination of criteria was used to reach the applicant's significance conclusion.

...

Where professional judgement is used to determine the significance of adverse effects, the extent of reliance on professional judgement must be described and rationale for the extent of the reliance must be provided. An applicant's ESA must provide an evaluation of the likelihood and significance of any adverse environmental effects, for consideration by the NEB...¹⁰

306. The numbered list set out above clearly indicates that the process is intended to be sequential, as does the ordering and wording of the three bullet points under the heading "Guidance". Moreover, the direction that applicants must evaluate both the likelihood and significance of any adverse environmental effects makes it clear that an applicant cannot avoid evaluating the significance of an environmental effect at this stage simply on the basis that the environmental effect is unlikely to occur.

307. Last, read in context, the excerpt relied upon by Trans Mountain regarding an applicant's use of a combination of criteria (the last sentence of the paragraph below the second, long bulleted list) appears to be specifically directed at Step 2 – assessing the significance of a project's adverse effects – not at the entire approach to determining whether a project is likely to cause significant adverse environmental effects. The FEARO guide, discussed below, makes this clear.¹¹ In effect, Trans Mountain's approach transforms likelihood from an independent step and collapses it into a measure of significance to be considered alongside magnitude, duration, frequency, etc. Such an approach is clearly inconsistent with a plain reading of the NEB Filing Manual.

¹⁰ Available here: <https://www.neb-one.gc.ca/bts/ctrq/gnnb/flngmnl/index-eng.html>, see A.2.6.3 (emphasis added).

¹¹ Available here: http://www.ceaa.gc.ca/Content/D/2/1/D213D286-2512-47F4-B9C3-08B5C01E5005/Determining_Whether_a_Project_is_Likely_to_Cause_Significant_Adverse_Environmental_Effects.pdf., at p. 188.

FEARO guide

308. Trans Mountain concedes that the FEARO guide “does describe the three significance evaluation bullets as general steps”. The FEARO guide provides as follows:

4.1 Step 1: Deciding Whether the Environmental Effects are Adverse

4.2 Step 2: Deciding Whether the Adverse Environmental Effects are Significant

4.3 Step 3: Deciding Whether the Significant Adverse Environmental Effects are Likely¹²

309. As Gunton and Broadbent observe,¹³ these steps are clearly intended to be sequential. In other words, an applicant is required to consider the significance of all adverse environmental effects, and the likelihood of all significant adverse environmental effects; because the analysis proceeds in that order, an applicant cannot avoid considering the significance of an adverse environmental effect simply on the basis that it is unlikely. Significance must be considered before likelihood.

310. Nor is Trans Mountain’s combined-step approach supported by comments in the FEARO guide that the “concept of significance cannot be separated from the concepts of ‘adverse’ and ‘likely’”, and “only environmental effects that are both likely and adverse can be considered in the determination of significance. Environmental effects that are unlikely or are not adverse cannot be considered in significance decisions”. The latter comment appears in a paragraph discussing “[t]he central question for the RA or the Minister in the process decision following submission of a comprehensive study report”.¹⁴ Read in context, the comment must be taken as referring not to the information or analysis that an applicant is required to provide, but to the decision that the responsible authority or minister is ultimately required to make. As such, the comment does not assist Trans Mountain.

¹² *Ibid.*

¹³ Gunton & Broadbent, *Assessment of Spill Risk Report*, *supra*, at p. 39.

¹⁴ FEARO guide, at p. 186.

The OPS

311. Trans Mountain also seeks to rely on a 2007 OPS as justification for adopting a combined-step approach. This version of the OPS corresponded to CEAA 2012's predecessor and has been superseded. It provided as follows with respect to the assessment of cumulative effects:

The Practitioners Guide emphasizes approaches and issues associated with the cumulative environmental effects assessment of large projects; however, it also notes that this framework can be scaled down and adapted for use with smaller projects.

The level of effort directed to the assessment of cumulative environmental effects should be appropriate to the nature of the project under assessment, its potential effects and the environmental setting. For example, the practitioner should give particular attention to the selection of future projects to be considered in the cumulative environmental effects assessment where:

- certain and reasonably foreseeable projects may have an impact on the same valued ecosystem components as the project under assessment;
- rapid development of the project area is anticipated; or
- particular environmental sensitivities or risks are involved.¹⁵

312. The current version of the OPS provides:¹⁶

The practice of project EA calls for examining potential environmental effects of the project on valued components (VCs) and considering mitigation measures. A cumulative environmental effects assessment allows for the consideration of additional mitigation measures. This is done prior to determining the significance of adverse environmental effects for the EA decisions and for the implementation of the follow-up program.

The approach and level of effort applied to assessing cumulative environmental effects in a project EA is established on a case-by-case basis taking into consideration:

¹⁵ Available here: <http://www.ceaa.gc.ca/default.asp?lang=En&n=1F77F3C2-1> (emphasis added).

¹⁶ Available here: <http://www.ceaa.gc.ca/default.asp?lang=En&n=1DA9E048-1> (emphasis added).

- the characteristics of the project;
- the risks associated with the potential cumulative environmental effects;
- the state (health, status or condition) of VCs that may be impacted by the cumulative environmental effects;
- the potential for mitigation and the extent to which mitigation measures may address potential environmental effects; and,
- the level of concern expressed by Aboriginal groups or the public.

313. With regard to the former version of the OPS, the TMEP cannot properly be characterized as a “smaller project”, or one having few or minor “potential effects”. With regard to the current version of the OPS, a lower level of effort cannot reasonably be justified given the potentially catastrophic effects of the TMEP and the level of concern expressed by Aboriginal groups and the public to date. Moreover, as discussed below, the OPS’ guidance with respect to cumulative effects does not address the approach to be taken to the separate, subsequent, determination of significance: As the OPS directs, the cumulative effects assessment takes place prior to determining significance. Accordingly, neither the current nor former OPS supports Trans Mountain’s use of a combined-step approach.

Northern Gateway JRP

314. Trans Mountain cites in support of its combined-step approach the following statement of the Northern Gateway Joint Review Panel regarding cumulative effects methodology: “... it is standard practice to screen out project effects that are not likely to interact cumulatively with other projects or activities...”.¹⁷ According to Trans Mountain, this statement “suggests that likelihood can appropriately be considered prior to a determination of significance in order to help focus an ESA on the most relevant potential effects”.

¹⁷ Available here: <http://gatewaypanel.review-examen.gc.ca/clf-nsi/dcmnt/rcmndtnsrprt/rcmndtnsrptvlm2-eng.pdf>, see p. 189.

315. The Joint Review Panel's Northern Gateway report does not support Trans Mountain's use of a combined-step approach, for two reasons. First, the comments excerpted by Trans Mountain refer to the assessment of cumulative effects, not the approach to evaluating the significance of environmental effects generally, or whether a project is likely to cause significant adverse environmental effects. Second, the significance of the adverse environmental effects of a range of types of oil spills was considered by both Northern Gateway and the Joint Review Panel, despite the low likelihood of some of these types of spills occurring.

316. With regard to cumulative effects, as the Panel explained, “[c]umulative effects assessment evaluates project effects remaining after mitigation that may interact with other projects and activities that exist or are reasonably foreseeable”.¹⁸ As set out above, the current OPS makes clear that cumulative environmental effects are to be taken into account “prior to determining the significance of adverse environmental effects for the EA decisions”.¹⁹ Pursuant to s. 19(1) of *CEAA 2012*, “[c]umulative environmental effects are assessed in relation to the other factors listed in subsection 19(1). For example, significance of environmental effects is determined taking into account cumulative environmental effects”.²⁰

317. As such, the Joint Review Panel's comments regarding the assessment of cumulative environmental effects is not relevant to a consideration of the correct approach to evaluating significance, or whether a project is likely to cause significant adverse environmental effects. The two exercises are separate, and cumulative effects are themselves subject to evaluation for significance. As such, the fact that an environmental effect is screened out from the cumulative effects assessment because it is not likely to interact cumulatively with other projects or activities does not have any bearing on whether that environmental effect can properly be screened out from an evaluation of significance.

¹⁸ Northern Gateway, *supra*, at p. 188.

¹⁹ Current OPS, *supra*.

²⁰ *Ibid.*

318. Moreover, the Joint Review Panel's comments must be read in context. The Panel begins its discussion of cumulative effects methodology by noting that "Northern Gateway limited its cumulative environmental effects assessment to circumstances where there was a reasonable expectation that the project's contribution to cumulative environmental effects would affect the viability or sustainability of the resource or value". The comments relied on by Trans Mountain are located in a paragraph in which the Panel expressly rejects this approach:

The Panel finds that, while it is standard practice to screen out project effects that are not likely to interact cumulatively with other projects or activities, the methods Northern Gateway used in its environmental effects assessment are unique in considering the project's contribution to cumulative effects only if it would affect the viability or sustainability of a resource. In general, the Panel does not accept this test for screening out the need to conduct a cumulative effects assessment. Doing so could screen out circumstances where cumulative effects are of concern despite the project's contribution not affecting the viability or sustainability of a resource or value...²¹

319. The Panel's rejection of Northern Gateway's approach is properly read as a critical comment on the appropriate level of effort in a cumulative effects assessment.

320. Second, the Joint Review Panel's report makes it clear that the significance of adverse effects must be considered even if those effects are determined to be unlikely to actually occur. Indeed, Northern Gateway itself acknowledged that *CEAA 2012* "required it to consider the environmental effects of malfunctions and accidents" and "placed priority on assessing both the likelihood of a spill and associated consequences".²²

321. The Panel in turn "considered both the likelihood of a spill event happening, and the consequences of the spill if it happened. The Panel then considered whether any adverse consequences were likely to be significant", distinguishing between small spills and large spills.²³ The Panel concluded that small spills were "almost certain to occur during the life of the project" but were "unlikely to cause significant adverse

²¹ *Northern Gateway*, *supra*, at p. 188.

²² *Ibid*, at p. 143-144.

²³ *Ibid*, at p. 146.

environmental effects”. In contrast, the Panel found that large spills were “not likely and may not occur during the life of the project”; however, “in the unlikely event of a large oil spill, there would be significant adverse environmental effects”, but no “permanent, widespread damage” because “functioning ecosystems would recover through mitigation and natural processes”.²⁴ The Panel found on this basis that the spill risk posed by the project was “manageable”²⁵ and concluded for the purposes of *CEAA 2012* that “after mitigation, the likelihood of significant adverse environmental effects resulting from project malfunctions or accidents is very low”.²⁶

322. Similarly, in its analysis of necessity under the NEB Act, the Panel found that “in the unlikely event of a large oil spill, there would be significant adverse environmental effects”, although it “would not cause permanent, widespread damage to the environment”.²⁷ The Panel concluded in this regard that “[t]he environmental, societal, and economic burdens of a large oil spill, while unlikely and not permanent, would be significant”.²⁸

323. It is clear that in evaluating whether the project was likely to cause significant adverse environmental effects, the Joint Review Panel considered the significance of the adverse environmental effects of a range of types of oil spills, including spills that were unlikely to actually occur. The Joint Review Panel’s report on Northern Gateway therefore does not support Trans Mountain’s use of the combined-step approach.

324. Even if it can be said that the oil spills are low probability events, and Vancouver says it is clear on the evidence that oil spills are in fact high probability events²⁹, a low probability occurrence of an event does not equate to a “hypothetical”. Spill probabilities even of the magnitude acknowledged by Trans Mountain in its evidence are significant

²⁴ *Ibid*, at p. 168.

²⁵ *Ibid*, at p. 147.

²⁶ *Ibid*, at p. 168.

²⁷ *Ibid*, at p. 12.

²⁸ *Ibid*, at p. 13.

²⁹ The independent risk assessment prepared by Gunton and Broadbent calculates the risk of a marine-based oil spill in Vancouver Harbour with a volume greater than 1,000 barrels to be 87.4% and the risk of a spill with a volume greater than 10,000 barrels is 36.9%.

events³⁰ and the environmental and socio-economic impacts should have been fully assessed. Furthermore, all parties are agreed that the probability of a pipeline spill, including a spill into the Fraser River with the potential to impact the City of Vancouver, is 99%.

Tsleil-Waututh Nation Written Evidence - *Volume 5 – Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent* ([A4L6A6](#)), at PDF page 114 and 117

ii. Trans Mountain's risk assessment is flawed

325. The Gunton and Broadbent analysis of the Trans Mountain methodology for estimating spill likelihood identifies 27 major weaknesses in the Trans Mountain risk assessment and concludes that the spill risk analysis meets none of the seven best practice criteria: (1) Transparency; (2) Reproducibility; (3) Clarity; (4) Reasonableness; (5) Reliability; (6) Validity; and (7) Stakeholder Participation. Four of these; clarity, reasonableness, reliability and validity, are discussed in detail below.

a. Clarity

326. The Gunton and Broadbent report notes that Trans Mountain expresses the likelihood of a spill as a return period rather than the probability of a spill over the life of the project, and that this presents a major weakness in the communication of spill estimates to decision-makers. Return periods incorrectly imply that an oil spill event will occur only once throughout the recurrent interval when in fact the event can occur numerous times or not at all.

Tsleil-Waututh Nation Written Evidence - *Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent –* ([A4L6A6](#)), at PDF page 57

327. With respect to Dynamic's pipeline spill risk assessment, this assessment does not combine failure frequencies for individual incidents to represent an incident frequency for all failure types, does not adjust the km-year failure frequencies to reflect the length

³⁰ Trans Mountain's own evidence confirms that the probability of any size tanker spill in the Vancouver Harbour ranges between 5% and 8.3%.

of both Line 1 and Line 2 of the TMEP pipelines, and does not combine failure frequencies for both pipelines in order to estimate overall pipeline spill frequency for the TMEP.

Tsleil-Waututh Nation Written Evidence – *Volume 5 - Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent* – ([A4L6A6](#)), at PDF page 58

328. To address the weaknesses in the pipeline spill risk assessment, Gunton and Broadbent adjusted the spill frequencies provided by Trans Mountain in Attachment D of the *Risk Update* and *TMPL Risk Results* study for the length of Line 1 and Line 2 of the TMEP. They then restated failure frequencies for both lines as return periods consistent with the rest of the TMEP application to estimate a spill return period for Line 1 and Line 2 of 4.1 years and 1.8 years respectively. Combined, the risk results in the TMEP application show that a pipeline spill could occur on either Line 1 or Line 2 every 1.3 years (TM 2015c, 2.01-2.02). It should be noted that failure frequencies and return periods for Line 1 represent the likelihood of a leak or rupture whereas failure frequencies and return periods for Line 2 represent the likelihood of a rupture only (TM 2015c).

Tsleil-Waututh Nation Written Evidence - *Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent* – ([A4L6A6](#)), at PDF page 59

b. Reasonableness

329. Gunton and Broadbent identify seven weaknesses of Trans Mountain's risk assessment that fall under the reasonableness criteria. These include:

1. *Reliance on tanker incident frequency data that underreport incidents by between 38% and 96%.*

330. Gunton and Broadbent discuss the findings in peer reviewed studies regarding the underreporting of vessel accident data recorded in the LRFP database, which is the database that analysts used in Trans Mountain's TERMPOL 3.15 study to determine tanker incident frequencies. Using various statistical methods, researchers estimate that

reporting performance by LRFP ranges between 4% and 62% for select flag states compared to actual accident occurrences. In effect this suggests that as few as one in 25 accidents were reported in the LRFP database for a particular flag state over the period from January 2005 to December 2009. In the best-case scenario for accidents involving Canadian vessels, the LRFP database reports only 69% of all accidents and thus omits nearly one third (31%) of all accidents occurring for vessels with a Canadian flag.

Tsleil-Waututh Nation Written Evidence - Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent – ([A4L6A6](#)), at PDF page 64 and 65

331. In the TERMPOL 3.15 study, risk assessors did not adjust data derived from the LRFP database to incorporate any uncertainties or underreporting associated with LRFP data. Best practice requires risk assessors to, at a minimum, disclose the known issue of incomplete LRFP data in a transparent manner and describe why they did not adjust the data accordingly. Gunton and Broadbent note that the failure of the risk assessors to acknowledge deficiencies in LRFP data and make adjustments to correct for underreporting is particularly surprising given that, at the time the article documenting underreporting was published in 2010, the authors of that article were employees of the same organization that prepared the TERMPOL 3.15 study.

Tsleil-Waututh Nation Written Evidence - Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent – ([A4L6A6](#)), at PDF page 65 and 66

2. *Omission of tanker age characteristics in spill likelihood analysis.*

332. Non-accidental structural failure tanker incidents for double-hull tankers ranging between 16 and 20 years are over 2.5 times higher compared to tankers aged 11 to 15 years and over 4 times higher compared to tankers aged 6 to 10 years. As of 2009, it is estimated that the average age of double hull tankers in the worldwide operational fleet was between 4 and 8 years. Due to the young age of the worldwide tanker fleet non accidental structural failures could become significant after 2020 which corresponds to the operational period of the TMEP. The omission of such an increase has the potential to

significantly underestimate future tanker incident rates for non-accidental structural failures.

Tsleil-Waututh Nation Written Evidence - Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent – ([A4L6A6](#)), at PDF page 66

3. *Lack of rigorous analysis supporting revised tanker spill risk estimates.*

333. DNV incorporates risk reduction factors in its assessment of revised tanker spill risk which include: (a) a 20% reduction associated with the use of Vessel Traffic Services; and (b) a 28% decrease in collision risk from the use of tug escorts and enhanced situational awareness that includes Security Broadcasts, a public education campaign, notices to industry, and adherence to International Regulations for Preventing Collisions at Sea (DNV 2014a; 2014b).

Tsleil-Waututh Nation Written Evidence - Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent – ([A4L6A6](#)), at PDF page 73

334. Gunton and Broadbent identify a number of weaknesses in DNV's revised tanker spill risk assessments. First, DNV acknowledges that some of the reference studies used to estimate risk reduction factors from Vessel Traffic Services are more than 20 years old, more recent studies show smaller risk reducing effects of Vessel Traffic Services, and there is a large variation in the effects of Vessel Traffic Services in the different studies (DNV 2014b at p. 12).

335. Second, DNV also acknowledges that the complexity of coastline and the tanker routes, complexity of commercial shipping traffic, fishing and leisure craft activity, weather and tides in specific areas are all important considerations in assessing Vessel Traffic Services effectiveness, yet there is no comprehensive evaluation and comparison of these hazards as between the studies DNV relies on and the specific Segments of the TMEP tanker route.

336. With respect to the use of tug exports, DNV acknowledges that its method for estimating risk reductions factors for enhanced situational awareness is uncertain due to

the old dataset, the difficulty identifying the specific causes of the collisions, and the arbitrary assumption that these measures will be effective half the time (DNV 2014a, p. 3). This uncertainty calls into question DNV's application of a 28% risk reduction factor from tug escorts, particularly in light of the fact that the same study identifies risk reduction factors as low as 12% based on other approaches (DNV 2014a, p.5)

Tsleil-Waututh Nation Written Evidence - Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent – ([A4L6A6](#)), at PDF page 73 - 75

4. *Inadequate assessment of a worst-case oil pipeline spill.*

337. In the pipeline oil spill risk assessment in *Volume 7*, Trans Mountain models spill outflow volumes based on what it describes as a worst-case full bore rupture. Under this scenario, Trans Mountain uses a time interval of ten minutes prior to the control room operator shutting down the pump and closing the valves (Volume 7 pages 7-16).

Trans Mountain Pipeline ULC - Application – Volume 7: Risk Assessment and Management of Pipeline and Facility Spills – ([A3S4V5](#)), at PDF page 43

338. The assumption that a control room operator will detect and take action to address the spill within 10 minutes is not supported by recent pipeline spill data. Analysis of PHMSA data shows that of the 56 spills detected between 2002 and 2014 from the pipebody of onshore crude oil pipelines installed since 1980, half of the incidents (50%) were detected by a third party. According to the PHMSA data only 11% of the reported spills were detected by pipeline control rooms.

Tsleil-Waututh Nation Written Evidence - Volume 5 Assessment of Spill Risk for the Trans Mountain Expansion Project by Dr. Thomas Gunton and Dr. Sean Broadbent – ([A4L6A6](#)) at PDF page 70

339. This overly optimistic estimate of a 10-minute spill detection time also ignores the role that human error plays in many oil spills and other significant accidents.

340. There is no shortage of evidence to suggest that human factors are a major cause of significant accidents including those involving oil spills, fires and explosions. According to a report prepared by DNV outside of the hearing of the TMEP application,

the human factor is the main cause in approximately 80% of accidents.

City of Vancouver Written Evidence - Appendix 28 - Det Norske Veritas - Human factors and safety culture – ([A4L9C2](#)) at PDF page 2

341. A 2006 report by Nuka Research Planning Group LLC for the Prince William Sound Regional Citizens Advisory Council also identified human factors, either individual errors or organizational failures, as the cause for up to 80% of oil spills and marine accidents:

“[I]mproved technologies redundant systems and enhanced automation generally do not prevent oil spills caused by human error. ... Moreover, technological and engineering improvements in the marine sector have been shown in some cases to actually increase the risk of an oil spill or accident occurring due to human factors such as fatigue, skill or knowledge deficiencies, or risk compensation.”

City of Vancouver Written Evidence - Appendix 29 - Nuka - An assessment of the role of human factors in oil spills from vessels – ([A4L9C4](#)) at PDF page 4, 6 and 48

342. Human error is a significant factor in marine oil spill risk assessments as well. The US Coast Guard in its report “Human Error and Marine Safety” identified human error as contributing to 84% to 88% of tanker accidents, 79% of towing vessel groundings, 89% to 96% of collisions, 75% of allisions and 75% of fires and explosions. Human error can also cause response mistakes and failures that can exponentially increase the negative effects of such accidents.

“Today’s ship systems are technologically advanced and highly reliable.

*“Yet the maritime casualty rate is still high. Why? Why is it with all these improvements we have not significantly reduced the risk of accidents? It is because **ship structure and system reliability are a relatively small part of the safety equation. The maritime system is a people system, and human errors figure prominently in casualty situations. About 75-96% of marine casualties are caused, at least in part, by some form of human error.**”*

*City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 30;
City of Vancouver Written Evidence - Appendix 30 - US CG - human error and marine safety – ([A4L9C6](#)) at PDF page 2*

343. The most environmentally disastrous oil spills in the history of the Trans Mountain pipeline were caused by faulty welds and other construction defects, human error and forces of nature. Operator error accounts for 15% of all Trans Mountain oil spill incidents, and 20% of incidents were caused by miscellaneous factors with a human error component.

City of Vancouver Written Evidence - *Appendix 18 - Sean Kheraj* –
[\(A4L7X6\)](#) at PDF page 29

344. Other accidents in which human factors were identified as major contributors include:

- a. the 2007 Cosco Busan oil spill in San Francisco, which the National Transportation Safety Board concluded was caused by human errors of the pilot and master of the vessel;
- b. the July 24, 2007 rupture of the Trans Mountain pipeline and resulting release of crude oil in Burnaby BC and Burrard Inlet;
- c. the March 22, 2014 collision between the bulk carrier Summer Wind and the Miss Susan Tow in the Houston Ship Channel Texas during which the pilot of the Summer Wind was using a portable pilot unit laptop and both vessels had working radars and automatic identification system yet never contacted each other by radio until 4 minutes before the accident causing a double hull cargo tank rupture; and
- d. the Enbridge hazardous liquid pipeline rupture and release in Marshall Michigan on July 25, 2010 which remained undetected for 17 hours due to inadequate training of personnel.

City of Vancouver Written Evidence – [\(A4L7K6\)](#) at PDF 30 and 31;

City of Vancouver Written Evidence - *Appendix 33 - National Transportation Safety Board Accident Report, Enbridge Incorporated Hazardous Liquid Pipeline Rupture and Release – Marshall, Michigan (July 25, 2010) - (A4L9E4)* and [\(A4L9E5\)](#) at PDF page 13

c. Reliability

345. Gunton and Broadbent identify four major weaknesses related to the reliability of the methodological approach used by DNV to estimate spill return periods:

1. Lack of confidence intervals that identify the degree of uncertainty or variability that should be taken into consideration when applying the spill risk estimates to the assessment of environmental and socio-economic impacts.
2. Inadequate sensitivity analysis including, for example, no sensitivity assessment of the impacts on the spill risk assessment of a substitution of Panamax for the much larger Aframax tankers that Trans Mountain has assumed will call on the WMT.

The tanker spill risk assessment in the TERMPOL 3.15 study assumes that the 408 TMEP tankers calling on WMT would all be Aframax tankers (TERMPOL 3.15, p. 34). Although the TMEP application acknowledges the potential increase in the number of tankers of 2 to 3 per month (4 to 6 trips to and from the WMT) for a 25% Panamax tanker class substitution, the risk assessment in the TERMPOL 3.15 study does not evaluate the potential increase in risk from this increase in tanker traffic.

The substitution of Panamax tankers substitution could increase tanker traffic from the TMEP by a theoretical maximum of approximately 96 to 144 tankers per year or an increase of 24% to 35% over the 408 Aframax tankers assumed for the purposes of Trans Mountain's application.

Table 4.6. Potential Increase in TMEP Tanker Traffic from Substitution

Tanker Substitution	Monthly Increase in Tanker Loadings	Annual Increase in Tanker Loadings	Total Number of Tankers (per year)	Percentage Increase to Base Case
25%	2 – 3	24 – 36	432 – 444	6 – 9%
50%	4 – 6	48 – 72	456 – 480	12 – 18%
75%	6 – 9	72 – 108	480 – 516	18 – 26%
100%	8 – 12	96 – 144	504 – 552	24 – 35%

Source: Computed from TM (2013, Vol. 8A).

Tsleil-Waututh Nation Written Evidence - Volume 5 Tab 4A Appendix 1
Assessment of Spill Risk Report – ([A4L6A6](#)) at PDF page 77

Since incident frequencies conditional spill probabilities environmental data and traffic data parameters are multiplied together any uncertainty propagates through to the final estimate of spill likelihood and could result in significant changes to tanker spill return periods.

Tsleil-Waututh Nation Written Evidence - Volume 5 Tab 4A Appendix 1
Assessment of Spill Risk Report – ([A4L6A6](#)) at PDF page 77 and 78

3. The TERMPOL 3.15 study and oil spill risk assessment in *Volume 7* identify a number of mitigation measures that Trans Mountain claims will significantly reduce tanker, terminal, and pipeline spill likelihood. However, the effective implementation of these mitigations measures depends on the monitoring and enforcement efforts of the responsible parties, in this case Trans Mountain, the NEB and Transport Canada.

According to an audit performed by the Commissioner of the Environment and Sustainable Development (2011, p. 10), nearly two thirds (64%) of the compliance verification files reviewed by the NEB identified deficiencies and only 7% of those files provided evidence the NEB followed up with companies to determine if deficiencies were corrected. Further, 100% of the emergency response plans reviewed had deficiencies and there was a follow-up to address the deficiencies in only one case.

The same report determined that Transport Canada had not taken sufficient action to address non-compliance since 53% of the completed inspection files reviewed during the audit had instances of non-compliance and 73 of these files had incomplete or missing evidence that corrective action was taken (CESD 2011 p. 10). Further, Transport Canada had not verified many emergency response plans submitted by regulated companies and had given only temporary approval to nearly half of the plans established by companies shipping dangerous products (CESD 2011, p. 10).

Tsleil-Waututh Nation Written Evidence - Volume 5 Tab 4A Appendix 1
Assessment of Spill Risk Report – ([A4L6A6](#)) at PDF page 78 and 79

Despite these findings, the Trans Mountain risk assessments fail to take into account any risk factor for potentially ineffective mitigation.

4. Finally, Gunton and Broadbent identify a common weakness in all of Trans Mountain's risk assessment documents and that is the failure to provide decision-makers with any information about the limitations or qualifications of the analyses that should be keep in mind when evaluating the risk assessment results.

d. Validity

346. DNV fails to provide any justification for the use of the MARCS model to estimate tanker spill risk for the TMEP.

347. DNV has not evaluated alternative spill risk models, applied these models to the TMEP or compared the models and their results. Many other spill risk models exist such as the methodological approach DNV used for the Northern Gateway Project, the Oil Spill Risk Analysis model developed by the US Department of the Interior and currently in use by the US Bureau of Ocean Energy Management, and the Vessel Traffic Risk Assessment model developed by academics at the George Washington and Virginia Commonwealth Universities. The failure to justify the use of the MARCS model relative to alternative models is a major deficiency that compromises the credibility of the results

reported.

Tsleil-Waututh Nation Written Evidence - Volume 5 Tab 4A Appendix 1
Assessment of Spill Risk Report – ([A4L6A6](#)) at PDF page 81

iii. Trans Mountain has failed to identify and assess the risk posed by, or demonstrate preparedness to mitigate and respond to, the range of hazards that could impact the pipeline or terminal operations.

348. The Trans Mountain pipeline and Westridge Marine Terminal facilities face a range of natural and manmade hazards along the entirety of the proposed expansion route that have not been adequately assessed by Trans Mountain. The impacts and consequences of these hazards vary based on the proximity of human populations, environmental sensitivities, surrounding geography, physical infrastructure, weather and terrain conditions, and the level of local preparedness and response capacity.

349. Many of these hazards have been identified by local authorities and the Province from an emergency management perspective but are largely ignored by Trans Mountain in its application. Trans Mountain has failed to identify and assess the risk posed by, or demonstrate preparedness to mitigate and respond to, the range of hazards that could impact the pipeline or terminal operations.

350. In 2012 and 2013 the City of Vancouver worked with NRCan to assess the risk of a magnitude 7.3 earthquake in the Georgia Strait using HAZUS a modelling tool that calculates the impact of hazards on communities. The result of this work was the development of an Earthquake Preparedness Strategy that was reported to and approved by Council. Although there are a range of more probable and also higher magnitude earthquakes that could occur in other locations in the lower mainland this scenario was identified for the purposes of Vancouver's emergency planning because it is the scenario which is likely to have the most severe impact.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 29

351. The inadequacy of Trans Mountain's own risk assessment and emergency preparedness process is illustrated by the fact that the only reference to Trans Mountain's

earthquake planning and preparedness is contained in a single page in Trans Mountain’s Emergency Management Plans. This is just one example of the many gaps in Trans Mountain’s application materials which, in the City of Vancouver’s submission, supports a finding by the Board that Trans Mountain has not adequately assessed the serious risk to human health and safety that the TMEP presents. Additional examples are discussed below.

Control Point Plans

352. No control point plans were provided by Trans Mountain, information that is required in order to evaluate the capacity of Trans Mountain to respond to a pipeline rupture impacting the Fraser River or other water bodies. This stands in contrast to the level of detail provided by Kinder Morgan to the US Pipeline and Hazardous Materials Safety Administration by its Emergency Response Field Guide for Puget Sound.³¹ It also stands in contrast to the level of detail made available to the public by Western Canada Spill Services (WCSS) with respect to Control Point Plans for critical control points along waterways in Alberta that are at risk from pipeline ruptures. WCSS is an Alberta based response agency and an example of a WCSS critical control point plan is included at Appendix 72 of the City of Vancouver’s Written Evidence.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 69-70;

City of Vancouver Written Evidence – *Appendix 71 – Kinder Morgan, “Emergency Response Field Guide – Puget Sound”* – ([A4L7V2](#));

City of Vancouver Written Evidence – *Appendix 72 – Example of WCSS Critical Control Point Plan* – ([A4L7V3](#))

Earthquakes & Seismic Risk

353. In response to City of Vancouver IR No. 2c 3.1j, Trans Mountain confirmed that a

³¹ City of Vancouver Written Evidence – Appendix 71 - Kinder Morgan, “Emergency Response Field Guide - Puget Sound” (revised July 2013) Cover Page and Table of Contents – ([A4L7V2](#))
Full document available online at
http://www.phmsa.dot.gov/staticfiles/PHMSA/ERR/Kinder_Morgan_Trans_Mountain-Puget_Sound.pdf (accessed May 22, 2015)

seismic liquefaction assessment for the Fraser River crossing has not yet been completed. Instead, Trans Mountain has put before the Board only a preliminary, desktop seismic assessment that does not provide the necessary information required to assess the risks associated with the proposed pipeline crossing. Trans Mountain proposes to bury an oil pipeline at a location that is approximately 1 kilometre upstream of the future Metro Vancouver drinking water distribution line, which runs beneath a river home to significant fish and wildlife populations (including salmon) and which feeds directly into the Strait of Georgia.

Trans Mountain Pipeline ULC. – *Response to City of Vancouver IR No.2C – (A4K5C0)* at PDF page 19

Flood Design – failure to properly account for impacts of climate change (one of the requirements under CEAA 2012)

354. The 2012 APEGBC Report on Flood Assessment in a Changing Climate (APEGBC, 2012) sets out the criteria for flood design for all construction projects along the Fraser River. This includes a requirement that flood values be increased by a minimum of 10% to account for the impacts of climate change on, for example, rising sea levels and increased precipitation. Further, an increase in flood values above the minimum of 10% is required where a historical trend is detectable.

City of Vancouver Written Evidence - Appendix 5 – APEGBC, *Legislated Flood Assessments in a Changing Climate*, (2012) – ([A4L7W3](#)) at PDF page 29

355. The design basis for pipeline crossing of water courses that Trans Mountain proposes is 1:200 for all crossings other than the Fraser River and approximately 1:500 for the Fraser River. Trans Mountain states that they will include only a 10% increase in the designated flood value to account for climate change.

356. For the Fraser River, new information is available that specifically looks at climate impacts to the hydrologic regime. The most recent information related to flows on the Fraser River is the climate impacted flow data in BC Ministry of Forests Lands and Natural Resources 2014. These estimated flows are significantly greater than the historic flow estimates for a range of return periods, and are well in excess of 10%.

BC Ministry of Forests, Lands and Natural Resource Operations – *Simulating the Effects of Sea Level Rise and Climate Change on Fraser River Flood Scenarios*, May 2014 - http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/Simulating_Effects_of_Sea_Level_Rise_and_Climate_Change_on_Fraser_Flood_Scenarios_Final_Report_May-2014.pdf, referred to in Trans Mountain’s Reply Evidence – Part 1 – (A4S7E9) – at PDF page 143

Multiple Hazards

357. Earthquake, flooding, extreme weather, wildfire, transportation accidents (including marine transportation), and chemical and explosive hazards have all been identified by IPREM (the Integrated Partnership for Regional Emergency Management in Metro Vancouver) as hazards with the greatest potential impacts to Metro Vancouver. However, Trans Mountain has not provided any assessment of the impact of these hazards on its own response capacity and that of its contractors, or on the resiliency of the Project facilities.

City of Vancouver Written Evidence - *Appendix 27 – Regional Hazards Impacting Metro Vancouver* – (A4L9A9) at PDF page 148

358. The Federal Policy for Emergency Management also identifies the importance of an all-hazards risk assessment.

Risk Assessment Policies:

“5.3 The risk assessment aims to gain an understanding of potential risks associated with all types of natural and human induced hazards and disasters. Such an assessment would also identify the potential impacts of these events on people, property and the environment. Risk assessment can provide the basis on which appropriate prevention, mitigation and preparedness measures can be planned, provide information on likely damage impacts and operating difficulties, and facilitate rapid emergency responses, based on acceptable risk tolerance levels.”

“7.6 Include in emergency management plans any measures to assist provincial and territorial governments and, through the provincial territorial governments, local authorities.”

“7.11 Mitigation Prevention

- a. Conduct mandate specific risk assessments, including those affecting critical infrastructure, within or related to their area of responsibility based on all-hazards risk analysis and risk assessment methodology.

...”

City of Vancouver Written Evidence - *Appendix 25 – Public Safety Canada, Federal Policy for Emergency Management – (A4L9A6)* at PDF page 5 and 6

359. Despite the scoping statements within Trans Mountain’s Emergency Response Plans regarding the breadth of hazards that emergency response plans are intended to cover, the ERPs filed by Trans Mountain are largely based on oil spill response with very limited consideration for other hazards that may impact the sites and do not demonstrate compliance with NEB regulatory requirements. For example, notably absent from the assessment of the risk of natural hazards is any consideration of such common occurrences as landslides and severe weather events. Further the ERPs do not address contingency plans for operation and response under abnormal operating conditions.

Trans Mountain Pipeline ULC – *Response to City of Vancouver IR No. 2 – (A4H8I9)* at PDF page 42

360. There is one section in Trans Mountain’s ERPs with the heading titled “Multiple Hazard”, however, the title is misleading in that the information provided in the section simply identifies the different types of hazards that may occur. The Multiple Hazard section does provide any assessment of, or response plans for, the occurrence of more than one hazard at the same time. In addition to this significant gap in Trans Mountain’s emergency planning, the “Multiple Hazard” section fails to comply with the requirements of the NEB’s Audit Protocol in the following respects³²⁻³³:

³² NEB Audit Protocol - *2.1 Hazard Identification, Risk Assessment and Control:*

Expectations: *The company shall have an established, implemented and effective process for identifying and analyzing all hazards and potential hazards. The company shall establish and maintain an inventory of hazards and potential hazards. The company shall have an established, implemented and effective process for evaluating the risks associated with these hazards, including the risks related to normal and abnormal operating conditions. As part of its formal risk assessment, a company shall keep records to demonstrate the implementation of the hazard identification and risk assessment processes.*

1. There is no description of the hazard assessment that is used to inform the ERP.
 2. There is no evidence of any impact assessments related to the identified natural hazards, or the results of those assessments, anywhere in the ERP.
 3. There are no specific response procedures identified.
 4. No consideration has been given to how a response would differ for an emergency at Westridge Terminal as compared to any other point along the pipeline. Instead, the ERP's for both the terminal and the pipeline facilities are virtually identical.
 5. The responsibilities of staff and contractors with respect to natural hazard response have not been identified.
 6. No consideration has been given to the impact of any of the identified hazards on the pipeline or terminal operations.
-

The company shall have an established, implemented and effective process for the internal reporting of hazards, potential hazards, incidents and near-misses, and for taking corrective and preventive actions, including the steps to manage imminent hazards. The company shall have and maintain a data management system for monitoring and analyzing the trends in hazards, incidents, and near-misses.

The company shall have an established, implemented and effective process for developing and implementing controls to prevent, manage and mitigate the identified hazards and risks. The company shall communicate those controls to anyone exposed to the risks.

³³ **NEB Audit Protocol - 3.2 Operational Control-Upset or Abnormal Operating Conditions:**

Expectations: *The company shall establish and maintain plans and procedures to identify the potential for upset or abnormal operating conditions, accidental releases, incidents and emergency situations.*

The company shall also define proposed responses to these events and prevent and mitigate the likely consequence and/or impacts of these events. The procedures must be periodically tested and reviewed, and revised where appropriate (for example, after upset or abnormal events).

The company shall have an established, implemented and effective process for developing contingency plans for abnormal events that may occur during construction, operation, maintenance, abandonment or emergency situations.

7. No consideration has been given to the management of an oil spill response under abnormal operating conditions, that is to say operating conditions that result from one or more of the hazards listed in the ERP.

City of Vancouver Written Evidence - *Appendix 77 - NEB Audit Protocol – (A4L8E5)* at PDF page 5, 7-8

361. During the Information Request process, Vancouver asked a series of questions of Trans Mountain which were relevant to an assessment of Trans Mountain’s ability to respond to a range of regional hazards and the extent to which the consequences of such events can be mitigated. Trans Mountain did not provide the information requested and a motion to compel was denied by the Board.³⁴

362. Similarly, in response to the City of Vancouver’s IR No.1 10.05 g requesting contingency plans for earthquake, fire and explosion, and emergency response vessel malfunctions, WCMRC stated that it was “currently updating their Business Continuity Plan”. In a follow-up request a number of months later, City of Vancouver IR No. 2 5.1c, the City requested that the business continuity plans be provided in their current state together with details of any proposed revisions. Trans Mountain refused to provide this information and was not compelled by the Board to do so.

City of Vancouver - *Reply on the Motion to Compel Full and Adequate Responses to IR No. 2 – (A4J7V4)* at PDF page 50

363. It is not enough to say that the hazard assessments will be carried out after the

³⁴ **CoV IR No. 2 – 4.4a** “Please provide the inventory lists for hazards and potential hazards for both the pipeline and the Westridge Marine Terminal.”

4. 4b “Please describe the established process for identifying and analyzing all hazards and potential hazards related to the pipeline and the Westridge Marine Terminal and explain how this process aligns with best practice for hazard identification.”

4.4c “Has KMC put in place a process to evaluate the risk associated with all identified hazards, including the risks related to normal and abnormal operating conditions.”

4.4d “Has KMC completed risk, impact and consequence assessments for earthquake, tornadoes, bomb threat, security, flooding, fire and explosion, and any other hazard identified as per the hazard inventory for both the pipeline and the Westridge Marine Terminal.”

TMEP application has been approved. The full range of hazards ought to have been identified and assessed as part of this hearing process in order for the Board to:

- a. properly consider whether the detriments of the project, including the risks to the environment, human health and the economy from an accident or malfunction, outweigh the benefits and is not, therefore, in the public interest; and
- b. properly consider the scope and magnitude of the likely adverse environmental impacts of the project, including impacts from an accident or malfunction, and the adequacy of any proposed mitigation measures, including Trans Mountain's Emergency Management Plans and Programs.

364. As the Board stated in *Ruling No. 50*, the onus is on Trans Mountain to substantiate all claims made in its application through facts or other documentary evidence filed. In the absence of any planning documents or other evidence to demonstrate that Trans Mountain and its contractors have the capacity to respond to a multiple hazard event, the Board must find that the capacity does not exist and assess the risks posed by the project on that basis. Thus, when assessing Trans Mountain's proposed oil spill response capacity and mitigation measures, the Board must proceed on the assumption that, in the event of a cascading emergency (one that, for example, involves a natural or man-made emergency which triggers fires, hazmat incidents, etc.) there may be no capacity to respond to an oil spill from a tanker or pipeline and that, at a minimum, response will be significantly delayed. The impacts of such an unmitigated spill have been modelled by GenWest Systems Inc. (GenWest) and the results of the GenWest oil spill models are summarized in the City of Vancouver's Written Evidence and discussed in detail below.

365. Trans Mountain's own evidence confirms that its contractors do not have the capacity to respond to or in the event of natural or man-made hazards or cascading emergencies event. In response to City of Vancouver IR No.2 4.9c, Trans Mountain advised that contractor services and equipment are not available in the following circumstances:

- a. Severe weather on some part or all of the mobilization route;
- b. A combination of road closures and poor visibility; and
- c. A major emergency incident occurs elsewhere in the contractor's area of operations.

Trans Mountain Pipeline ULC - *Response to City of Vancouver IR No. 2.04.9.c – (A4H8I9)* at PDF page 83

366. Finally, the City of Vancouver submits that a comprehensive multi-hazard assessment ought to have included an assessment of hazards impacting both the Trans Mountain Line 1 and the proposed TMEP (Line 2), which run parallel to each other. Trans Mountain has largely ignored the Line 1 operations in its application materials except insofar as Trans Mountain asserts that those operations provide helpful evidence to support the assertion that the risk of an accident or malfunction on the TMEP is low. However, the failure to provide the Board with any evidence at all of the compounding effect of an event such as an earthquake or flooding along those portions of the pipeline route where the Line 1 and Line 2 run parallel to each other is another significant gap in the application materials.

367. Line 1 is properly within the scope of the Board's review for the purposes of assessing the risks of the TMEP for a number of reasons: First, Trans Mountain relies on past Line 1 operations as evidence to support its assessment that the risk of an accident or malfunction, pipeline leak, etc. is low; Second, sections of Line 1 are being recommissioned as part of the TMEP application; Third, the Board's cumulative effects assessment requires the assessment of the environmental effects of malfunctions or accidents "and any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out. In the absence of any evidence at all of these cumulative effects, the Board is unable to complete its assessment of the TMEP and, applying the precautionary principle, must recommend against approval.

iv. *The Likelihood of an Oil Spill is High for both Burrard Inlet and the Fraser River*

368. A number of recent reports including reports from the Auditor General of Canada

and the Tanker Safety Expert Panel have revealed substantial gaps in planning and preparedness for oil spill response in Canada. Transport Canada commissioned a risk assessment to inform the report of the Tanker Safety Expert Panel, which was completed by WSP Canada Inc. The WSP risk assessment considers both likelihood and consequence in the assessment.

369. WSP ranked the entire Strait of Georgia, including the Vancouver region as “very high” on the Environmental Risk Index for crude oil spills within a range of volumes from 10 m³ to 10,000 m³. This assessment did not, however, take into consideration the potential future increase in tanker traffic as a result of the proposed TMEP. Future projects including the TMEP were separately considered in Appendix 4 to the WSP Risk Assessment where it is stated that *“doubling the volume of oil passing through the Pacific sub-sector 5 would likely increase the spill risks to ‘very high’ for all zones (nearshore, intermediate and deep sea) for 10 000 m³ spill volume and greater.”*

City of Vancouver Written Evidence - [A4L7K6](#) at PDF page 53;

City of Vancouver Written Evidence - *Appendix 53 - Report of the Commissioner of the Environment and Sustainable Development to the House of Commons - Chapter 1: Oil Spills from Ships, 2010* – ([A4L7L2](#));

Pacheedaht First Nation Written Evidence – *Appendix B - Tanker Safety Expert Panel, A Review of Canada’s Ship-Source Spill Preparedness and Response, September 2014* – ([A4L7F7](#));

City of Vancouver Written Evidence – *Appendix 55 - WSP Canada (2014) Risk Assessment for Marine Spills in Canadian Water: Phase 1, Oil Spills South of the 60th Parallel, Report from WSP Canada Inc. to Transport Canada* – ([A4L7L4](#))

370. The Trans Mountain spill risk estimates also show that the individual spill probabilities for the specific types of spills, that is terminal (77%) and pipeline (99%), are extremely high. The spill probability for a tanker, although understated in TMEP’s application is, even on its own analysis, also high at 16 – 67%. These probabilities, taken together, mean that it is a certainty that there will be an oil spill from the TMEP.

Table 4.3. TM's Estimate of Spill Probabilities Based on the TMEP Regulatory Application

Type of Spill		Probability over 30 Years	Probability over 50 Years
Tanker Spill	Any size	10.0% – 48.3%	16.2% – 66.7%
Terminal Spill	Spill <10 m ³	58.6%	77.0%
Pipeline Spill	Leak	99.9%	99.9%
Tanker, Terminal, or Pipeline Spill		99.9%	99.9%

Source: Computed from TM (2013, Terpol 3.15); Dynamic Risk (2014a; 2014b; 2014c); TM (2015a; 2015b; 2015c) Note: Pipeline spill represents probability of spills on both Line 1 and Line 2 of the TMEP pipeline. See footnote 4 for calculations. Note that these estimates are confirmed by TM in TM (2015b) sections 2.02 – 2.04.

Tsleil-Waututh Nation Written Evidence - Volume 5 Tab 4A Appendix 1 *Assessment of Spill Risk Report* – ([A4L6A6](#)) at PDF page 15 and 61

C. A Reasonable Worst-Case Oil spill will have devastating consequences for Vancouver [marine-based or pipeline]

371. Vancouver has several unique characteristics that make it particularly vulnerable to a hazard event such as an oil spill from a tanker or from a segment of the pipeline near the Fraser River.

These include:

- (i) the density of population in the downtown core and in close proximity to Burrard Inlet and English Bay;
- (ii) the high number of vulnerable populations;
- (iii) the complexity of the transportation infrastructure;
- (iv) the extensive shoreline;
- (v) the wildlife supported by the ocean and the Fraser River; and
- (vi) the marine-dependent economic and recreational activities.

372. Vancouver is densely populated, with projections for major growth in the future.

Every day hundreds of thousands of people travel to Vancouver to work, increasing the daytime population of Vancouver, especially in the downtown core, to 223,000. Vancouver is also a popular tourism destination, which adds to the number of people that would be exposed in the event of an oil spill. In the summer months, over 800,000 cruise ship passengers come through Vancouver, with as many as five cruise ships docking in a single day.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 6 and 32

373. There are a high number of vulnerable populations in Vancouver that require special planning considerations. Vulnerable populations include but are not limited to the elderly, children, people who don't speak English, people who are homeless, medically dependent, or disabled. Many people living in the Downtown East Side are particularly vulnerable to emergencies, as the City experienced during the recent chemical fire at Port Metro Vancouver.

374. On the afternoon of March 4th, 2015, a chemical fire broke out at the Centerm container terminal at Port Metro Vancouver facilities. Due to the chemical nature of the fire, a Shelter-In-Place order was issued. Notification to residents in Vancouver's downtown eastside was challenging because of the large number of people outside on the streets without access to media outlets. This meant that first responders had to deploy immediately to this area to notify people on the streets in person. The City of Vancouver was able to successfully respond to the chemical fire because its responders were immediately engaged, had an emergency response plan in place, and had immediate access to all of the pertinent information that was required. By way of contrast, none of the evidence provided by Trans Mountain in the application materials before the Board comes close to demonstrating that Trans Mountain is prepared to respond in the case of an oil spill that impacts the City of Vancouver.

375. A recent study on vulnerable populations in Vancouver identified additional areas within Vancouver that are at risk. In addition to the downtown eastside, neighbourhoods that were identified with high vulnerability are Grandview-Woodlands and Strathcona. False Creek North was also identified due to the population growth.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF pages 32 - 35

376. Transportation infrastructure in the region is complex, and includes many bridges as well as important public transportation routes such as the sea bus, which may be impacted by a hazard event in the harbour, and West Coast Express, which may be impacted by a hazard affecting the Port.

377. Key pieces of critical infrastructure in the city are also vulnerable, especially those housing vulnerable people such as hospitals and care homes. These sites require additional consideration when conducting risk assessments and developing response plans as their residents may be disproportionately impacted by emergency events and the stress of evacuation or shelter-in-place. Whereas in a rural or less densely populated area, evacuation may be the identified option, it is not the best option for Vancouver given the densely populated urban environment, the risk of exposure for people evacuating, the lack of transportation options, and the potential for transportation bottlenecks.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF 34

378. Finally, one of the challenges identified in the response to the Port Fire that is also a concern for the City of Vancouver in the event of an oil spill is the lack of air monitoring equipment available for deployment across the community to assess the impacts to human health as the wind direction changed. While different air quality monitoring equipment exists with various agencies in the lower mainland, there is no one agency with equipment to monitor all types of air-borne hazardous chemicals. Plume modelling from Environment Canada also took a long time to be communicated to the EOC.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 34-35

i. Marine-based Oil Spill

379. The City of Vancouver, City of Burnaby and the Tsleil-Waututh Nation commissioned an expert to conduct oil spill trajectory modelling of four major oil spill scenarios in Burrard Inlet. The modelling, done by Genwest Systems Inc, found that a spill in Burrard Inlet would quickly impact nearly all communities surrounding the Inlet.

In all modeling scenarios, between 50 per cent and 90 per cent of the oil would reach the shorelines within days, and in many scenarios within hours, causing significant impacts to human health, the environment and the economy. The impact of an oil spill on shorelines has important implications for response recovery efforts because beaching of oil can cause it to adhere to sediment and increase the speed at which it will submerge or sink when it refloats.

**City of Vancouver Written Evidence – Appendix 56 – Genwest Systems Inc Report –
(A4L7L5)**

380. Genwest created a two-dimensional model to analyze the spill trajectories of four oil spill scenarios in Burrard Inlet. A spill of 16,000 cubic metres (m³) was modeled at each of three locations: i) First Narrows Bridge; ii) Second Narrows under the Canadian National Railway Bridge; and iii) Outer Harbour at Anchorage #8. A fourth spill of 8,000 cubic metres (m³) was modeled at the Westridge Marine Terminal. Scenario modeling was conducted using GNOME (General NOAA Operational Modeling Environment) and incorporated physical transport processes (e.g. tidal currents), a constant wind, and historical observed wind and tide data.

381. Based on results from the four spill scenarios, Genwest concludes that:

1. The confined setting of Burrard Inlet can result in oil spreading quickly with potential to affect the entire inlet from the Port Moody and Indian Arms, to the Outer Harbour and beyond.
2. Winds and tides are major drivers of oil movement in the inlet with strong winds tending to strand oil on the leeward shore while weak winds allow tidal currents to distribute oil over a larger area.
3. The models “provide a realistic representation of the behavior of oil spills in Burrard Inlet [and] can therefore be used to realistically evaluate the possible extent of oil spread resulting from a spill at the Terminal, Second Narrows, First Narrows, and the Outer Harbour locations.”

382. A stochastic modeling approach was also used combining ten (10) random start times to capture the expected range of possible results and Genwest tested and confirmed that the stochastic model provides a realistic representation of expected zones that would be threatened by an oil spill in each release scenario. Figure 10 at Appendix 1 shows that, within a period of 24 hours, virtually all stretches the City of Vancouver waterfront could be affected by a spill at the First Narrows at any time of year.

City of Vancouver Written Evidence - ([A4L7K6](#)) at PDF page 59

383. In the event of an oil spill at First Narrows in March (using 2005 wind and tidal conditions), 10.9 kilometres of shoreline would be oiled within the first 24 hours. This is illustrated in **Figure 11** below:



Figure 11: Oiled Shoreline

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 61

384. As was confirmed by the spread of oil in the *M/V Marathassa* incident, even an oil spill that is only a small fraction of the 16,000 cubic metre volume modelled by Genwest will result in extensive oiling of Vancouver's shorelines, including along

Stanley Park, the downtown core, and the False Creek and Kitsilano neighbourhoods.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 42;

City of Vancouver Written Evidence - *Appendix 42 - Map of Shoreline Oiling, April 23, 2015* – ([A4L9D8](#))

385. Genwest conducted an additional analysis using the stochastic modelling approach. This additional analysis focused exclusively on the areal coverage of floating oil (that is all oil that was not beached on a shoreline). The purpose of the analysis was to provide a statistical view of the oil that would drift around Burrard Inlet and which would be the target of traditional oil spill recovery operations. The results of Genwest's analysis show that a significant percentage of the oil spill tends to spread covering many tens of square kilometres. This was found to be particularly true for a spill at First Narrows where, in four days, an area of nearly 90 square kilometres might expect to have some floating oil present. After only 48 hours, an area of over 70 square kilometres might expect to have some floating oil present.

City of Vancouver Written Evidence – ([A4L7K6](#)); City of Vancouver Written Evidence – *Appendix 56 – Genwest Systems Inc Report* – ([A4L7L5](#))

386. The real-life example of the Marathassa Oil Spill, involving an estimated 2,700 litres (2.7 cubic metres) of oil which spread to cover an area of 6.1 square kilometres within the first 18 hours, confirms that reliability of the Genwest analysis.

ii. Spill from Pipeline and Undetected Pipeline Leaks

387. Trans Mountain's evidence is that oil could be released from the proposed Line 2 at a rate of up to 180 cubic meters per hour and remain undetected by Trans Mountain's leak detection system "for an extended period".

Trans Mountain Pipeline ULC - *Response to Province of BC IR No. 2* – ([A4H8W6](#)) at PDF page 34;
Trans Mountain Pipeline ULC- *Response to Catherine Jensen IR No. 1.2.2* – ([A3Y2S8](#))at PDF page 23

388. 180 cubic meters is equivalent to 180,000 litres of oil or well over one hundred

times the volume of oil recovered from the Marathassa Oil Spill.

389. We know that Trans Mountain has experienced lengthy, undetected leaks on the TMP, in the past and, further, that future pipeline leaks are virtually guaranteed. The only unknown is the volume of the release. However, past experience with the Trans Mountain Pipeline and the 5,000,000 litre Nexen spill in Alberta (July 2015) confirm leaks can go undetected for lengthy periods of time, even in the case of a new pipeline with state-of-the-art technology.

390. In July 2005, a volume of 210,000 litres of crude oil was released from the TMP from a pipeline leak that went undetected for more than a week.

City of Vancouver Written Evidence - *Appendix 18 - Sean Kheraj* – ([A4L7X6](#)) at PDF page 39

391. On another occasion, crude oil leak from the Trans Mountain Pipeline went undetected for 12 hours, ultimately releasing approximately 125,000 litres over an estimated 200 square foot area of park land.

City of Vancouver Written Evidence - *Appendix 18 - Sean Kheraj* – ([A4L7X6](#)) at PDF page 38

392. Trans Mountain's application includes a model of an oil spill scenario into the Fraser River prepared by Dynamic Risk which confirms that oil spilled at the Port Mann Bridge will reach the mouth of the Fraser River and be carried out into the Fraser River Basin within 12 hours or less.

Trans Mountain Pipeline ULC - Application – Volume 7 - *Qualitative Ecological Risk Assessment of Pipelines (Part II)* – ([A3S4X0](#)) at PDF page 29

393. The Fraser River Risk Assessment Report also confirms [at pdf page 54] that approximately 7.5 km downstream from the Port Mann Bridge, the Fraser River in an oil spill starts to split into multiple channels as it enters the Delta and, “Depending upon seasonal flow regimes and the tide, these channels provide multiple pathways by which spilled oil could reach the sea.”

Trans Mountain Pipeline ULC - Application – Volume 7 - *Qualitative Ecological Risk*

Assessment of Pipelines (Part I) – ([A3S4W9](#)) at PDF pages 135

394. While the modelling was not done on a small enough scale to illustrate the actual volume of oil that would be diverted to the north arm of the Fraser River in the event of an oil spill, it does confirm that some portion of the oil spilled would make its way into this channel. This oil transported along the north arm would have most direct impact on Vancouver residents and businesses on the Fraser River.

395. Trans Mountain has acknowledged that the impacts of even a relatively small volume of oil spilled into the Fraser River would be substantial, leading to physical habitat disturbance that could take up to 5 years to restore and recover. As Trans Mountain states in its evidence, the lower Fraser River main stem and its estuary provide critical rearing, staging and migratory habitat for adult and juvenile salmon. The river channels and mudflats associated with the Fraser River Delta, as well as areas of mudflat, salt marsh, and other wetlands along the Fraser River and associated islands in the river and Delta are regarded as important fish habitat (including migratory, spawning and rearing habitat), as well as providing habitat for birds (including migratory birds) and other wildlife species.

Trans Mountain Pipeline ULC Application – Volume 7 - Qualitative Ecological Risk Assessment of Pipelines (Part I) – ([A3S4W9](#)) at PDF pages 54 and 56

396. The substantial impact on this habitat identified by Trans Mountain does not even take into account the full range of species and ecological and physical factors that would further compound impacts. Trans Mountain's own model omits the physical characteristics, such as braiding, of the Lower Fraser River, which results in an underestimate of the volume of stranded oil on shorelines.³⁵ No consideration has been given to the impact of sunken or submerged oil on clean up and recovery, despite the fact that the conditions of the Fraser River are likely to lead to submergence in the event of a

³⁵ Raincoast Written Evidence - *Potential effects on salmon of an oil spill into the Lower Fraser River – ([A4L9F4](#)) at PDF page 38*

diluted bitumen spill.³⁶ Further, the modelled spill assumes perfect functioning of response systems and immediate detection and containment.³⁷ As will be discussed below, these assumptions are unrealistic and seriously underestimate the impacts and consequences of a pipeline rupture and spill to the Fraser River.

397. There are obvious negative implications for the communities and businesses situated on the Fraser River, compromising the health and well-being of individuals and impacting the financial well-being of businesses in the area. In the absence of any assessment by Trans Mountain of these socio-economic impacts, and no evidence at all of mitigation measures, the Board must proceed on the basis that the impacts on the City of Vancouver will be significant.

398. In addition to impacts of a spill on the Fraser River channel itself, Trans Mountain's Fraser River model confirms that oil spilled into the Fraser River at the Port Mann Bridge will reach the ocean and will impact British Columbia's coast line within the first 72 hours. This spread of oil results in shoreline oiling along the south shore of Burrard Inlet, including Jericho Beach and Spanish Banks, around Stanley Park, and extending to the north shore of Burrard Inlet (see PDF pages 15 and 27). Following the initial 72 hour period, the likelihood of re-oiling and continuing spread of oil is high. For example, the map at PDF page 13 of Trans Mountain's Risk Assessment illustrates the extent of oiling in both the Georgia Strait and to Burrard Inlet.

Trans Mountain Pipeline ULC - Application – Volume 7 - *Qualitative Ecological Risk Assessment of Pipelines (Part I)* – ([A3S4W9](#)) at PDF pages 13, 15 and 27

399. Not only has Trans Mountain failed to provide any impact assessment of this spread of oil to Vancouver's shoreline, it has also failed to provide any evidence on which the Board could assess Trans Mountain's capacity, or the capacity of its contractor (WCMRC), to respond concurrently to all three spill conditions and environments (river,

³⁶ Raincoast Written Evidence - *Potential effects on salmon of an oil spill into the Lower Fraser River* – ([A4L9F4](#)) at PDF pages 31 - 35

³⁷ Raincoast Written Evidence - *Potential effects on salmon of an oil spill into the Lower Fraser River* – ([A4L9F4](#)) at PDF pages 29

marine-based and coastal shorelines) over such an extensive geographic area. Trans Mountain is the responsible party in the case of a pipeline spill and yet it has failed to do any of the critical work (for example, Pre-SCAT and geographic response plans) that would be required to assess the coastal shorelines that its own modelling confirms will be impacted by a spill into the Fraser River.

400. In order to address this gap in Trans Mountain's Application, the City of Vancouver has provided expert evidence of the economic and environmental impacts of an oil spill and the resulting shoreline oiling on the city. This is the only evidence before the Board of socio-economic impacts of an oil spill on the city and is not contested by Trans Mountain in any substantive way. Trans Mountain's primary response to the City of Vancouver's evidence is the assertion that the risk of a spill is so low that the evidence can be ignored. For the reasons discussed above, first, on the question of the proper approach to risk assessment and, second, on the expert assessment of the substantial risks presented by the TMEP, the City of Vancouver submits that Trans Mountain's argument must fail.

401. Even if Trans Mountain's approach to risk assessment were correct, Trans Mountain's own evidence of the virtual certainty of multiple pipeline spills from TMEP over the life of the project, taken together with the modelling work that its expert conducted illustrating the extensive spread of an oil spill into the Fraser River, impacting the City of Vancouver both along the north arm of the Fraser River and the beaches and shoreline of Burrard Inlet, confirms that the significant socio-economic impacts of an oil spill on the City of Vancouver must be considered and accounted for in the Board's assessment of the TMEP.

402. Turning to the risk assessment that Trans Mountain ought to have undertaken as part of its Application, the first step in that assessment requires an understanding of the fate and effects of diluted bitumen.

iii. Fate and Effects of Diluted Bitumen

403. A number of reports in the US as well as the experience of the Kalamazoo River spill identify two unique risks associated with a spill of diluted bitumen. The first is the

potential for diluted bitumen to submerge when spilled and the second is the risk posed to air quality and human health by the toxic plume created by evaporating diluents. These two factors present additional risks to first responders and the public and have implications for the speed and effectiveness of any oil spill response and recovery measures.

404. The report of Jeffrey W. Short, Ph.D, entitled “*Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary*” and dated May 11, 2015 (the “**Short Report**”) provides a peer review of the Trans Mountain ecological risk assessment (the “**ERA**”) and an independent assessment of the fate and effects of oil spills from the proposed project in Burrard Inlet and the Fraser River estuary. The Short Report also makes a number of findings about the fate and behaviour of diluted bitumen as compared to normal crude oils.

City of Vancouver Written Evidence - Appendix 3 - *Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – (A4L7W1)*

405. Trans Mountain’s evidence on spill modelling notes the critical importance of understanding the behavior of the oil slick in assessing the mitigation strategy. The City of Vancouver agrees. However, Trans Mountain’s understanding of the behavior of diluted bitumen is based on the Gainford study experiments, which used unrealistically thick oil slicks thereby extending the period of time that the oil would remain floating. As a result, Trans Mountain’s assessment of the effectiveness of its mitigation strategy is fundamentally flawed.

406. The Gainford study experiments observed that diluted bitumen would attain neutral buoyancy within the first 48 hours after a spill, assuming a temperature of 15°C. These observations were, however, based on an experiment in which the natural spreading of oil was prevented by the tank configuration used. The result of this containment was that the oil slick observed in the Gainford study experiments was much thicker (1.15 mm) than what would be observed for oil that spread naturally in the ocean without any barriers to contain it (0.4 mm). Trans Mountain’s expert, Witt O’Brien, acknowledges in its report on the fate and behavior of diluted bitumen, that the

unnaturally thick oil slick produces a slower evaporation rate. The slower evaporation rate, in turn, artificially lengthens the period of time during which the diluted bitumen will reach neutral buoyancy and become susceptible to sinking.

Trans Mountain Pipeline ULC Application – Volume 8C – *A study of fate and behaviour of diluted bitumen oils on marine waters* – ([A3S5G2](#)) at PDF page 20

407. Evidence of the slick thickness that would naturally occur within the first two minutes of an open-water oil spill is found in the Appendix to the Witt O'Brien report. Figure 2 of the Appendix confirms that the oil spill would spread to a thickness of 0.4 mm within the first 120 second (2 minutes) of the spill.

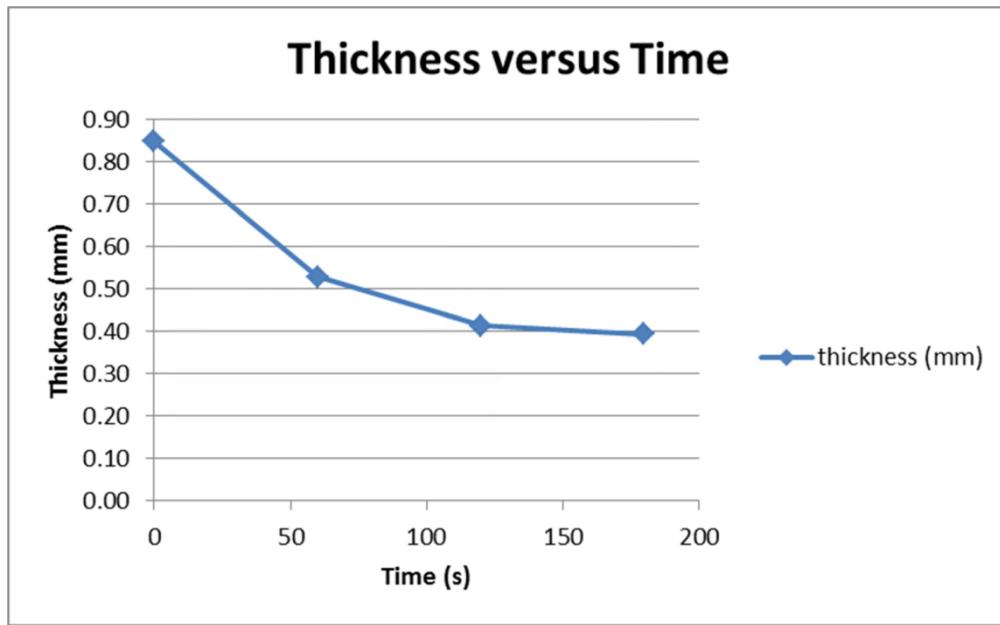


Figure 2: Thickness versus time for a 5-drop spill.

Trans Mountain Pipeline ULC - Application – Volume 8c: *Appendix B Diluted Bitumen Weathering Memos* – ([A3S5I0](#)) at PDF page 23

408. Had the Gainford study experiments used the correct slick or film thickness for unconstrained oil (a thickness of 0.4 mm instead of a 1.15 mm thick oil film) the time required to reach neutral buoyancy may have been as brief as 24 hours. As the Short Report explains, this is because evaporation rates from a natural 0.4 mm thick oil slick

are about three times faster than from a 1.15 mm thick slick under identical ambient conditions.

City of Vancouver Written Evidence - Appendix 3 - *Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary* – ([A4L7W1](#)) at PDF page 56

409. The faster evaporation rate and the corresponding shortened time to reach neutral buoyancy would apply to all volumes of oil that are released before booming is in place as well as to the volumes of oil that continue to escape following booming.

410. Trans Mountain's reliance on the Gainford Study experiments significantly underestimates the risk of oil submergence and, therefore, overestimates the volume of oil that would be available on the water surface for recovery even under the most ideal conditions.

411. In its Reply Evidence filed August 20, 2015, Trans Mountain introduced several new studies into evidence that the City of Vancouver and its expert, Dr. Short, were not given an opportunity to respond to. However, there is no evidence before the Board that any of the new studies in Trans Mountain's Reply Evidence relied on results from an experiment that used correct slick thickness for an unconstrained oil spill in open water. In the absence of any evidence that these studies rely on an analysis of the submergence rate of diluted bitumen when it spreads to a slick thickness of 0.4 mm in open water, the only conclusion that the Board can be reach is that Dr. Short's key finding that diluted bitumen is capable of submerging in as little as 24 hours after an oil spill remains uncontested.

412. The findings of Short Report include the following:

1. The bitumen component of diluted bitumen consists essentially of highly biodegraded petroleum that is naturally prone to submerging in fresh and brackish water.

City of Vancouver Written Evidence – Appendix 3 - Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 49

2. Submergence would be hastened if inorganic suspended particulate material (SPM) entrained in the water column adheres to the bitumen, increasing the density of the bitumen.

This is significant for any assessment of the impacts of an oil spill in Burrard Inlet or the Fraser River but has been ignored by Trans Mountain as a result of its erroneous reliance on the Gainford Studies. Surface waters of Burrard Inlet and the Fraser River estuary are often brackish or nearly fresh where the fresh water of the Fraser River mixes with the ocean water (referred to as the Fraser River plume). Frequent winds, warm temperatures and high Fraser River discharge during spring and summer also create favourable conditions for submergence of diluted bitumen which could occur as early as 24 hours following the initial oil spill.

City of Vancouver Written Evidence – Appendix 3 - Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 60

3. Unlike normal crude or refined oil, diluted bitumen is a mixture of high volatility low density hydrocarbon diluent such as benzene with low volatility high density bitumen and, once spilled, the diluent quickly evaporates.

City of Vancouver Written Evidence - Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7K6](#)) at PDF pages 46 and 49

4. The tidal conditions and long, flat shorelines in Burrard Inlet make it conducive to stranding of the spilled diluted bitumen on shorelines. An oil spill anywhere in Burrard Inlet would almost certainly result in considerable shoreline oiling, which in itself forms an important habitat for organisms. Once incorporated beneath the surface of the shoreline, diluted bitumen can persist for considerable periods of time in the absence of physical disturbance.

City of Vancouver Written Evidence – Appendix 3 - Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 48

5. If diluted bitumen submerges in the waters of Burrard Inlet or elsewhere in the Fraser River estuary, species inhabiting the water column or on adjacent shorelines may ingest oil directly. Once ingested, these species become an indirect route for oil exposure to predatory species.

City of Vancouver Written Evidence – Appendix 3 – Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 47

413. The Short Report concludes that a credible worst-case scenario oil spill of 16,000 cubic metres in Burrard Inlet or elsewhere in the Fraser River estuary could rank within top ten bird mortality events from an oil spill. ***Comparison with other spills suggests that a major spill near the Fraser River could kill more than 100,000 sea and shorebirds.***

City of Vancouver Written Evidence – Appendix 3 - Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 69

414. Marine mammals are also vulnerable as they inhabit the sea surface. ***A major oil spill could result in substantial mortalities of harbour seals and porpoises and could jeopardize the viability of the endangered southern resident killer whale population,*** which would permanently alter the marine food web of the Salish Sea.

City of Vancouver Written Evidence – Appendix 3 – Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 10

415. Even spills considerably smaller than the credible worst-case scenario of 16,000 m³ can have substantial adverse effects on sea- and shorebirds as well as marine mammals and other organisms inhabiting the sea surface, shorelines and the water column if the oil submerges. ***Dr. Short estimates that the adverse effects for small to medium spills (100 to 1,000 m³) in Canada and in Alaska have the potential to contaminate tens of kilometers of shoreline and persist over a period of decades.***

City of Vancouver Written Evidence – *Appendix 3 – Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary* – ([A4L7W1](#)) at PDF page 88 and 89

iv. Human Health Effects

416. Trans Mountain’s application includes several human health risk assessments for operational emissions from the Burnaby Farm Tank the Westridge Terminal and for Marine Transportation as well as for certain spill scenarios at Westridge Terminal and at Arachne Reef in the vicinity of the Haro Strait.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 48

417. The Fraser Health and Vancouver Coastal Health Authorities in British Columbia reviewed the human health risk assessments filed by Trans Mountain and identified a number of limitations in these assessments including:

- a. The assumptions in the air dispersion models may be incorrect because they do not accord with established provincial, national, and international guidelines. For example:
 - i. the human health risk assessments included in Trans Mountain’s application do not conform with standard BC Ministry of Environment requirements as set out in the “*Technical Guidance on Contaminated Sites Supplemental Guidance for Risk Assessments*”;
 - ii. no reference is made in the human health risk assessments to Health Canada guidance documents, as recommended by the British Columbia Ministry of Environment;
 - iii. Trans Mountain’s human health risk assessments state that there is no available toxicity assessment for the inhalation of lead even though this information is readily available in the BC Ministry of

Environment, “*Technical Guidance on Contaminated Sites Supplemental Guidance for Risk Assessments*” (October 2012)

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 48

- b. The model results are compromised by the omission of identified key air pollutants, such as diesel particulate matter, 1,3-butadiene and carbon tetrachloride from the air dispersion models.
- c. Trans Mountain only modelled one hydrocarbon product, Cold Lake Winter Blend diluted bitumen, to the exclusion of all other products that would also be carried by the expanded pipeline system such as gasoline and jet fuel, which contain a greater proportion of lighter and more volatile flammable hydrocarbon fractions.
- d. The only exposure pathway modelled was air inhalation. Other plausible pathways of potential exposure include inhalation of dust, food ingestion, and direct dermal contact, all of which should have been included in Trans Mountain’s health risk assessments. The human health risk assessments also failed to assess potential post-spill health risks to members of the public and to responders involved in the clean-up of the oil spill. This is a significant gap given the evidence that Vancouver Coastal Health reviewed demonstrating the potential for long term physical health effects for people involved in oil spill clean-up.³⁸
- e. None of Trans Mountain’s health risk assessments addressed the human health risks from the construction phase of the proposed Project.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 49 and 50; City of Vancouver Written Evidence – Appendix 50 - Vancouver Coastal Health and Fraser Health Authority, “*Guidance to Metro Vancouver and Fraser Valley Municipalities to Assist in Reviewing the Trans Mountain Pipeline Expansion Project from a Public Health Perspective*” (August 2014), Appendix C

³⁸ Vancouver Coastal Health and Fraser Health Authority, “*Guidance to Metro Vancouver and Fraser Valley Municipalities to Assist in Reviewing the Trans Mountain Pipeline Expansion Project from a Public Health Perspective*” (August 2014), Appendix C

Municipalities to Assist in Reviewing the Trans Mountain Pipeline Expansion Project from a Public Health Perspective” (August 2014) – ([A4L7K9](#))

418. Fraser Health and Vancouver Coastal Health noted that it was not clear from Trans Mountain’s proposal what it was planning to fund in the event of a spill that resulted in human health consequences. They recommended that Trans Mountain be required to clarify its financial commitment to post-spill recovery and compensation costs and demonstrate its ability to cover those costs.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 50;

Air Quality Study

419. To demonstrate the fact that Trans Mountain’s human health risk assessments provide an insufficient basis on which the Board can assess the potential impacts of an oil spill and, in particular, the vapour emissions associated with an oil spill, Levelton Consultants Ltd. modelled the air quality impacts of an oil spill at four different spill locations – English Bay, First Narrows Bridge, Second Narrows Bridge and Westridge Terminal.

420. The Levelton Report then compares the results from its air quality modelling assessment to acute inhalation exposure limits and the Protective Action Criteria (**PAC**) from the United States Department of Energy Emergency Management Issues Special Interest Group. The PAC is described in the report as a hierarchy-based system, with three tiers of exposure limits for each chemical:

- a. PAC-1 for “mild, transient health effects” such as dizziness and nausea;
- b. PAC-2 for “irreversible or other serious health effects that could impair the ability to take protective action such as neurological damage”; and
- c. PAC-3 for “life threatening health effects”

421. Levelton predicts air quality exceedances for the majority of pseudo-components of acute inhalation, PAC-1 or PAC-2 exposure thresholds as a result of an oil spill at any of the four modelled spill locations. ***PAC-2 exceedances were predicted for benzene***

both on-water and on-land, identifying Stanley Park, Lions Gate Bridge and Second Narrows Bridge as areas where people may be present. These people would be exposed to irreversible or other serious health effects, such as neurological damage, that could impair their ability to take protection action.

422. The PAC-2 exposure to the Stanley Park area is of particular concern for the City of Vancouver given the high pedestrian, cyclist and other recreational traffic on the Stanley Park seawall throughout the year, with peak traffic in the summer months. The Seawall attracts 2.7 million users per year.³⁹

423. In addition to the PAC-2 exposure, Levelton has predicted exceedances of PAC-3 exposure thresholds for i-butane, n-pentane and n-hexane over the water. ***The exposure to PAC-3 “life threatening health effects” over the water has significant implications for response agencies and others involved in the oil spill response as well as the feasibility of that response while the PAC-2 and PAC-3 exposures persist.***

424. Levelton notes in its report that the study area was not large enough to capture the full extent of potential impacts arising from an oil spill and concludes that, if the study were more comprehensive, the results would likely indicate a greater population affected and higher concentrations of air contamination.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 52

425. In terms of the exposure timeframe, Levelton finds that the greatest human risk from benzene and i-butane is likely to occur during the first hour following an oil spill based on the simulations conducted. The maximum predicted one-hour concentrations for benzene decreased below the PAC 1 threshold six hours after an oil spill but remained above the acute inhalation exposure limit for all spill locations and scenarios considered.

426. In a letter dated May 25, 2015, Vancouver Coastal Health and Fraser Health commented on the findings in the Levelton report and the risk to human health from the

³⁹ City of Vancouver Written Evidence- Appendix 83 – *Written Evidence of Rashid Sumaila, PhD* ([A4L9G4](#)) at PDF page 19

high concentrations of chemicals in the first hour or two following a spill, stating that it is not certain whether the air monitoring equipment that would be required to assist with oil spill response could, even if available, be deployed quickly enough.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 53

427. Vancouver Coastal Health and Fraser Health Authority have also made it clear that, while the Levelton report provides a starting point for the type of rigorous HHRA that is required, further work must be undertaken by Trans Mountain to properly inform the Board of the risks to human health posed by the TMEP, as follows:

“Because the proponent [Trans Mountain] does not believe it is a credible risk, the proponent has not modeled the consequences of a large oil spill in Burrard Inlet. We believe this is a critical omission. Even if such an event is as extremely unlikely as the proponent believes, and we cannot verify this conclusion, the public health consequences of such an event could be very significant, given the large and densely populated communities surrounding Burrard Inlet. Our literature review indicates that health impacts from large spills are possible and concerning. The screening level air dispersion modeling commissioned by Metro Vancouver also supports the need for further detailed analysis of the public health consequences following a large spill in Burrard Inlet”

City of Vancouver Written Evidence - Appendix 51 - Letter from Fraser Health and Vancouver Coastal Health dated May 25, 2015 – ([A4L7L0](#))

428. This is a further example of the deficiencies in Trans Mountain’s application and demonstrates the need for further assessment work to be carried out before the Board can complete its assessment of the TMEP

v. **Impacts on City of Vancouver Resources**

429. Vancouver’s experience with the recent *MV/Marathassa* oil spill (the “**Marathassa Oil Spill**”) demonstrated that responding to the relatively small volume of

oil spilled in that incident placed significant demands on Vancouver's staff and resources and resulted in significant response and recovery costs to Vancouver.

430. Vancouver staff were present for the entire 16-day activation of the Incident Command Post (ICP) for the Unified Command (UC), which was set up at Port Metro Vancouver and DFO offices at 401 Burrard Street from April 9 through to April 24. Up to 20 Vancouver staff members attended the ICP on a given day.

431. Vancouver Fire and Rescue Services (VFRS) was also active in a number of roles. The Fire Chief served as the Vancouver representative in Unified Command for several days and VFRS staff were also actively involved at the ICP and Vancouver's EOC in various capacities. VFRS and Vancouver Police Department (VPD) staff were deployed to beaches to provide information to the public, working along with volunteers, Park Rangers and Engineering staff.

432. VFRS and VPD marine boats were deployed to conduct on water assessments and to observe the oil spill cleaning operations. It is important to note that, had the incident involved a fire, VFRS does not have the training or equipment to fight ship-board fires on oil tankers. The role of VFRS, if any, would very limited.

433. In the first two days following the oil spill, Unified Command did not have security plans in place or plans for shoreline clean up and closures. As a result, Vancouver deployed staff and volunteers to shoreline and beach areas to warn the public about the oil spill and to ask them not to touch any oil on the shoreline or any impacted wildlife. Vancouver also had notification signs prepared and posted them at various beach locations. Vancouver established a call-in number for the public for the region and this was used to receive and provide information about the spill-impacted wildlife claims and volunteer interests.

Waste collection transportation and disposal

434. Staff from Vancouver's Engineering Department were involved at Vancouver's EOC and coordinated with the Ministry of Environment Waste Management team to develop a plan for managing hazardous waste on the shoreline. Staff from Vancouver's

sanitation department were deployed to assist with the removal of oil spill related hazardous waste.

Volunteer Management

435. A number of convergent volunteers showed up at different oiled sites to clean up oil, including at English Bay on April 9, 2015. To protect public safety and the health of those attempting to clean up oil, the City deployed trained volunteers to provide information to the public about the spill and to warn people about the dangers of touching the oil. The City also took calls from volunteers at the call-in number, with over 4000 members of the public offering to help with clean-up.

Lost Use of Parks and Other Municipal Spaces

436. The initial WCMRC response was staged from the Burrard Civic Marina. Shoreline clean-up happened at Stanley Park, New Brighton Park, Crab Park and around English Bay. Some resources were staged at these areas during clean-up. In addition, some public spaces were closed to the public for a period of time or use was limited. This included beaches and parks (English Bay Beach, Second Beach, Third Beach, Crab Park, and New Brighton Park) that were signed to warn the public against people or pets going into the water, and the parts of Stanley Park that were closed for cleanup of the oil spill.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF pages 87 - 91

437. The participation of Vancouver's Risk Management group in the recovery from the Marathassa Oil Spill is ongoing and it is not yet known when the recovery phase will be completed. Preliminary steps have been taken to secure Vancouver's claim for compensation for costs incurred as a result of the oil spill, however, the extent of those costs is not yet known. What is clear is that the response to the volume of oil spilled in this incident placed significant demands on Vancouver's staff and resources. Response and recovery costs incurred by Vancouver alone may be in the range of \$1 million or more.

438. Based on this experience with the Marathassa Oil Spill, it is reasonable to expect that a larger oil spill would result in exponentially higher costs to Vancouver. Further, as was demonstrated by the subsequent table-top exercise that Nuka facilitated for Vancouver, a worst case tanker spill (16,000 cubic metres) in Burrard Inlet cannot be fully mitigated, and there would be significant adverse impacts to the local environment, culture, public health and economy.

439. Prior to the Marathassa Oil spill, Vancouver commissioned independent expert evidence to provide an opinion on the costs that local governments are likely to incur in responding to and recovering from an oil spill based on a review of and interviews with other local governments that have experienced oil spills. The evidence of Jeremy Stone is provided in Appendix 81 of the City of Vancouver's Written Evidence.

City of Vancouver Written Evidence - *Appendix 81 – Evidence of Jeremy Stone –*
[\(A4L8E9\)](#)

Summary of Stone Evidence

440. As Mr. Stone states in his written evidence, a common principle in disaster management is the notion that all disasters are “local”. Until external resources arrive, local jurisdictions confront disasters on their own, and long after recovery teams leave local communities live with the lasting effects of disasters. Consequently, the greatest exposure from oil spills is borne by the local jurisdiction.

441. Further, despite the availability of compensation mechanisms the most vulnerable populations to oil spills will generally be locally impacted communities, and the costs or impacts that are not compensated by national and international regimes will devolve to local governments, local businesses, and local individuals.

442. A thorough accounting of the costs that local governments face is important to understand the exposure of impacted cities to potential oil spills, and the levels of compensation required for long-term recovery.

443. Mr. Stone concludes that a catastrophic spill could present significant costs for local governments. The upper bound of the quantified spill costs that he identified add up

to close to \$1 billion in costs. The aggregate number would likely be much higher if monetary figures could be provided for the numerous cost categories that were identified in the course of this research yet for which there was no available quantitative data. In addition, the characteristics of the location of the oil spill also play an important part in oil spill impacts, and spills that occur near high population areas, such as the City of Vancouver, can be much more expensive to clean up. Finally, it must be kept in mind that these cost categories do not include the direct costs incurred by the ship owner, contractors or other parties responsible for the on water response and clean-up of a marine-based oil spill.

444. There are numerous cost categories and local government impacts identified by Mr. Stone in his report as costs incurred by local governments in responding to and recovering from oil spills. What follows is a summary of some of the more significant costs identified:

- a. **Staging** - Cost of staging response activities (resources and activities dedicated to the coordination of response activities).

Example: \$1,633,951 – Cosco Busan oil spill

- b. **Fire, police and emergency services** - for the relatively small Cosco Busan spill (188 m³), the cost of emergency services alone was \$203,419. The costs to the City of New Orleans of the Deepwater Horizon spill, where the spill never reached the city's shores, was \$305,000.

- c. **Public Health Costs** - in the context of costs to local governments, this refers to costs of public health precautionary measures, such as beach closures, public notification, air and water monitoring and worker safety.

Example: \$610,696 - Kalamazoo spill

- d. **Waste collection, transportation and disposal** - waste management activities with both short and long term costs.

No local government data was available, however recent spill recovery modeling for a spill of up to 60,000 m³ calculated disposal costs of approximately \$107,000,000

- e. **Communication costs** - This can include various IT costs including a communications center and staff for researching and relating information to the public.

Example: \$297,982 - Cosco Busan oil spill

- f. **Volunteer Management** - Typical cost categories for volunteers include: reception and registration, training (both safety and work training), personal protective equipment (PPE – overalls, boots, gloves, masks etc.), equipment and materials (spades, buckets, sorbents), accommodation, transport, and food/water and medical costs.

Example: \$408,377 - Cosco Busan oil spill. However, in addition to direct costs of managing volunteers, there are additional hidden costs which are difficult to calculate

- g. **Permitting and Regulatory Oversight** - Following the Exxon Valdez disaster some researchers found that issues like temporary structure permit requests, building code enforcement, land use permits, land leases, water demand, and other types of requirements put enormous pressure on local governments (Rodin et al., 1992).

No cost figure available.

- h. **Lost Use of Parks and Other Municipal Spaces** - Marine and waterfront properties owned or used by municipalities may be damaged by direct oil contamination or while being used as staging or temporary disposal sites during the response. Although marine property losses have been recorded for various spills (*Cadiz, Hebei Spirit*) there is little indication of what portion of these properties were owned by local governments.

- i. **Municipal Brand Recovery** - The image of a city can be tarnished by an oil spill when concerns are raised over the cleanliness of the city, the safety of seafood or local goods, and the quality of the water or other tourist amenities. In almost every case it is necessary for municipalities to launch brand recovery campaigns to reinvigorate their economies in the wake of such disasters.

Example: \$37,000,000 - Prestige oil spill

- j. **Opportunity Costs** - Opportunity costs to a municipal government associated with spill response and recovery efforts include: staff time, routine operations and maintenance, and future development activities.
- k. **Costs of damage assessment** - Natural resource assessments, economic analyses, and other damage assessments are usually necessary to prepare for response activities and claims recovery, as well as to perform ongoing monitoring and post disaster planning.

Example: \$550,000,000 - Exxon Valdez oil spill

- l. **Mitigation and Preparedness Activities** - The quality of the contingency planning and the management of response operations have been defined as a potentially crucial variable in determining the costs of the oil spill.

For example, in the wake of the 1988 *Nestucca* fuel barge spill in Washington and the catastrophic 1989 Exxon Valdez tanker spill in Alaska, the Washington legislature created two dedicated accounts to fund the Department of Ecology's oil spill prevention, preparedness, and response activities. Today its core services include vessel and facilities inspections, plan review and approvals, contingency plan drills, natural resource damages assessment on spills to water, environmental restoration, and response to oil and hazardous materials spills delivered 24/7 from field offices.

According to the 2013-15 operating budget for the program, nearly \$27.0 Million is assigned to the program. Out of this budget 17% (\$4.68 million) is allocated for prevention.

m. **Legal Costs** - Recovery from oil spills can cost millions of dollars in litigation and other legal services. However, due to the strict confidentiality that is held around legal expenses it is challenging to determine the total cost associated with litigation.

Example: \$59,000,000 Prestige oil spill

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 82 - 85;

City of Vancouver Written Evidence - *Appendix 81 – Evidence of Jeremy Stone* – ([A4L8E9](#))

445. Vancouver's recent experience with the Marathassa Oil Spill has confirmed that many of the cost categories identified in the Stone Report are costs that Vancouver would actually incur in the event of a large oil spill. Following an initial debrief on the Marathassa Oil Spill, a table top exercise facilitated by Nuka identified a number of additional risk factors and response activities in relation to an oil spill involving diluted bitumen. For example, requirements for evacuation, shelter-in-place, air quality testing, personal protection equipment, were not engaged by the Marathassa Oil Spill. However, based on the expert evidence of Nuka, Dr. Short and Levelton regarding the chemical properties of diluted bitumen, the evaporation rate of the diluents, the toxicity of the plume created by evaporating diluents, and the resulting explosion hazard and health risks, these additional response measures and health costs should be anticipated in the event of a large spill of diluted bitumen.

vi. *Economic Impacts*

Impact of a Spill on Vancouver's Marine-based Economy

446. Vancouver commissioned independent expert evidence to provide an assessment of the potential economic cost of an oil spill in Burrard Inlet on key ocean- dependent economic activities within the City of Vancouver in order to inform the NEB's

assessment of the potential costs and benefits of the proposed TMEP. The evidence of Rashid Sumaila, PhD, is provided in Appendix 83 of the City of Vancouver's Written Evidence.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 92; City of Vancouver Written Evidence - *Appendix 83 – Written Evidence of Rashid Sumaila – ([A4L9G4](#))*

447. Vancouver's ten shoreline beaches attract over three million users per year, waterfront parks attract another five million, and the 22 km seawall attracts another 2.7 million users per year. Professor Sumaila estimates that ocean dependent activities in Vancouver directly employ four percent of Vancouver's population and, *when indirect and induced values are also considered, Burrard Inlet provides employment for approximately eight percent of Vancouver's population.*

448. Professor Sumaila's report (the “**UBC Report**”) assessed the performance of five ocean-dependent economic activities: commercial fishing, port activities, inner harbor transportation, tourism, and recreation. These ocean-dependant activities are estimated to currently contribute a total of \$6.430 to \$6.700 billion CAD in output value, 32,520 to 36,680 person years of employment, and \$3.061 to \$3.261 billion CAD in gross domestic product (GDP) to the Vancouver economy each year.

449. Three potential spill scenarios were analysed in the UBC Report: (a) no spill, (b) a hydrocarbon spill in May of 16,000 m³ at First or Second Narrows; (c) and a hydrocarbon spill in October of 16,000 m³ at First or Second Narrows. The report concludes that, in the event of a May spill, Vancouver's ocean-dependent activities could suffer total losses in the range of \$380 million to \$1.230 billion CAD in output value, 3,238 to 12,881 person years of employment, and \$201 to \$687 million CAD in GDP. *Under this May scenario, 46% of output value, 138% of employment, and 40% of the contribution to GDP from the proposed TMEP, as estimated by Trans Mountain in its Application, would be lost to an oil spill by just the five economic activities assessed in the UBC Report.*

450. In the event of an October spill, these same five ocean-dependent activities could suffer total losses in the range of \$215 million to \$1.020 billion CAD in output value, 1,972 to 11,216 person years of employment, and \$115 to \$757 million CAD in GDP. Under this October scenario, 38% of output value, 120% of employment, and 34% of GDP from the proposed TMEP, as estimated by Trans Mountain in its Application, would be lost to an oil spill.

451. The losses from a hydrocarbon spill are substantial given the narrow focus of the UBC Report on the market values of only five key ocean-dependent economic activities in Vancouver. The value of socio-economic impacts to local businesses and residents whose employment is not directly linked to Burrard Inlet was not assessed in this study, including impacts on human health, real property values, community cohesion, local non-tourism businesses, general well-being of residents in the City of Vancouver, the Greenest City brand, and environmental damages. The UBC Report also does not include the costs of a spill response clean up and litigation activities or the costs incurred by local governments which are discussed above.

Impact of a Spill on Vancouver's Brand

452. Prior to the Marathassa spill Vancouver commissioned independent expert evidence to provide an assessment of the brand value of the City of Vancouver brand and to determine what impact, if any, an oil spill in the Metro Vancouver area defined as the City of Vancouver surrounding municipalities and bordering water bodies of the Pacific Ocean and Fraser River would have on this Brand Value from an economic standpoint. The Brand Finance Report is attached at Appendix 82 to the Written Evidence of the City of Vancouver.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 91;
City of Vancouver Written Evidence - *Appendix 82 – Edgar Baum, Brand Finance (Canada) Inc.* – ([A4L8F0](#))

453. Vancouver's brand was valued using a brand strength assessment (the “**Brand Strength Index (BSI)**”). Brand Finance determined a relative brand strength score for Vancouver of 65 out of 100 as compared to five other cities: San Francisco, Singapore, Sydney, Shanghai and Hong Kong. Brand Finance used the BSI to calculate the Brand

Value of Vancouver and calculated total Brand Value (including Primary, Secondary, and Tertiary sectors) at US \$31.475 billion.

454. As part of the brand valuation assessment, independent market research was conducted by Luth Research a San Diego based market research firm. The responses from a significant majority of respondents to *the market research study demonstrated that the Vancouver brand is associated with the environment, ‘green’ living and environmental leadership* that was discernably ahead of that of the five other city brands studied.

455. As part of the independent market research study, survey respondents were asked to provide feedback regarding the changes in their perceptions of and behaviours toward each of the six cities studied in the event of a small, medium, and large oil spill. The results of this study were used to assess the impacts of an oil spill on Vancouver’s brand value. Mr. Baum concludes that *an oil spill would result in the impairment of the Vancouver brand and a reduction in Brand Value ranging between US \$1 billion for a small spill and US \$3 billion for large spill.*

Limitations of Existing Compensation Regime for Marine-based Spills

456. There is an aggregate sum of \$1.278 billion CAD available under the international marine compensation regimes, which are comprised of the Civil Liability Convention (1992 CLC), the 1992 IOPC Fund Convention, and the 2003 Supplementary IOPC Fund Protocol. However, according to the IOPC Claims Manual, a claimant is entitled to compensation only if he or she has suffered a quantifiable economic loss. It is unclear whether, under the IOPC system, any compensation would be available for lost recreational opportunities for residents (use of beaches, parks, and landscape) and non-use or passive use losses (cultural, non-use and heritage values) that occur in the time interval between the oil spill and the period when restoration is completed. These losses could be significant for Vancouver and its residents in the event of an oil spill.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 97

457. Canada also has in place a Ship-sources Oil Pollution Fund (SOPF), which currently has a reserve of approximately \$400 million and a maximum liability from any one spill which is limited to approximately \$162 million. This brings the total compensation available for damages from an oil tanker spill to \$1.44 billion CAD.

458. In view of Vancouver's evidence regarding the range of local government costs that it will be exposed to in the event of an oil spill, in addition to the costs identified for Vancouver's ocean-based economies and the damage to Vancouver's brand, it is clear that the \$1.44 billion CAD in compensation will quickly be surpassed in the event of a reasonable worst case oil spill impacting Burrard Inlet. The inadequacy of the existing compensation regime becomes even more apparent when the costs of the response and recovery organizations, who will be tasked with the on-water containment, recovery, disposal and restoration activities, are taken into account.

459. Further, Vancouver's review in its evidence of the low percentage of claims that have been approved and paid out in the case of both the 2007 *Hebei Spirit* and the 2002 *Prestige* oil spills, confirms that many of the costs incurred by Vancouver, its businesses and residents as a result of an oil spill will not be compensated under the IOPC Fund or SOPF regimes.

Hebei Spirit

460. Incident - on December 7, 2007, a crane barge was being towed by two tugs when the tow line broke, the barge drifted and collided with the anchored *Hebei Spirit* which was carrying 209,000 tonnes of four different crude oils. The collision punctured three of the five tanks aboard the tanker and resulted in the leaking of some 10,900 tonnes of oil.

461. Impact - The spill occurred near Mallipo Beach (in Taean County) considered one of South Korea's most beautiful and popular beaches. The spill affected three of the four provinces along the western coast of South Korea, ultimately fouling more than 375 kilometers of shoreline.

462. Compensation Claims - According to the IOPC 2010 Annual Report, the *Hebei Spirit* was a major challenge to the Fund as 127,483 claims (mainly from fishing and

shellfish sectors) were received in connection with the incident by December 31, 2010. ***Compensation was only paid on 32,420 of these claims, representing 25% of the total number of claims submitted. Further, only 35% of the total value of these 32,420 claims was paid.***

Prestige

463. Incident - on November 13, 2002, the tanker Prestige, carrying 76,972 tonnes of heavy fuel oil, began listing and leaking oil some 30 kilometres off Cabo Finisterre (Galicia, Spain). On November 19, whilst under tow away from the coast the vessel broke in two and sank. The break up and sinking released an estimated 63,272 tonnes of oil. Over the following weeks, oil continued to leak from the wreck at a declining rate. It was subsequently estimated by the Spanish Government that approximately 13,700 tonnes of oil remained in the wreck.

464. Impact - Due to the highly persistent nature of the Prestige's cargo, released oil drifted for extended periods with winds and currents, travelling great distances. The west coast of Galicia was heavily contaminated and oil eventually moved into the Bay of Biscay, affecting the north coast of Spain and France. Traces of oil were detected in the United Kingdom on the Channel Islands, the Isle of Wight and on the Kent coast.

465. Compensation Claims - Claims handling offices were set up in Spain and France. The office in Spain received 845 claims, including 15 claims from the Spanish Government totaling 984.8 million Euros related to costs incurred in respect of: at-sea and on-shore clean-up operations; removal of the oil from the wreck; compensation payments made in relation to the spill on the basis of Spanish legislation; tax relief for businesses affected by the spill; administration costs; costs relating to publicity campaigns; costs incurred by local authorities and paid by the State; costs incurred by 67 towns that had been paid by the State; costs incurred by the regions of Galicia Asturias Cantabria and Basque Country; and costs incurred in respect of the treatment of the oily residues. ***The IOPC assessed the claims by the Spanish Government at 300.2 million Euros, only 30% of the total losses claimed.*** Other unclaimed losses, such as loss of natural heritage (the Atlantic Islands National Park) and loss of recreational uses by

tourists and residents arising from the *Prestige* oil spill were estimated at 14 times greater than the allowable IOPC compensation limits.

466. Based on a review of the IOPC incident summaries for the *Prestige* and *Hebei Spirit* incidents, there is a gross divergence between the total estimated damages caused by an oil spill, the value of the compensation claims actually submitted by third parties, and the compensation eventually paid under the IOPC Regime. In both of these cases, where only 30% of approved claims were actually compensated, the result is that third parties, such as the City of Vancouver, its residents and businesses, who receive no benefit from the pipeline and oil exporting operations bear a substantial percentage of the risk created by those operations.

467. The IOPC Fund undertook a review of its decisions taken in the period 1979 to 1993 and summarized its findings in a document entitled *Criteria for the Admissibility of Claims for Compensation* dated January 12 1994. A review specific to environmental damage claims was also undertaken and summarized in the IOPC Fund document dated January 4, 1994.

468. The following table sets out various categories of losses and the IOPC Fund's treatment of those losses as compensable or not, based on information provided in these two IOPC Fund reviews.

Simplified table of examples of cost of oil spill vs. compensation

	Example	CLC – IOPC Compensation
Environmental damage ¹¹⁸	Non economical marine environmental losses such as rehabilitation, replacement or acquisition of equivalent natural resources	Unclear
Cleaning and restoration	Cost of reasonable clean-up measures	Yes
Waste Management	Cost of landfill space, dead animals and fishes, absorbent boom, oiled sand, other solid and liquid waste, debris	Yes ¹¹⁹
Preventative Measures	Measures taken to prevent or minimize Pollution damage, including costs associated with the capture, cleaning and rehabilitation of wildlife, in particular birds, mammals and reptiles.	Yes
Property Damage	Property that has been contaminated by oil	Yes
Fisheries and related sectors	Loss of income	Yes
Use of advisers	Costs of work carried out by advisers in connection with the presentation of claims falling within the scope of the Conventions	Yes
Tourism	loss of earnings to hotel or a restaurant located in the <u>immediate vicinity of the affected area and close to a contaminated</u> public beach; Marketing campaigns to prevent/ reduce economic losses	Yes
Tourism	loss of earnings to hotel or a restaurant that is	No <i>(however each claim should be</i>

	not located close to a contaminated public beach; Marketing campaigns to prevent/ reduce economic losses	<i>considered on its merits)</i>
Tourism (Non-regulated)	AirBnB, temporary/ vacation rentals	No
Other businesses	Businesses providing services or goods to tourism-related businesses and not directly to tourists (e.g. laundry services, taxi companies, merchants who purchase the fish from the boats, etc.)	No
Recreation	Use of beaches, seawall and landscape, sports (such as fishing) and natural resources by the public during the recovery period	No
Non-use/ passive use	Cultural, existence and heritage value (e.g. Stanley Park)	No
Public Health costs	Short and Long term health costs (physical and psychological)	No ¹²⁰
Evacuation of urban area and temporary shelter	Evacuation of urban area, temporary shelters, food and water	Unclear
Technical Assistance Programs	Claims & legal assistance, employment assistance, etc.	Unclear
Other Assistance Programs	Human and social services designed to assist impacted populations, such as job training, child care assistance, senior services, domestic violence response, etc.	No
Legal Costs	Legal/ litigation costs incurred by government	Unclear ¹²¹
Volunteer Management	Engagement, PPE (Personal protective equipment), transportation, food and water, medical cost, liability insurance, planning, training, management of volunteers during oil spills	Unclear <i>(some claims presented by voluntary groups involved in the protection of wildlife were accepted on BRAER and TANIO cases)</i>
Research and damage assessment	Research studies and assessments	Only if the study was carried out as a part of the spill response as, a direct consequence of a particular oil

469. Overall the review of past oil spills demonstrates the challenges inherent in the international oil pollution compensation regime. Funding limits are inadequate and many categories of losses remain uncompensated. In practice, the IOPC Fund has been very restrictive in assessing claims especially for damage to the marine environment. To date no claims for restatement of the environment have been admitted in the Fund's experience.

470. The devastating effects of major tanker oil spills on the marine and coastal environment as well as the significant economic losses and other costs to local governments, residents and businesses impacted by the oil spill have focused Vancouver’s attention on the risk of oil pollution from the TMEP’s proposed increased tanker traffic, marine terminal tank farm, and pipeline facilities. Based on the examination of practical examples discussed above, Vancouver has identified a number of gaps in the existing national and international compensation regimes and several factors which limit the regime’s effectiveness in compensating for the full socio-economic and environmental costs of an oil spill.

471. In the event of a large oil spill in Burrard Inlet the existing compensation regime will be inadequate to fully compensate Vancouver its businesses and residents. Vancouver will be only one of many claimants who will also be submitting significant compensation claims. Taking the costs to Vancouver identified in Mr. Stone’s report together with the impairment to Vancouver’s brand value assessed by Brand Finance and the costs to Vancouver’s ocean-based economy assessed in the UBC Report, the economic impact of a large oil spill in Burrard Inlet on Vancouver and its ocean-based economy could exceed \$2 billion.

472. When this \$2 billion is taken together with the costs of the many other claimants that will be seeking compensation from the same \$1.44 billion fund, it is clear that Vancouver would only recover a fraction of its actual costs. This off-loading of risk onto third parties is very clearly against the public interest. As between the project proponent, Trans Mountain, and innocent third parties, it is Trans Mountain that ought to bear the risks associated with an oil spill. Trans Mountain does not dispute this in relation to spills from its pipeline operations. However, it is reasonable to require that Trans Mountain, as the beneficiary of the pipeline, tank farm and marine terminal operations, also bear the risk of all uncompensated costs arising from an oil spill from a tanker that is shipping oil from the Westridge Marine Terminal.

Securing Recovery for Un-Compensated Losses

473. Vancouver commissioned independent expert evidence to provide an assessment of the possible risk transfer mechanism that could be purchased by Trans Mountain to provide compensation for those economic impacts of a marine-based oil spill that would not otherwise be covered under the existing compensation regime due either to the nature of those impacts or the dollar amount of those impacts. The evidence of Karen MacWilliam is provided in Appendix 89 of the City of Vancouver's Written Evidence.

474. In her report, Ms. MacWilliam evaluated four different alternative risk financing options: (a) contingent capital arrangement; (b) catastrophe bond; (c) finite risk plan; and (d) captive insurer. Based on this evaluation, Ms. MacWilliam concludes that the most suitable risk financing option is a catastrophe bond insurance securitization arrangement with a cost estimated to be in the range of 3.5% to 14% of the total coverage required, for an initial bond issue with a maturity of 1 to 5 years.

475. For example, a \$500,000,000 bond could have an initial cost ranging from \$17,500,000 to \$70,000,000 (including broker's commission). One time administrative costs could be as much as \$450,000 with ongoing administrative costs up to \$400,000 annually if there are claims from a triggering event.

476. The likelihood of successfully issuing and subscribing a catastrophe bond decreases as the amount of the bond increases. The likelihood of subscribing a catastrophe bond for an amount that is sufficient to compensate for \$1 billion in losses from a triggering event is less than 20%.

City of Vancouver Written Evidence – Appendix 89 – Evidence of Karen MacWilliam – ([A4L9H1](#))

477. A catastrophe bond functions as a risk transfer mechanism, whereby some of the financial risk of the triggering event (an oil spill in the Burrard Inlet) is transferred to sophisticated financial investors. The rate of return required by the investors is a function of the risk of the triggering event occurring. The higher the likelihood of the triggering event occurring the higher the rate required by bond investors. Were the risk considered

low, the expected rate of return for investors would be low and the likelihood of placement would be high.

478. As such, the catastrophe bond acts as a risk pricing mechanism whereby the expected cost of the risk transfer mechanism can be considered to be illustrative of the cost of the risk that is being transferred. In the case of the Catastrophe Bond discussed in the MacWilliam evidence, the risk to be transferred is part of the risk associated with an accident or malfunction from a project related tanker. In short, the catastrophe bond is an estimate of the monetary value of the risk that project tankers pose to Vancouver and its residents. Insofar as the MacWilliam evidence confirms that such a mechanism would be expensive and difficult to arrange, this demonstrates that the risk that the TMEP would impose on Vancouver, without any return to Vancouver for accepting that risk, is wholly unjustifiable.

D. The consequences of a marine-based oil spill into Burrard Inlet or a spill from the pipeline into the Fraser River cannot be mitigated

479. The evidence that is before the Board on the question of mitigation is discussed in detail below and, based on this evidence, the City of Vancouver submits that the Board must reach the following conclusions:

- a. There is no evidence that Trans Mountain, its contractors (WCMRC) and the government agencies that it relies on, including the Canadian Coast Guard, Transport Canada, and Environment Canada, have developed appropriate plans or programs to minimize the impacts of an oil spill the City of Vancouver, its residents and the environment. Trans Mountain's proposed mitigation measures are not adequately explained, have many gaps, and do not include required training and exercising. Further, to the extent that there is some limited evidence before the Board regarding proposed revisions or enhancements to existing plans and programs, there is no evidence on which the Board can conclude that these proposed plans and programs will sufficiently mitigate impacts, or that funding will be available to ensure the implementation of proposed mitigation measures.

- b. The existing marine-based oil spill response regime in Canada does not adequately engage or resource local governments and communities at risk from a spill. The result is that the effectiveness of any of Trans Mountain's proposed mitigation measures is significantly undermined.
- c. Regardless of the investment in preparedness, there are conditions under which response no response will be possible. This is true both in the event of a response to a marine-based oil spill and in the event of a pipeline spill into the Fraser River.
- d. Even under the most optimal conditions for oil spill response and recovery, only a small percentage of oil spilled can be contained and recovered. Uncontained oil will quickly strand on Vancouver's beaches and shoreline and making much of it unrecoverable.

i. Existing and Proposed Emergency Response Regime

1. *The Evidence Demonstrates that Response Plans and Capacity do not currently exist and Proposed Enhancements have not adequately been planned for or funded.*

480. In its application, Trans Mountain relies on WCMRC as the organization that would be responsible for responding to an oil spill from a tanker and asks the Board to accept that WCMRC has the capacity and the emergency planning in place to respond to and mitigate the impacts of an oil spill. Trans Mountain also relies, in its application, on the Canadian Coast Guard as the agency that would be responsible for initiating and overseeing a response where the vessel owner does not take responsibility for the spill or in the event of a “mystery” spill.

481. What Trans Mountain has failed to do is present to the Board, and to the Intervenors in the hearing, the evidence that is required to demonstrate WCMRC response plans and capacity. Further, the evidence from the Canadian Coast Guard, when taken together with the evidence filed by other Intervenors, demonstrates that there are significant gaps in Canadian Coast Guard contingency plans and no evidence at all of the capacity of the Canadian Coast Guard to respond to an oil spill in Burrard Inlet.

482. Finally, with respect to Trans Mountain's own emergency plans and capacity to respond to a pipeline spill, Trans Mountain has failed to disclose its control point plans for the Fraser River (or elsewhere) and the substantially redacted emergency plans that have been produced demonstrate significant gaps in Trans Mountain's response planning.

WCMRC

483. Emergency Planning – Throughout the Information Request process, Vancouver made repeated requests for access to WCMRC's emergency response plans and, in particular, business continuity plans and contingency planning documents. On October 30, 2014, WCMRC responded that it was in the process of updating their Business Continuity Plan “to ensure … that contingency plans are in place for earthquake, fire and explosion.” Vancouver repeated its request for WCMRC planning documents in the second round of Information Requests. Despite the fact that it has now been over eighteen months since Vancouver first requested these documents and more than a year has now elapsed since WCMRC responded that it was updating its plans, no business continuity or contingency planning documents have been provided.

Trans Mountain Pipeline ULC – *Request for Information from WCMRC* –
Attachment 3 ([A4E2V0](#)) at PDF page 3

Trans Mountain Pipeline ULC – *Response to City of Vancouver IR No. 2*
([A4H8I9](#)) at PDF page 106

484. WCMRC and Trans Mountain have also failed to provide any plans for oil spill response along Vancouver's shorelines or plans for responding to submerged or sunken oil. In the absence of this information there is no ability to assess capacity to respond or effectiveness of any proposed response measures to mitigate the environmental and socio-economic impacts of a spill.

485. Capacity - WCMRC is the only certified response organization working on the West Coast of Canada and would, necessarily, be the organization that Trans Mountain relies on to provide response capacity for an oil spill from a tanker. However, while tanker owners must have a contract with WCMRC to provide response capacity, there is

no obligation to activate response in the event of an oil spill. As Transport Canada confirmed in its response to a City of Vancouver Information Request:

“While vessel owners must report pollution incidents and are held strictly liable for costs and damages that are incurred as a result of oil being released from their vessels while in waters under Canadian jurisdiction, they are not legally required to activate their arrangement and to contract with Western Canada Marine Response Corporation to clean up a spill after it has occurred”.

Government of Canada - *Response to City of Vancouver Information Requests-* ([A4R3Z6](#)) at PDF page 108

486. Trans Mountain has identified a reasonable worst case oil spill from a tanker to be 16,000 cubic metres. However, as Port Metro Vancouver has pointed out, the Tanker Safety Expert Panel has recently recommended that there be an ability to address a “worst case discharge” which they define as the complete discharge of a tanker’s oil cargo along with all bunker fuel.

Port Metro Vancouver – *Notice of Motion of VFPA Regarding IR #1* – ([A3Y8T0](#)) at PDF page 10 (2014 July 4)

487. Currently, WCMRC is only required by Transport Canada to complete the following for a certification:

- one 150 tonne equipment deployment drill and one 1,000 tonne tabletop scenario exercise annually;
- one 2,500 tonne equipment deployment drill every 2 years; and
- one 10,000 tonne tabletop exercise every 3 years.

As the evidence confirms, the exercise requirements have not been strictly enforced. A recent WCMRC 1,000 tonne exercise was based on a scenario that provided for the release of 83,000 L of diesel into a *pre-deployed* boom. Only 3,000 L were assumed to have escaped the boom. In the event of an oil spill in open water, there would be no pre-

deployed boom to capture the spill. As such, all that the exercise demonstrated was that WCMRC has the capacity to respond to a 3000 L spill of diesel. Even then, it is evident from the recent Marathassa Oil Spill that, while WCMRC may have the equipment to respond to a relatively small oil spill in open water, it is only capable of containing and recovering a fraction of the spill volume even under ideal response conditions.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 54

488. WCMRC has recently proposed increasing its response capacity to 20,000 tonnes (equivalent to 21,277 cubic metres based on a conversion of 940 kg/m³, the upper density limit of the pipeline products), a proposal that Trans Mountain relies on in its application. In the absence of any evidence that would assist the Board to assess whether sufficient personnel, equipment and other resources are being proposed by WCMRC to enable a 20,000 tonne response, the Board must proceed on the basis that WCMRC will continue to have only a fraction of the response capacity required for an uncontained spill.

489. Trans Mountain also relies on availability of cascading resources to respond to a spill in excess of 10,000 tonnes, but the evidence before the Board demonstrates that these resources likely will not be available for a number of reasons. First, the recent cross-board CANUSPAC exercise involving by the US and Canadian Coast Guards confirmed that there is currently no legal mechanism in place whereby American Oil Spill Response Organizations (**OSROs**) can cross the border into Canada to respond to oil spills under the direction of the Canadian Coast Guard. The reason for this is that Canada has been unable to address the important legal issue of responder immunity for American OSROs. Similarly, in the case of a spill without a known responsible party, the US Marine Spill Response Corporation would not cross the border into Canada. This is confirmed in the after-action report from the CANUSPAC exercise as follows:

“Canada’s inability to address responder immunity for American OSROs seeking to cross the border to respond to oil spills has been a great concern for about two decades. U.S. OSROs entering into Canada ... in order to support response actions, even when the Joint Contingency Plan between the two nations has been activated, is still not able to occur, during spills or exercises.”

“In the case of a spill without a known responsible party, [Marine Spill Response

Corporation (MSRC)] would not cross the border into Canada at the request of the [US Coast Guard] unless the USCG signed the MSRC international addendum. The USCG is unable by current legal standards to sign such an addendum, which would in essence put the U.S. government in the position of potentially defending MSRC against claims in the Canadian court system.”

Friends of the Earth Written Evidence – Appendix E – CANUSPAC 2014 AAR – ([A4L9X2](#)) at PDF page 11 and 12

490. The second impediment to Trans Mountain’s reliance on cascading resources is the fact that the limited evidence provided by WCMRC concerning the Mutual Aid agreements that it has in place within Canada only provide that the assisting response organization “may, at its discretion” make response services available. The Province of BC requested copies of WCMRC’s Mutual Aid agreements, but only received a list of agencies that WCRMC claims to have MoU’s with together with a template form of agreement which states that “*nothing in this Agreement obligates either party to make available their respective Marine Spill Response Services*”, as follows:

2.1 Marine Spill Response Services

(a) Each of the parties (a “**Providing Party**”) **may, in its discretion**, agree to make available its Marine Spill Response Services to the other party (a “**Requesting Party**”) in the event of an Incident occurring within Requesting Party’s Response Area.

2.2 Best Efforts Basis

(a) Each party acknowledges that ***nothing in this Agreement obligates either party to make available their respective Marine Spill Response Services*** to Requesting Party.

(b) By entering into this Agreement, the parties undertake only to use their respective Best Efforts to make available to the other party any Marine Spill Response Services that the Providing Party has agreed to provide under Article 2.

WCMRC- Attachment 3 Trans Mountain Pipeline ULC - Request for Information from WCMRC - Table 1 – ([A4E2V0](#)) at PDF page 5

491. The clear limitation on WCMRC’s response capacity demonstrated by the evidence is just one example of the significant gaps in the application evidence before the Board on the issue of mitigation. Even if the Board is not prepared to find that the application is premature and that insufficient evidence is before it to carry out the

environmental impact assessment that is mandated by *CEAA 2012*, the Board must find, on the evidence before it, that there are inadequate mitigation measures in place such that the project will result in adverse environmental impacts. Further, in the absence of a demonstrated capacity to respond to either a 16,000 cubic metre spill or a “worst case discharge” as defined by the Tanker Safety Expert Panel, the risk to public is too high. A voluntary commitment by WCMRC, who is not a party to the application and would not be subject to terms and conditions imposed by the Board, is not enough to protect public interest.

Canadian Coast Guard

492. Many of the issues around the Canadian Coast Guard’s (CCG) oil spill response capacity and preparedness as raised by the Auditor General of Canada in the 2010 report of the Commissioner of the Environment remain issues today. This was clearly demonstrated during the Marathassa Oil spill. Some of the findings of the Auditor General include the following:

- a. Although the CCG has concerns over the state of its equipment, due to the lack of current information on risks and the absence of a recent capacity analysis, the Coast Guard is not able to determine how much oil spill response equipment it should have in place.

City of Vancouver Written Evidence - *Appendix 53 - Oil Spills from Ships* – ([A4L7L2](#)) at PDF page 28

- b. The Marine Pollution Incident Reporting System (MPIRS) implemented by the CCG in 2001 contained information that was “incomplete and of questionable quality.” MPIRS reports do not clearly indicate the level of effort spent by the Coast Guard in responding to spills or the results of the response efforts, such as the estimated amount of oil recovered and the environmental impacts resulting from the spills.

City of Vancouver Written Evidence - *Appendix 53 - Oil Spills from Ships* – ([A4L7L2](#)) at PDF page 31

- c. Incomplete and unreliable documentation on responses to ship source

spills affects the CCG's ability to know how well it is achieving its objectives. Limitations associated with the MPIRS also prevent the Coast Guard from conducting reliable trend analysis on ship source spills which in turn is important for conducting risk assessments and assessing the adequacy of equipment and capacity.

City of Vancouver Written Evidence - *Appendix 53 - Oil Spills from Ships –* ([A4L7L2](#)) at PDF page 32

493. In response to a number of Vancouver's Information Requests, Trans Mountain repeatedly stated that any marine-based oil spill response will be managed through an incident command system (ICS). Further, Trans Mountain relied on ICS as a justification for refusing to produce or develop specific contingency plans for oil spill response. However, Trans Mountain also made it clear in its evidence that it will have no responsibility for responding to a marine-based oil spill as this is the obligation of the responsible party. What Trans Mountain has failed to state is that there are no legal requirements in the *Canada Shipping Act* for the responsible party to establish an incident management team, one of the core elements of ICS. Further, as noted above, there is also no requirement for the ship owner to activate WCMRC if they choose not to. This was confirmed by the Department of Fisheries and Oceans in its response to the City of Vancouver's Information Request.

Government of Canada - *Response to City of Vancouver Information Requests-* ([A4R3Z6](#)) at PDF page 49

494. Compounding this gap in Trans Mountain's emergency plans and the requirements of the *Canada Shipping Act* is the fact that current CCG Marine Spills Contingency Plan - National Chapter does not incorporate the Incident Command System (ICS). The Pacific Region Plan provided by the CCG in response to the City of Vancouver's Information Request was developed in 2001, based on the 1998 National Contingency Plan, with no subsequent updates to incorporate ICS or other changes in the Regime and provides no specific area plans or information for the Pacific Region.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 69

City of Vancouver Written Evidence – *Appendix 70 – Canadian Coast Guard, “Marine Spills Contingency Plan – National Chapter”* – ([A4L7V1](#))

Government of Canada Response to City of Vancouver Information Request – *Coast Guard Marine Spills Contingency Plan Pacific Region* – ([A4R3Z6](#)) at PDF page 127-220

495. Effective oil spill response using ICS requires not only the capability to staff an Incident Management Team, but also that comprehensive contingency plans have been developed and tested in advance to inform the actions of the IMT and responders. ICS is the mechanism by which contingency plans are implemented; the use of ICS does not eliminate the need to develop robust contingency plans before an emergency has occurred as Trans Mountain contends.

496. That National Contingency Plan is also insufficient to enable the Canadian Coast Guard to respond to concurrent spills. In response to the City of Vancouver’s information request about the capacity of the CCG to manage more than one spill at a time, the CCG reference the *Brigadier General Zalinski* operation as an example of how incidents of national significance are planned for and managed under the current regime. The CCG began contingency planning for the Zalinski operation in 2003, and operations were ongoing from 2013 – 2015. Despite more than a decade of contingency planning for the operation, the CCG was unable to respond effectively to the Marathassa Oil Spill, as confirmed by the Independent Review of the M/V Marathassa, also submitted as evidence by the CCG. It is clear that without significant increases in response capabilities the CCG will remain incapable of responding to large or concurrent incidents.

Government of Canada - *Response to City of Vancouver IR No.19 –* ([A4R3Z6](#)) at PDF page 54 and 69

497. The absence of any evidence of oil spill contingency plans from either Trans Mountain or its contractor, WCMRC, and the gaps in the *Canada Shipping Act* around coordinated planning and response stand in stark contrast to the detailed level of multi-government standards and planning required in the United States, and for Washington State in particular. For example, there is no overarching framework for coordinated planning and response in Canada such as that which is mandated through the US National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Region 10

Regional Response Team Northwest Area Committee's 2015 Northwest Area Contingency Plan. Further, Canada has no detailed planning standards to inform vessel contingency plans, environmental protection, and oil spill response and recovery. These detailed planning standards are provided in the United States by the WA State Department of Ecology with respect to Contingency Planning for oil spills.

Washington State Department of Ecology – Written Evidence –
[\(A4Q1X6\)](#) at PDF page 10

498. The Northwest Area Committee's 2015 Northwest Area Contingency Plan (Dept of Ecology Exhibit 15) includes the requirement that: "Contingency plans also have to ensure there is access to enough people to fulfill all the roles in the incident command system and that management teams are trained to respond" Further, the NCP requires that response plan holders "prepare and submit a plan for responding, to the maximum event practicable, to a worst case discharge, and to a substantial threat of a discharge of oil or a hazardous substance. These response plans are required to be consistent with applicable Area Contingency Plans."

Washington State Department of Ecology – Written Evidence –
[\(A4Q1X6\)](#) at PDF page 11;
Washington State Department of Ecology – Written Evidence - *Exhibits 1-27*
Part 3 – [\(A4Q2D4\)](#) at PDF page 58

499. A further example of the inadequacy of the CCG National Contingency Plan is that it does not include measureable service levels. Instead, "Levels of Service" are vaguely described as providing "a preparedness capacity for response" without specifying what that capacity is. In fact, CCG's evidence in this hearing is that its response capacity "should never be counted as part of the proponents' spill response plans for project-related tanker traffic."

Canadian Coast Guard – *TMP Request for Information on Behalf of Intervenors* –
[\(A4A8U4\)](#) at PDF page 4;

500. The CCG would, however, be relied upon to respond to a spill in the event that the Responsible Party was unknown, unable, or unwilling to respond. The CCG, according to its own evidence, may also supplement the WCMRC response if necessary.

Clearly, the capacity of the CCG to respond is a critical component of the Spill Response Regime that Trans Mountain relies upon. The CCG has stated that “the Canadian Coast Guard does not foresee undue burdens placed on its response capability and considers the current configuration and placement of Response Organization and its own assets to be sufficient to meet the demands of increased tanker traffic”

Canadian Coast Guard – Written Evidence – ([A4L7D5](#)) at PDF page 12;

501. However, there is no evidentiary basis for this statement, given that, as per the response the City of Vancouver’s Information Request, the CCG does not know how to assess its own capacity. Despite recommendations from the report of the Auditor General, the CCG has confirmed that as of 2015 it “does not measure its response capacity as there is no nationally or internationally recognized method for doing so.” Clearly the CCG is not in a position to determine whether its own or WCMRC’s response capacity is sufficient to support the project.

Fisheries and Oceans Canada / Canadian Coast Guard. Written Evidence 14 – Attachment 2 – 3.1.4 Environmental Response – ([A4L7D5](#)) at PDF page 12;

Natural Resources Canada on behalf of Government of Canada – Response to City of Vancouver IRs (inc annexes) – ([A4R3Z6](#)) at PDF 45

502. Accordingly, not only is the CCG National Contingency Plan wholly inadequate, it is clear from the CCG’s own evidence that, when assessing the available mitigation measures in the event of a marine-based oil spill, the Board cannot take into consideration any possible contribution by the CCG to oil spill response efforts.

City of Vancouver Written Evidence – Appendix 70 – *Canadian Coast Guard, “Marine Spills Contingency Plan – National Chapter”* – ([A4L7V1](#)) at PDF page 16

Canadian Coast Guard – *Request for Information on Behalf of Intervenors from Trans Mountain* (August 27, 2014) – ([A4A8U4](#))

503. The Canadian Coast Guard has submitted evidence regarding the critical nature of the Marine Communications and Traffic Services (MCTS) program to oil spill prevention and response. The CCG has also provided evidence of significant cuts to the MCTS

program, regular failures in communication services, and an inability to track all technological failures that impact the system, and the absence of a system to track and resolve instances of human error impacting the system.

Natural Resources Canada on behalf of Government of Canada – *Response to City of Vancouver IRs (inc annexes)* – ([A4R3Z6](#)) at PDF page 78

Canadian Coast Guard - *Response to City of Vancouver Motion to Compel regarding Responses to Information Requests* – ([A4R9I1](#)) at PDF page 5

Natural Resources Canada on behalf of Government of Canada – *Response to City of Vancouver IRs (inc annexes)* – ([A4R3Z6](#)) at PDF page 79

504. The CCG has also confirmed that closures of MCTS centres in Victoria, Vancouver, and Comox have occurred, and that cuts have resulted in a reduction of 30 personnel from this program. The CCG has provided evidence of 6 failures of the MCTS system in the Vancouver area between May 11, 2015 and June 15, 2015.

Natural Resources Canada on behalf of Government of Canada – *Response to City of Vancouver IRs (inc annexes)* – ([A4R3Z6](#)) at PDF page 78; and

Canadian Coast Guard - *Response to City of Vancouver Motion to Compel regarding Responses to Information Requests* – ([A4R9I1](#)) at PDF page 5

505. The CCG does “not keep specific records or statistics of human error impacting communications capacity of MCTS” and, according to the CCG “the MCTS communication systems are too varied and complex in nature to reasonably capture all instances of technological failure.”

Natural Resources Canada on behalf of Government of Canada – *Response to City of Vancouver IRs* ([A4R3Z6](#)) at PDF page 79

506. It is unclear how a system that regularly fails, and for which records cannot be reasonably kept, can be relied upon to provide critical communications and traffic services to prevent and respond to spills.

Transport Canada

507. Transport Canada has provided evidence describing Port State Control as the “primary means for enforcing the Canadian Shipping Act, 2001.” This system established

by the International Maritime Organization (IMO), requires countries sharing common waters to agree to share inspection responsibilities and information.

Transport Canada - *Written Evidence* – ([A4L7K1](#)) at PDF page 41 and 42

508. However, it is clear from Transport Canada's own reporting record that the system is not reliable. Transport Canada failed to report any deficiencies identified for the *M/V Marathassa*, as demonstrated by the report on the Port State Control database. Transport Canada has stated that the department publishes all defects on the Port State Control database, and in response to the City of Vancouver's information request, advised that statistics for foreign flagged vessels could be found on the Tokyo MOU website. Transport Canada further confirmed that an inspection had been completed of the *M/V Marathassa* only after the spill into Burrard Inlet. The report on the Port State Control Database shows that a single initial inspection of the *M/V Marathassa* was conducted on April 9, with no deficiencies identified and no follow-up.

Legend: <input type="checkbox"/> - initial inspection <input checked="" type="checkbox"/> - follow-up without new deficiencies recorded <input checked="" type="checkbox"/> - follow-up with new deficiencies recorded						
Inspection Date	Inspection Place	Ship Name	Call Sign	Flag	No. of Deficiencies (total / new)	Detention
		(at the moment of inspection)				
<input type="checkbox"/> 09.04.2015	Vancouver, Canada	MARTHASSA	5BEB4	Cyprus	0 / 0	no

Number of outstanding deficiencies for the ship (at the moment of last inspection): 0

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509. This is in contrast to the Chronology of Events contained in the Independent Review of the *M/V Marathassa* submitted as evidence by the Canadian Coast Guard, which found that Transport Canada did issue a detention order on April 11. The vessel is currently listed as “low risk” even though its maiden voyage resulted in a spill and detention. The vessel was permitted to leave the Port of Vancouver with no record on the PSC database of a spill, any deficiencies, or its detention. According to the PSC Database, the primary source of information for authorities to determine the risk posed by a vessel to their Ports, the *M/V Marathassa* has not been assessed since April 9th. If this can occur under the Canadian system, the reliability of the reports of other nations must also be questioned.

Trans Mountain Pipeline ULC – *Reply Evidence – Canadian Coast Guard: Independent Review of the M/V Marathassa Fuel Oil Spill* – ([A4S7J6](#))
at PDF page 59

Natural Resources Canada on behalf of Government of Canada – *Response to City of Vancouver IRs* – ([A4R3Z6](#)) at PDF page 8; and

Natural Resources Canada on behalf of Government of Canada – *Response to City of Vancouver IRs* – ([A4R3Z6](#)) at PDF page 86

510. The TERMPOL Review Process was not completed in alignment with the TERMPOL Review Process 2001 Guidelines and cannot be relied upon to draw conclusions with respect to issues of Marine Accidents and Malfunctions. Transport Canada chaired the TERMPOL Review Committee (TRC) for the Trans Mountain application, and failed to implement the requirements under the TERMPOL Guidelines, or to consult any subject matter experts or recent literature regarding critical components of Trans Mountain’s TERMPOL submission. Despite the fact that issues including: public health and safety, oil spill response, marine firefighting, and the fate and effect of diluted bitumen fall squarely within the mandate of the TRC, they were not addressed by TERMPOL Review published by the TRC.

511. In response to information requests from the City of Vancouver, Transport Canada confirmed that the TRC consulted only the submissions of Trans Mountain relating to the fate and behaviour of diluted bitumen. They raised no concerns whatsoever with glaring omissions in the application, such as the validity of the Gainford Study or the lack of modelling of a spill from a tanker in segments 2 or 3. The TERMPOL Review Process Guidelines confirm that the TRC may use departmental databases or other sources of information to verify the proponent’s submissions.

512. Public health and safety is a primary concern of local governments and has been raised by a number of Intervenors, including the City of Vancouver on numerous occasions. However, the membership of the TRC did not include any public safety experts or representatives from municipal or provincial emergency management offices that would be able to provide this critical perspective.

Government of Canada - *Response to City of Vancouver IR No. 19 –*

([A4R3Z6](#)) at PDF page 118 and 119;

Vancouver Written Evidence - *Appendix 79 – Transport Canada’s TERMPOL Review Process* – ([A4L8E7](#)) at PDF page 14

Marine Firefighting

513. Trans Mountain’s application erroneously assumes that marine firefighting capacity suitable for dealing with a fire on a project tanker exists in Vancouver Harbour and is provided by the City of Vancouver. Trans Mountain states that “local marine firefighting capability is expected to be available with local fire departments”.

Trans Mountain Pipeline ULC. - *Vol. 8c: TERMPOL 3.15 - General Risk Analysis and Intended Methods of Reducing Risk - Det Norske Veritas* – ([A3S5F4](#)) at PDF page 30

Trans Mountain Pipeline ULC - *Response to IR from Province of BC IR No.1* ([A3Y2Z1](#)) at PDF page 187

514. The City of Vancouver is the only municipality in the region with fire boats and marine firefighting capability. However, this capacity is limited and Vancouver’s Marine Fire Response Service does not currently have the training or equipment to fight shipboard fires on tankers. Vancouver Fire and Rescue Services would respond to a fire on a project tanker only on a “response available basis” and would only be able to respond in a firefighting support role only, such as by cooling the external hull of the ship.

City of Vancouver - Written Evidence – ([A4L7V8](#)) at PDF page 69

515. The importance of a suitable marine firefighting is highlighted in 2013 report to the British Columbia Ministry of Environment: *West Coast Oil Spill Response Study, Volume 3.*

3. 3. 2 Marine firefighting resources are available for rapid deployment
Controlling shipboard fires and preventing explosions will minimize environmental damages as well as risks to crewmembers and possibly even to public safety. While most vessels have onboard equipment to fight small shipboard fires, a large vessel fire or explosion will require firefighting support from vessels with high-capacity pumps or fire suppression foams.

Trans Mountain Pipeline ULC – *Response to Allan R IR No. 1.21R – Attachment 3 – (A3X5W5)* at PDF page 23

516. Trans Mountain dismisses any consideration of the significant void in marine firefighting, claiming that a ship board fire resulting in a spill is an improbable event.

Trans Mountain ULC – *Response to City of Vancouver TERMPOL IR – (A4J7R6)* at PDF page 21

517. However, fires and explosions are a significant cause of oil spills from tankers accounting for 11% of all spills tanker spills greater than 700 tonnes between 1970 and 2014.

Trans Mountain Pipeline ULC - *Response to City of Vancouver TERMPOL IR Attachment 2 – (A4J7S1)* at PDF page 11

518. Even when a fire or explosion is not the cause of an oil spill, the available marine firefighting response capability is relevant factor. As the Canadian Coast Guard states the “greatest risk for life-threatening injuries during crude oil or refined product spill response is from fire or explosions”.

City of Vancouver Written Evidence - Appendix 69 - *CCG - Oil Spill Response Field Guide – (A4L7V0)* at PDF page 31

519. Trans Mountain has failed to accurately assess the risks associated with fires and explosions and overstates the current marine firefighting capacity in the region. The City of Vancouver’s marine firefighting assets are not suitable for tanker fires yet Trans Mountain proposes that project tankers would call on them to respond.

2. Gaps in Spill Notification and Detection

520. The TMP application relies on vessel captains to report a spill or incident and immediately initiate response by activating the agreement with WCMRC. WCMRC is relied on to respond within the Vancouver Harbour within 2 hours from the time of notification, assuming conditions are suitable. There are number of issues with these assumptions. First, if vessel captains do not report the spill or take responsibility for it, as was the case in Marathassa Oil Spill, several hours may pass by before an incident is

assessed and a response initiated. Second, as per Transport Canada's evidence, the vessel operator is not required to activate their agreement with WCMRC. Third, if the spill occurs at night or during poor weather conditions, there is the potential for several hours to pass by before an assessment can be completed and a response initiated. Enhanced response capacity is important but will not guarantee a response in sufficient time to prevent: submergence, shoreline impacts, containment of spill, etc.

Trans Mountain Pipeline ULC - *Response to City of Vancouver IR No. 2.05.5.e.ii –* ([A4H8I9](#)) at PDF page 129

521. WCMRC does not track how long the responsible party waits to initiate the notification process through the WCMRC call centre. No WCMRC exercises have involved a direct notification from a vessel.

Trans Mountain Pipeline ULC - *Response to City of Vancouver IR No. 2.05.5f –* ([A4H8I9](#)) at PDF page 130

522. Trans Mountain's assumption that "Tankers exercise notification procedures on board regularly and will immediately inform if a spill occurs" is not substantiated. In fact, it is clear from historical evidence that notification from tankers does not always occur immediately (as in the case of the Marathassa Oil Spill) and that, when it does, the assessment of the impact and quantity released may be grossly underestimated. This underestimation was evidenced in the Cosco Busan incident, as recorded in the Transportation Safety Board Report.

City of Vancouver Written Evidence – Appendix 76 - *Appendix A To The Written Evidence of Rob Dudgeon –* ([A4L9F7](#)) at PDF page p. 31

523. The best evidence before the Board involving response by WCMRC is the Marathassa Oil Spill. This spill was initially detected by civilian and reported to the CCG Marine Communications Traffic Services Centre (MCTS) at 16:48. The responsible party failed to report the spill and initially denied that the spill was coming from its vessel. Approximately three hours later, at 19:57, the CCG first activated WCMRC. The City of Vancouver was not notified for a further 9 hours and, even then, the notification was received informally rather than through a formal notification process.

524. Legislation governing oil spill response in Canada recognizes that responsible party may not notify or acknowledge responsibility voluntarily.

525. Trans Mountain's application relies on the Canadian Coast Guard to "ensure an appropriate response" whether or not a Responsible Party has been identified. In the case of the *M/V Marathassa*, the refusal of the owners to accept responsibility meant that the spill was deemed a "mystery spill" until early on the morning of April 10. The CCG was the agency tasked with overseeing response to mystery spills but was unable to ensure an appropriate response, in part, because the CCG responders were in the process of demobilizing from another incident (the *Zalinski*). When the identity of the Responsible Party was later confirmed, the CCG did not require the Responsible Party to contract an Incident Management Team or to staff the Incident Command Post to the level necessary for managing the consequences of a spill in Burrard Inlet.

3. *Gaps in Data Collection and Information Sharing with Unified Command Members and the Public*

526. The Incident Command System (ICS) is intended to facilitate the efficient sharing of information among responders and unified command members. However, during the Marathassa Oil Spill incident information that was critical not only to the on-water response, but also to the protection of environmental and human health, was often withheld without justification and much of it has never been provided. For example the City of Vancouver requested, on a number of occasions, information about the fate and effects of the product spilled, the cause of the incident, mass balance calculations expected to be taken from the ships fuel tanks, and results from chemical analysis of the product. In the City of Vancouver's view, this is critical information that should be provided as soon as possible to inform an appropriate response and to ensure that the polluter takes appropriate steps to prevent pollution in the future.

527. The challenges with information sharing also stand in contrast to the expectations and requirements for spill response in Washington State. As stated in the WA State Department of Ecology response to the City of Vancouver's Information Requests 1.b,

1.c, and 1.d:

“The information that the State of Washington needs to assess impacts is: prompt notification of the spill occurrence, spill volume and details of source/cause, oil type and its properties, trajectories, and knowledge of response tactics used by the Canadian officials and response organizations.”

“... Any oil spill response organizations called out to respond would also need this information. The oil spill response organization would use this information as well as conducting its own site safety assessments prior to responding to ensure the safety of its personnel.”

“Without this type of information, Washington would be unable to respond in a rapid, aggressive, and well-coordinated manner. Timely notification with complete information is essential for protecting Washington’s public health and environmental, cultural, and economic resources.”

Washington State Department of Ecology - *Response to City of Vancouver Information Request* ([A4R4I8](#)), at PDF page 4

4. Gaps in Environmental Assessment

528. In the case of the Marathassa Oil Spill, the Responsible Party hired a single consulting firm to simultaneously serve as the Responsible Party's designate in the Unified Command and to conduct shoreline assessment. Vancouver and other local stakeholders expressed concern about this relationship during the response, but it was permitted by the CCG. As a result there were a number of issues where Vancouver believes that a conflict of interest may have adversely impacted the rigor of environmental assessments conducted during the response. Specific examples include:

1. Shoreline Cleanup and Assessment Technique (SCAT) teams did not fully survey all areas of impacted or potentially impacted shoreline in Burrard Inlet and English Bay.
2. Shoreline assessment maps produced by the Responsible Party's contractor were incomplete and inaccurate.

3. Insufficient environmental sampling and monitoring was conducted and the Responsible Party's representative to Unified Command discouraged scientific sampling.

City of Vancouver Written Evidence – ([A4L7K6](#)), at PDF page 41 and 42

529. The conflict of interest issue was compounded by the fact that Environment Canada did not establish a Science Table to provide comprehensive advice on environmental monitoring or impact assessments.

530. Prior to 2012, Environment Canada would chair a Regional Environmental Emergency Team (**REET**) in response to an oil spill. The purpose of the REET was to bring together regional environmental experts to provide advice in support of a spill response.

531. The REET program has been replaced with the concept of a “Science Table” and Environment Canada representatives are based in Montreal. This change hindered environmental assessment during the Marathassa Oil spill. Although there was an Environment Canada representative communicating with the Unified Command via phone from Montreal, there was no Science Table established to provide comprehensive advice on environmental monitoring or impact assessment. The limit on the information that was available to the Unified Command to make decisions had serious implications for the environmental impact assessment and monitoring process, including significant delays initiating sampling. At this time, no environmental impact assessment has been provided by the Responsible Party.

City of Vancouver Written Evidence - [A4L7K6](#) at PDF page 43

532. Accordingly, to the extent that Trans Mountain relies in its Application on the potential mitigating benefits of the Environment Canada Science Table, Vancouver's experience with the Marathassa Oil Spill demonstrates that, in practice, a Science Table is not always established and the assistance provided may be of very limited benefit.

5. Gaps in Environmental Protection

533. On a number of occasions on April 9 and 10 City of Vancouver Unified Command staff requested protective booming of sensitive sites including beaches and shoreline of Stanley Park, English Bay and False Creek as a precaution. The response from the CCG was that they would “wait and see” where the oil was going. Ultimately oiling occurred along stretches of the shoreline of Stanley Park and in the Vancouver Harbour including several beach and park locations and no protective strategies were ever implemented.

534. This response is in direct contrast to the precautionary approach applied in other jurisdictions. The Cosco Busan oil spill in San Francisco Bay is an example of an oil spill in which the volume of oil spilled was unknown. The National Transportation Safety Board’s report of that spill notes that, in the absence of a firm estimate of the amount of oil spilled, the response organizations were required by California regulations to respond to the “reasonable worst-case” scenario, which would have been based on the capacity of the vessel’s largest fuel tank.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 42

City of Vancouver Written Evidence – Appendix 76 - *Appendix A To The Written Evidence of Rob Dudgeon* – ([A4L9F7](#)) at PDF page p. 15

ii. The existing marine-based oil spill response regime in Canada does not adequately engage or resource local governments and communities.

535. The marine-based oil spill response regime in Canada falls under the authority of the Federal Government. However, the Federal Government has effectively downloaded the risk assessment process to local communities without providing a mechanism to support those communities to engage in planning, response or preparedness. Instead, the Government of Canada states that:

Local and traditional knowledge are very important in response to spill incidents. Local governments and community organizations are encouraged to develop risk assessments for their jurisdictions and to develop contingency plans for use in anticipation of spill events.⁴⁰

⁴⁰ Government of Canada - Response to City of Vancouver- A4R3Z6 at PDF page 7

The capacity to develop risk assessments and contingency plans relies heavily on the provision on information from both the Federal Government and industry. The Oil Spill Response Regime does not, however, provide resources for local governments and community organizations to develop risk assessments and associated contingency plans for oil spills, which fall under federal legislation.

536. With respect to the TMEP, Trans Mountain has refused to provide critical information or analysis related to tanker and terminal operations, emergency plans, and the impacts of spills, that the City of Vancouver requested to inform local risk assessment. In fact, many of the questions put forward by Vancouver regarding issues of public health and safety were deemed by Trans Mountain to be irrelevant.

537. In the absence of critical information from Trans Mountain the City of Vancouver has commissioned independent experts to provide research and information to enable risk assessment for the City of Vancouver. The conclusion is that the risk of a spill from the proposed project is unacceptable and that there is no way to mitigate the risk to an acceptable level through contingency planning.

538. Having relied on local governments and community organizations to develop risk assessments for their jurisdictions and to develop contingency plans for oil spills, the Federal Government must also incorporate those risk assessments and the views of the City of Vancouver and other local governments of the risk that the TMEP poses into their decision-making.

Transport Canada Regional Advisory Councils (RAC) are ineffective

539. Transport Canada has submitted evidence describing the Regional Advisory Councils, which are intended to: “provide advice and make recommendations to the Minister on ship-source oil spill preparedness and response in their respective regions.” Transport Canada further states that these are “community-based advisory bodies representing interests that could be affected by a ship-source oil spill including Aboriginal groups, industry stakeholders, and the public.”

540. The existing Regional Advisory Councils do not provide an appropriate model for local government representation or citizen oversight for assessment, planning, preparedness or response to the Trans Mountain Expansion Project or current operations. Since their inception they have been underfunded and Transport Canada has failed to incorporate advice or recommendations on the preparedness and response regime, or to consult the appointed members on issues of major significance in their regions.

541. As an example, the TERMPOL Review Committee failed to consult the Pacific RAC on any part of the TERMPOL Review Process for the Trans Mountain Expansion Project. In other words, the very Council appointed to represent and provide expert local advice to the Minister was excluded from the assessment of the largest project ever proposed for transporting oil through the densely populated Burrard Inlet and along the South Coast of British Columbia. Transport Canada responded to questioning from the City of Vancouver by stating that the Pacific RAC was not part of the review because they are not a regulatory agency. This approach is unacceptable. Transport Canada representatives should have engaged the Pacific RAC in the review process to provide expert, local advice and recommendations to Transport Canada, as per the Council's mandate. If Transport Canada is serious about “renewed commitment to support local participation in ship source oil spill preparedness and response”, it is unfathomable that it did not take the opportunity to demonstrate this by engaging the Pacific RAC in the analysis of the TMEP Application.

Government of Canada – Response to City of Vancouver Information Request – ([A4R3Z6](#))

542. Members who have served on the RAC have expressed serious concerns about Transport Canada’s handling of their reports and recommendations. According to the evidence submitted by Cowichan Tribes and developed by Stafford Reid, a former Pacific RAC member, web-based records, including meeting minutes, reports and recommendations from the Pacific RAC to the Minister have been removed and are no longer accessible. However, Mr. Reid’s evidence is that “the recommendations and

actions pertaining to coastal protection investments offered to the federal government as well as to the shipping industry have mostly been ignored. It would be difficult to find any matter acted on in policy development or a capital investment for British Columbia based on RAC recommendation.

Cowichan Tribes Written Evidence – Stafford Reid Evidence Part 2 – Evaluation of Marine Transportation ([A4Q1L6](#)) at PDF page 91

543. In response to the City of Vancouver’s request for details of Transport Canada’s responses to recommendations put forward by the Pacific RAC, the only example provided was from the Pacific RAC’s submission to the Tanker Safety Expert Panel in 2013.

Government of Canada – Response to City of Vancouver Information Request – ([A4R3Z6](#))

544. The City of Vancouver also does not agree that the membership of the Pacific RAC accurately represents the interests that could be affected by a ship-source oil spill. It is unclear, for example, who on the committee is representing the interests of the citizens of the City of Vancouver and local businesses that exist in the community surrounding Canada’s busiest Port. Statements from Transport Canada “anticipating greater public engagement” are not sufficient to conclude that the RAC’s under Transport Canada will adequately or accurately represent interests of those that could be impacted by a spill from a Trans Mountain tanker.

545. A more appropriate model for local government and citizen participation in the Oil Spill Response Regime can be found in the Prince William Sound Regional Citizens Advisory Councils described below.

Citizen Engagement

546. Major oil spills in the US have resulted in the establishment of Citizens Advisory Councils. An example of this is the Prince William Sound and Cook Inlet Regional Citizens Advisory Councils. These councils consist of members representing a wide range of local stakeholders, are independent from government and industry, and are funded by industry at sufficient levels to engage independent experts, maintain staffing

levels, and participate meaningfully in oil spill planning, prevention, training and response. As confirmed in the evidence submitted by the City of Vancouver and developed by Nuka Planning and Research, these Councils were established by US congress in recognition of “the role complacency played in the Exxon Valdez oil spill.”

City of Vancouver Written Evidence - Appendix 40 – *Prince William Sound Regional Citizens' Advisory Council* – ([A4L9D6](#)) at PDF page 2

547. Trans Mountain relies on the Exxon Valdez Oil Spill (EVOS) as an example of the effects of a large oil spill on communities. While the communities affected by the EVOS are not comparable in demographics, economy or size to the communities at risk from a TMP tanker spill, the consequences were devastating.

Trans Mountain Pipeline ULC – Application – Volume 8A: Marine Transportation – ([A3S5Q3](#)), at PDF page 6

548. Although the Alyeska Pipeline Service Company initially rejected citizen oversight, in the aftermath of the EVOS, Alyeska leadership welcomed citizen involvement, and the US Congress established the Prince William Sound and Cook Inlet Regional Citizens Advisory Councils.

City of Vancouver Written Evidence – Appendix 41 – *Prince William Sound Regional Citizens' Advisory Council "Effectiveness of Citizen Involvement"* – ([A4L9D7](#)), at PDF page 4

549. The Prince William Sound RCAC has funding to enable 20 full time staff and experts. The council organizes operations under the following 5 major programs:

1. Terminal Operations and Environmental Monitoring
2. Oil Spill Prevention and Response Planning
3. Oil Spill Response Operations
4. Maritime Operations
5. Environmental Monitoring

550. These programs, and examples of the range of projects the Prince William Sound RCAC has spearheaded are included in the document submitted by the City of Vancouver “Effectiveness of Citizen Involvement”, prepared by the Prince William Sound Regional

Citizens' Advisory Council.

Trans Mountain Pipeline ULC – Application – Volume 8A: Marine Transportation – ([A3S5Q3](#)), at PDF page 6; City of Vancouver Written Evidence – Appendix 41 – *Prince William Sound Regional Citizens' Advisory Council "Effectiveness of Citizen Involvement"* – ([A4L9D7](#)), at PDF page 4

City of Vancouver Written Evidence – Appendix 41 – *Prince William Sound Regional Citizens' Advisory Council "Effectiveness of Citizen Involvement"* – ([A4L9D7](#)), at PDF page 7 - 11

551. Nuka Research and Planning highlighted the opportunity for similar Councils to be formed in British Columbia in its report on World Class Spill Response for the Province of BC, that Trans Mountain submitted as part of the hearing process. Whereas under the Canadian Regime and in the Vancouver region, most knowledge, research and expertise resides within industry, in Prince William Sound, the RCAC provides a trusted source of independent expertise and a council that is entirely aimed at protecting local interests.

Trans Mountain Pipeline ULC – Response to Robyn Allan Information Request – Attachment 3 – ([A3X5W5](#)), at PDF page 57

552. As demonstrated by the City of Vancouver's evidence, a worst - case diluted bitumen spill in Burrard Inlet or Georgia Strait would impact over 1 million people. It has the potential to result in widespread exposure to toxic chemicals, devastate the environment, and cost the economy billions of dollars. The City of Vancouver and Trans Mountain submitted evidence demonstrating the substantial and positive role that independent Citizens Advisory Councils have played in spill prevention, preparedness and response that addresses the specific needs of their local communities. Just as the US congress demonstrated through the establishment of the Regional Citizens Advisory Councils in Prince William Sound and Cook Inlet, “those people with the most to lose from oil pollution must have a voice in the decision that put their livelihoods and communities at risk.”

Trans Mountain Pipeline ULC – Response to Robyn Allan Information Request – Attachment 3 – ([A3X5W5](#)), at PDF page 57;

City of Vancouver Written Evidence – Appendix 41 – *Prince William Sound Regional Citizens' Advisory Council "Effectiveness of Citizen Involvement"* – ([A4L9D7](#)); and

City of Vancouver Written Evidence – Appendix 40 – *Prince William Sound Regional Citizens' Advisory Council* – ([A4L9D6](#))

iii. Regardless of the investment in preparedness, there are conditions under which no response will be possible

553. The recent Marathassa Oil Spill provides a real-life example of the impact of very typical Vancouver-area weather conditions on spill response efforts. There were several occasions during the response where the cleaning of vessel hulls anchored in English Bay was halted due to weather and safety concerns. Operations were halted for vessel cleaning for part of the day on April 13 and most of the day on April 14, 2015. The conditions on these days reflected fairly average conditions in the area, with rain on April 13 and winds gusting up to 50 km hour on April 14.

City of Vancouver Written Evidence – ([A4L7K6](#)) at PDF page 37

554. In addition to weather and sea-state conditions, air quality and risk of explosion also contribute to the range of conditions under which no response will be possible.

555. The risk of fire and explosion of potential vapours at or near the spill site is increased in the case of a diluted bitumen spill.

556. Trans Mountain acknowledges in its application that the reality of health and safety conditions at a spill site, along with other operational constraints, may result in delays in setting up boom around a damaged or leaking vessel.

"There is no substitute for establishing an early line of defense by rapidly booming a damaged vessel. This knowledge is tempered by the reality that health and safety conditions, suitable anchoring bathymetry proximate to the casualty, and operational constraints may not always make this outcome possible."

However, these realities have not been incorporated into Trans Mountain's risk assessment and capacity and effectiveness of oil spill response measures.

Expansion Project Oil Spill Response Simulation Study Arachne reef and
Westridge Marine Terminal – ([A3S5J0](#)) at PDF page 34

557. The Coast Guard Oil Spill Response Field Guide also identifies a number of oil spill components that present health hazards, including hydrogen sulphide, benzene and carbon monoxide. The Field Guide recommends that responders obtain hazard assessment information from a hazardous materials officer or safety industrial hygiene or medical personnel, noting that exposure assessment requires specialized testing equipment and specific training.

City of Vancouver Written Evidence - Appendix 69 - *CCG - Oil Spill Response Field Guide* – ([A4L7V0](#)) at PDF page 33 and 34, Table 3-2

558. The time required to obtain this hazard assessment information must be factored into any response time involving a spill from a tanker that has been loaded at the Westridge Marine Terminal with diluted bitumen. No evidence has been provided by Trans Mountain about the time required to bring in the specially trained personnel and conduct the hazard assessment, or the location and availability of the requisite testing equipment. It is clear, however, that this additional step will increase the overall mobilization and response time. It is also clear that, if LEL readings are greater than 25, no response in the vicinity of the spill can start until the vapours have been allowed to disperse.

a. Health and Safety

559. One of the health and safety “realities” that responders would face in the event of a spill of diluted bitumen is the risk of life-threatening injuries from fire or explosions due to exceedances of the lower exposure limit (“LEL”) vapour levels from evaporating diluents.

560. The Arachne Reef Scenario modelled by Trans Mountain in response to Cowichan Tribes IR No. 1.081 provides an example of the LEL vapour concentrations associated with a 16,000 cubic metre spill. In that scenario vapour concentrations exceeded 10% of the LEL for a total of approximately four hours of the first nine hours following the spill, reaching as high as 54.4% at and around the spill site. At the beginning of the release the vapour levels at the spill site were 54.4% of the LEL value

and remained above 10% for almost all of the first hour. At hour 8, the vapour levels reach 47.5% of LEL value in one location and are shown to be between 30% and 50% of LEL value in a substantial area surrounding the spill site. The spike to 47.5% was “due to change in wind conditions and movement of the spill on the water surface … and highlights the real need for responders to carefully monitor the conditions when approaching the area.” (p2)

Trans Mountain Pipeline ULC - *Follow-Up Response to NEB Ruling 33, Cowichan Tribes IR No. 1.08l, Attachment 1 – (A4D3G7);*
Trans Mountain Pipeline ULC – *Response to City of Vancouver IR No. 2 – (A4H8I9) at PDF page 137 and 138*

561. Trans Mountain’s Emergency Response Plan’s directs that “Whenever vapour levels are approaching 10% of the LEL for any spilled product, responders will leave the area immediately.” This is consistent with the industry standard for spill response safety, which is 10% of the LEL. The Canadian Coast Guard Field guide requires responders to leave the area “quickly and carefully” when vapour concentrations are greater than 25% of LEL. In these circumstances, there would be significant delays in the commencement of response and oil recovery efforts.

Kinder Morgan Canada (July 2014) Westridge Marine Terminal Emergency Response Plan - *Section 1.1.3 Fire/Explosion and Section 3.3 Vapour Monitoring Flowchart (A4D3F1)* at PDF page 19 and 38;

Kinder Morgan Canada (July 2014) Trans Mountain Emergency Response Plan - *Section 1.1.3 Fire/Explosion and Section 3.0 Spill Site Assessment (A4D3F2)* at PDF page 19 and 42;

Trans Mountain Pipeline ULC – Response to City of Vancouver IR No.2 – *(A4H8I9)* at PDF page 137;

City of Vancouver Written Evidence – *(A4L7K6)* at PDF page 68

562. Trans Mountain provides further evidence of the response delays caused by evaporating diluents as follows:

“In the event vapor concentrations exceeded the protective limits for Level C PPE, responders would either standby until vapor concentrations declined or

initiate work further away from the source where vapor concentrations would be within Level C parameters. Continuous air monitoring would be conducted to identify the point where vapor concentrations were low enough to downgrade PPE to Level D. No response activities would be conducted in Level B (SCBA respiratory protection).”

Trans Mountain Pipeline ULC - *Response to Cowichan Tribes IR No. 1.08.n – (A3Y2I8)*, at PDF page 37

563. Given the reality of the health and safety issues presented by a spill of diluted bitumen, Trans Mountain’s modelling of a 16,500 cubic metre spill based on the assumption that “the spill site atmosphere in each of the scenarios presented no toxic or explosive hazards to first responders and that the site may be immediately approached” is entirely unrealistic. On Trans Mountain’s own evidence, responders would be delayed in their initial response to the oil spill due to unsafe LEL conditions and would experience subsequent, lengthy interruptions in response activities when vapour concentrations spike again as a result of changing wind conditions and the movement of the spill on the water. Further, the overall delay in response required to allow for the exercise of extreme caution throughout has not been accounted for in Trans Mountain’s model.

Trans Mountain Pipeline ULC - *Follow-Up Response to NEB Ruling 33, Cowichan Tribes IR No. 1.08l, Attachment I – (A4D3G7)* PDF page 4

564. The mitigated response scenario that was modelled and the unprecedented recovery rates that Trans Mountain attributes to expedited response times are inconsistent with basic health and safety requirements. The response does not reflect the delay in response times that must be factored in due to the presence of hazardous vapour concentrations. The recovery rates and response times are significantly exaggerated as a result.

b. Visibility

565. Nuka confirms in its report that night operations are not a regular practice for on-water oil spill response because of reduced efficiency and increased risk to responders, noting that there are no examples of night-time on-water response in southern British

Columbia. Darkness limits safe deck operations, makes it more difficult for response vessels to find pockets of oil to recover, creates the need for a second shift of responders for night operations, increases tactical errors, increases risk of accidents and makes it more difficult to deal with emergencies such as a man overboard. One of the most obvious limitations of nighttime operations is that fact that aerial reconnaissance is precluded, making it very difficult to track and target oil for recovery.

"In conditions where the visibility is restricted to less than 1 km it is difficult to direct response operations from the air and extremely difficult to find and recover oil slicks using vessels even with state of the art remote sensing techniques "

City of Vancouver Written Evidence - Appendix 68 - Part 2 Nuka – ([A4L9F5](#)) at PDF page 13

City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 50

566. Trans Mountain correctly admits in its evidence that, during night-time conditions “the utility of the remote sensing data may be severely limited.” However, despite this admission, the spill modelling fails to account for the *severely limited* usefulness of remote sensing data to assist with nighttime oil recovery operations.

Trans Mountain Pipeline ULC – Application - Volume 8C: *Trans Mountain Expansion Project Oil Spill Response Simulation Study Arachne reef and Westridge Marine Terminal* – ([A3S5J0](#)) at PDF page 35

567. There may also be times when on-water vessel operations are possible but poor visibility - including darkness - precludes aerial reconnaissance making it very difficult to track and target oil for recovery.

City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 58

568. Mechanical oil spill response systems use mechanical equipment - primarily containment boom, skimming systems, pumps, hoses, and storage devices - to contain and recover oil that floats on the water surface. Mechanical oil spill response systems

rely upon the ability to locate and track oil slicks, which is typically done from aircraft either visually or using specialized sensing equipment.

City of Vancouver Written Evidence - Appendix 68 - *Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations* – ([A4L9F1](#)) at PDF page 4

569. Nuka prepared an independent response gap analysis along the proposed TMEP marine transportation route which included a sensitivity analysis for night operations. The Nuka report concludes that night operations would require a doubling of response personnel with only a modest increase in the total volume of oil recovered over a 72 hour response period.

City of Vancouver Written Evidence Appendix 68 - *Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations* – ([A4L9F1](#)) at PDF page 38;

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at PDF page 3

570. In terms of visibility during day-light hours, fog advisories lasting from hours to days occur frequently in the Vancouver area, including both local and widespread events (Crawford, 2015).

City of Vancouver Written Evidence - Appendix 68 - *Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations* – ([A4L9F1](#)) at PDF page 39

571. Visibility data from 2005 shows one notable period with four consecutive days where day-time visibility at both the Victoria and Vancouver airports was well below the aerial reconnaissance operating limits and marginal for vessel operations. If a spill were to occur at the beginning of this gap period, several days might elapse during which no on-water recovery occurs. If a spill occurs at the end of a day, it is unlikely that on-water recovery would begin until first light the following morning.

City of Vancouver Written Evidence - Appendix 68 - *Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations* – ([A4L9F1](#)) at PDF page 59

c. Impact of Delays on Mitigation Efforts

572. Nuka modelled a series of variations on a summer spill scenario in the Outer Harbour to evaluate the impact of delays on volume of oil that could be recovered in the first 72 hours after a spill. The 72 hour timeframe was selected because the recovery of on-water spills that have weathered for more than 72 hours is no longer effective. Trans Mountain acknowledges in its evidence that after 4 days, slick thickness becomes an issue and oil is no longer recoverable.

City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 59;

Trans Mountain Pipeline ULC – Application – Volume 8C: Trans Mountain Expansion Project Oil Spill Response Simulation Study Arachne Reef and Westridge Marine Terminal – ([A3S5J0](#)) at PDF page 19;

573. The base scenario modelled by Nuka assumes that the spill is timed such that the first responding forces arrive and begin operations at first light of the first day of response. Nuka then analysed the impact of delays of 6, 12, 18, 24 and 48 hours to reflect the reality that delayed response is a common occurrence and may result from any number of factors, including: delayed spill detection and notification, delays during equipment mobilization and transportation to the spill site, inability to track oil and communicate its location, inability to respond due to human health or responder safety, inability to respond due to environmental conditions, or a night-time spill.

City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 81

574. And from Trans Mountain's own evidence:

“The spill location and the environmental conditions during the response influence operational effectiveness. Winds, waves and currents (tidal or wind-driven) will affect the following mitigation efforts:

- 1) Ability to reach the spill site;*
- 2) Deployment of booms to contain, concentrate and reduce the spreading of spill oil;*
- 3) Mechanical skimming to recover oil from the surface of the water; and*

- 4) *Transfer recovered oil from smaller skimming vessels into sufficient larger units for temporary storage.”*

Trans Mountain Pipeline ULC - *Response to NEB IR No.1 – (A3W9H8)* at PDF page 369

575. A 6-hour delay in response time reduces the total recovery by 15%. After 12 hours, recovery is reduced by approximately one-third.

576. During the April 2015 Marathassa Oil Spill, 13 hours elapsed between the time the spill was first detected by a recreational boater (5:00 p.m.) and the time that WCMRC, the response contractors, had completed booming around the vessel to contain the leaking oil at its source (6:00 a.m. the following morning). For a tanker spill that occurs at twilight during the winter the period of delay before on-water recovery commences at daybreak would be much longer.

City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – (A4L9F1) at PDF page 82

577. An 18-hour delay reduces modeled oil recovery by 44%. Delays of this length can result from a range of factors, including delayed spill detection. For example, there was a 17 hour delay in detecting the 2010 Enbridge Line 68 diluted bitumen spill into the Kalamazoo River. Once detected additional time elapsed before any on water recovery was attempted, during which time the oil was transported downriver, stranded on riverbanks, and sunk into river sediments.

578. A 24-hour delay cuts overall recovery estimates in half. A 24-hour delay may result from a response gap period where environmental factors exceed operating limits for spill response systems. The Nuka Report confirms that there are often periods of 24 hours or longer, particularly during winter, when environmental conditions along the tanker route would preclude on water recovery operations.

579. If the delay were to last for 48 hours the model estimates that total recovery would be reduced by 83%. It is not uncommon for oil spills to occur during extreme weather and, in such cases, response gap delays may last for 24 to 48 hours or even longer. For example, during the 2004 *Selendang Ayu* incident in Alaska's Aleutian Islands, the same severe storm that caused the freighter to break up and spill approximately 1,325 m³ of fuel oil also prevented any on-water recovery operations. All of the oil recovered from that spill was cleaned up off of beaches after they had already been impacted by the spill.

City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 82

Figure 3.8 summarizes the model outputs for the Outer Harbour summer scenario with no delays and the sensitivity analyses for response delays.

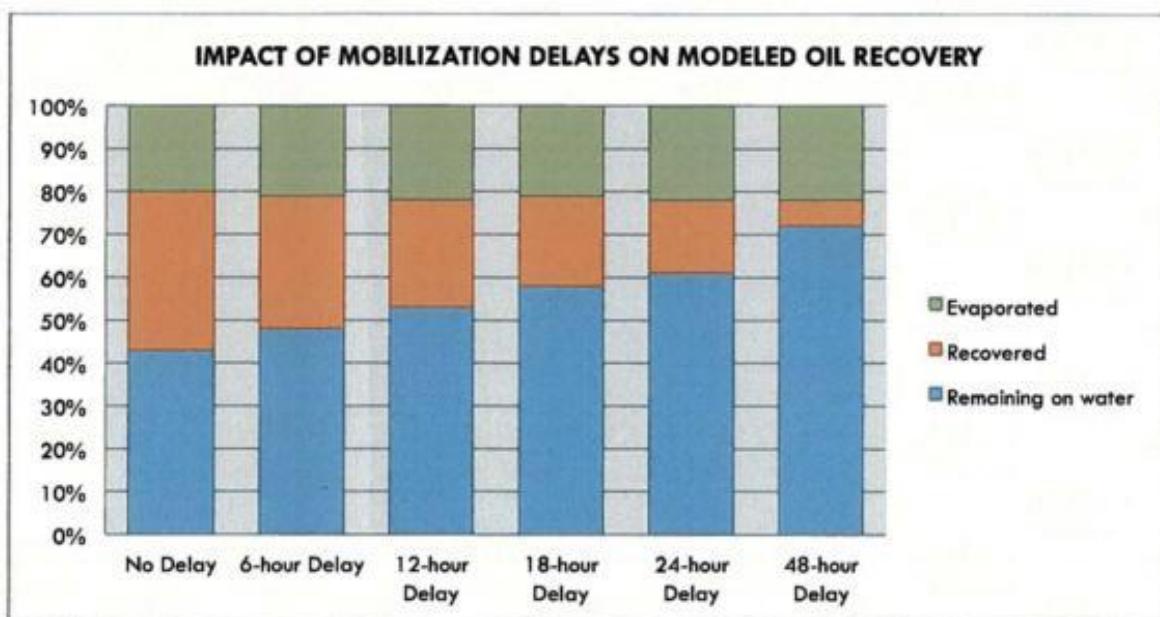


FIGURE 3.8. EFFECT OF RESPONSE DELAYS ON MODELED OIL RECOVERY FOR OUTER HARBOUR SUMMER 16,000 M³ SPILL SCENARIO

City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 83

5. Even under optimal conditions, response cannot recover enough oil to sufficiently mitigate the risk to Vancouver

580. The three time factors affecting a response identified by WCMRC are: 1. Mobilization; 2. Travel time; and 3. Deployment time. WCMRC typically assumes an average of 2 hours for mobilization alone. This does not include travel time or equipment deployment time. The National Transportation Safety Board report on the Cosco Busan spill found that a 30% oil recovery rate was “remarkable” and that incident had the benefit of a coordinated response from 4 separate responsible organizations. The report from the CCG on the Marathassa Oil Spill also confirms that the average recovery from an oil spill is only 10 to 15% of the volume of oil spilled.

WCMRC- Attachment 3 Trans Mountain Pipeline ULC_Request for Information from WCMRC-Table 1 – ([A4E2V0](#)) at PDF page 6;

City of Vancouver Written Evidence – Appendix 76 - *Appendix A to The Written Evidence of Rob Dudgeon* – ([A4L9F7](#)) at PDF page p. 15

581. Even under ideal conditions, with no issues of evaporating diluents to address, Trans Mountain’s assumption that booming could be completed within 4 hours from the time of the spill is unrealistic. This is most clearly evidenced by the recent Marathassa Oil Spill. In that case, it took WCMRC crews 90 minutes to arrive on-scene after receiving direction from the Canadian Coast Guard (although the spill was first reported at 5:00 pm by a recreational boater, the CCG did not direct WCMRC to respond to the spill until hours later). Following their arrival at the scene, WCMRC crews required an additional 8.5 hours to deploy the containment boom. This adds up to a total response time of 10 hours from the time that CCG gave the direction and 13 hours from the time of the spill detection.

City of Vancouver Written Evidence – ([A4L7K6](#)) – at PDF page 36 and 37

582. One of the reasons for the length of time required to boom the vessel is likely a result of the challenges presented by night-time operations, a factor that would also be applicable to Trans Mountain’s 10:00 p.m. Arachne Reef spill scenario but was not taken into account in its modelling.

583. Trans Mountain’s Arachne Reef spill scenario (Haro Strait) includes the following unrealistic and consistently favourable assumptions about what would occur “upon

recognition” of the incident:

- The Master would have notified the CCG and WCMRC about the accident and activated oil response efforts;
- The Master would make an All-Vessel broadcast over GMDSS indicating the vessel’s position and type of accident;
- Local tug operators and global salvage organizations (whether based in the region or elsewhere) would have typically begun assessing their opportunities to intervene or assist
- A visual assessment would have been conducted of the main deck and hull areas in an attempt to locate and quantify the damage;
- All tanks would have been gauged and their volumes reconciled against the ship’s load computer (it is notable that a mass balance calculation for the Marathassa Oil Spill still has not been provided);
- Typically, vessel owners have an established relationship with marine professionals, including those with experience in casualty and salvage matters.
- A coordinated effort amongst the vessel master, owners, the classification society, local responders and others would have been initiated to analyze the best immediate course of action.
- The only people who could be exposed to the vapours from the spill are fisherman and recreational boaters, who would leave the area immediately. This ignores the very real potential for impacts to first responders and resulting delays.

Trans Mountain Pipeline ULC – Application – *Volume 8C: Trans Mountain Expansion Project Oil Spill Response Simulation Study Arachne Reef and Westridge Marine Terminal* – ([A3S5J0](#)) at PDF page 19 and 20

584. Applying all of these extremely favourable and, in most cases, unrealistic assumptions, Trans Mountain’s spill modelling at Arachne reef still only results in a 74% recovery of oil, with 4,290 cubic metres of oil (equivalent to 4,290,000 litres) left on the shore or on water. In the event of a spill in Vancouver Harbour, the impact of 4,290 cubic metres of unrecovered oil on the City of Vancouver would be devastating.

585. At the Board’s request, Trans Mountain also submitted a partial response gap analysis as part of the project application (Trans Mountain 2014a) but it did not apply a standard methodology and did not account for several important operational factors, such

as visibility limits, interaction among factors and seasonal variability.

586. The Nuka Report accounts for many of the same inputs as Trans Mountain's partial study as well as additional operational factors, in particular limits on visibility and seasonal wind patterns, which Trans Mountain omitted. Nuka also applied a more rigorous and detailed gap analysis using a standard methodology derived from multiple peer reviewed studies. The results of Nuka's response gap analysis provide a quantitative estimate of the percentage of time during which on-water oil spill response operations would or would not be feasible in each location at different times of the year.

City of Vancouver Written Evidence - Appendix 68 - part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 6

587. Figure 3.7 shows the difference between summer and winter recovery estimates for each of the five scenario locations modeled. At all sites, winter recovery estimates are lower than summer estimates as a result of the three input variables that change between summer and winter: (1) wind speeds are altered to reflect mean summer and winter conditions; (2) water temperature is altered to the representative surface temperatures; and (3) length of operational periods for on-water recovery are adjusted based on day length (daylight). Recovery rates are lower in winter because of the impacts of higher wind speeds and shorter days.

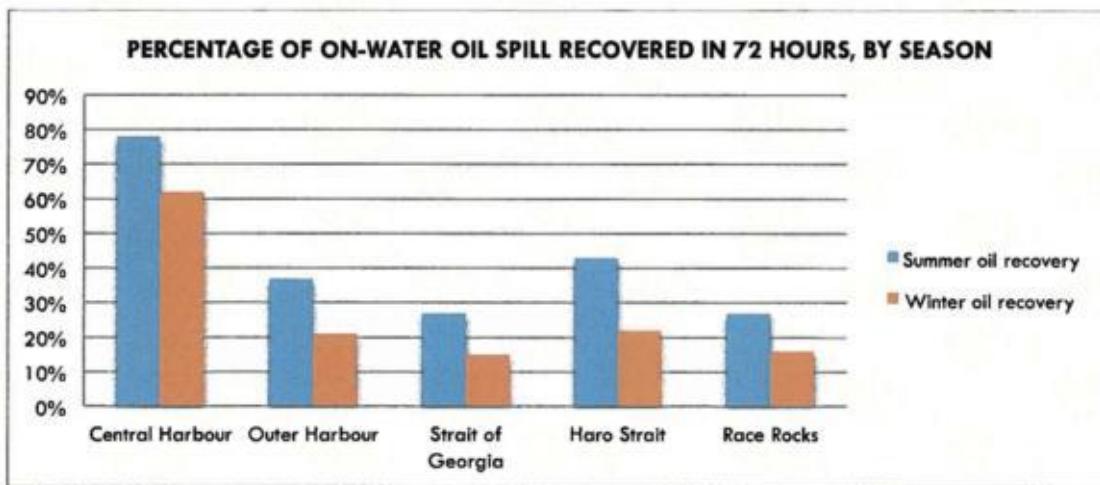


FIGURE 3.7. IMPACT OF SEASON ON ESTIMATED OIL RECOVERY (EXISTING, PROPOSED, AND ADDITIONAL SUPPLEMENTARY RESPONSE FORCES

City of Vancouver Written Evidence - Appendix 68 - *Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations* – ([A4L9F1](#)) at PDF page 80

588. The results of Nuka's base-case scenario demonstrates that, when visibility and wind conditions are factored in to the Haro Strait gap analysis, for example, the percentage of oil recovered is only 42% in summer and 22% in winter, results that are much lower than Trans Mountain's unrealistic 78% recovery. The Nuka results in the base-case scenario are higher, but winter oil recovery is still only estimated at 62%. Further, this base-case analysis by Nuka does not take into account the impacts from response delays (details of which were discussed above), or the impacts from stranding of oil on the shorelines of Burrard Inlet and the potential for submergence of oil (discussed below).

589. In its Reply Evidence⁴¹, Trans Mountain incorrectly assumed that Nuka's response gap analysis erred in failing to consider waves of a certain height and steepness, and recalculates Nuka's analysis to correct the perceived error. This assumption was incorrect and resulted in nine pages (pages 13 through 21) of unnecessary and inaccurate Reply Evidence (in particular, Sections 4.2.2.3, 4.2.3, 4.2.4 and 4.2.5, including Tables 4 through 8 and Figures 4 through 6), all of which must be ignored by the Board.

d. Other Factors Affecting Mitigation: (1) Stranding; (2) Fate & Behaviour of Dilbit

1. Stranding

590. When an oil spill occurs in coastal areas, there is the potential for the slick to move toward shorelines where the consequences of coating or toxicity may be high for intertidal or other coastal species and where at least some of the oil will become stranded or trapped in the shoreline rocks plants and sediments. (Short 2015)

⁴¹ Trans Mountain Reply Evidence, *Reply to the City of Vancouver, Tsleil-Waututh Nation, City of Burnaby, Metro Vancouver “Technical Analysis of Oil Spill Response Capabilities and Limitations for the Trans Mountain Expansion Project”* - 20 August 2015

City of Vancouver Written Evidence – Appendix 3 – Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 74

591. Once oil is stranded on the shore, it is difficult and resource intensive to remove, and the removal operation may have associated impacts on species and habitat as well. The amount of oil that strands is influenced by the oil viscosity, shoreline type, and amount of energy that drives the oil toward the shoreline in the first place (wind speed and direction and tidal cycle). In some cases, oil may be permanently trapped onshore and therefore unavailable for on-water recovery. In other cases, some of the oil may remobilize back into the water, although the addition of sediments and debris may cause the oil to submerge or sink, so it may not be available to on-water skimming.

City of Vancouver Written Evidence – Appendix 3 – Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary – ([A4L7W1](#)) at PDF page 61

592. Stochastic scenario modeling conducted for Burrard Inlet showed that between 50% and 90% of the oil spill was stranded on shorelines (Genwest Inc., 2015). Oil spills at either of the two Burrard Inlet sites Central and Outer Harbour are *highly likely* to strand.

City of Vancouver Written Evidence - Appendix 68 - Part 2 Nuka – ([A4L9F5](#)) at PDF page 4

593. The base-case recovery estimates in Figure 3.7 for the Central Harbour do not account for the high likelihood that oil spills at this location would quickly reach shorelines and therefore become unavailable due to on-water skimming. The Nuka model could not account for oil that strands on shorelines and, therefore, a separate analysis was conducted by Nuka to determine the effects of stranding on the model results.

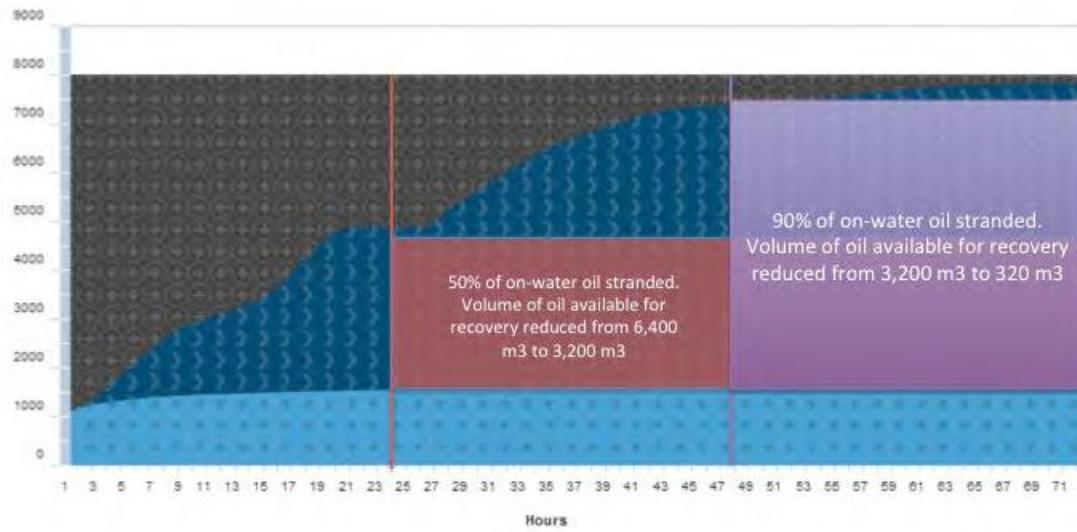
City of Vancouver Written Evidence - Appendix 68 - Part 1 - Nuka - technical analysis of oil spill response capabilities and limitations – ([A4L9F1](#)) at PDF page 78

594. The impact of shoreline stranding on the Nuka modelling results is twofold:

- Stranding significantly reduces total oil recovery estimates.** Shoreline stranding reduces the total volume of oil available for on-water recovery and, therefore, reduces total recovery estimates. The result is that there will be a higher percentage of unrecovered oil that will impact the coastline and the marine environment.
- Stranding reduces the duration of on water recovery.** In Burrard Inlet, 50% of the oil stranded on shorelines within the first 24 hours after the spill, and up to 90% stranded by 48 hours (Genwest Inc., 2015). This means that by 48 hours into the response, on-water recovery would be ineffective as virtually all of the unrecovered oil would be stranded. The result is a reduced response period from the 72 hours used in the Nuka Report.

City of Vancouver Written Evidence - Appendix 68 - Part 2 Nuka – ([A4L9F5](#)) at PDF page 5

Figure 3.1.2. illustrates the impact of oil stranding on the recovery estimates in the Nuka Report.



595. The red box that is overlaid on the model output graph shows 50% of the oil stranding at hour 24, which would reduce the total volume available for recovery from

6,400 cubic metres⁴² to 3,200 cubic metres. At hour 48, if 90% of the on-water oil stranded, the volume available for recovery would be further reduced from 3,200 cubic metres to 320 cubic metres.

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at PDF page 5

596. For Burrard Inlet sites in particular, this means that the on-water recovery estimates do not consider the fact that the oil slick could reach the shoreline before on-water response forces encounter it. Once oil reaches the shoreline, it may become permanently stranded or it may be re-mobilized during a future tide cycle. Remobilized oil is typically weathered and may be in the form of a tarball or tar patty that cannot be recovered with a skimmer. It may also incorporate enough sediment to submerge or sink. In either scenario, the recovery potential is significantly reduced as a result of the shortened recovery period and the inability of skimmers to recover remobilized oil that is weathered.

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at PDF page 11

597. Nuka's baseline scenarios (Figure 3.7 above) also assume favourable timing with no delays in spill detection and reporting, even though these delays are common and should be expected.

2. Fate & Behaviour of Dilbit

598. Another factor that was not taken into account by Trans Mountain in its spill scenarios was the density changes to the diluted bitumen caused by rapid evaporation of the lighter components together with wave action or sediment interactions. The Nuka Report also used a model that assumed the oil would remain floating. However, the authors of the Nuka Report note that changes to the physical and chemical properties of diluted bitumen may make it impossible for on-water mechanical recovery systems to

⁴² The starting balance of oil on water is 6,400 cubic metres as opposed to the modelled 8,000 cubic metres because 1,600 cubic metres will evaporate.

recover oil within the first 48 hours after a spill, either because of viscosity or because oil density limits are reached.

"Diluted bitumen when spilled undergoes a rapid increase in viscosity (stickiness) that can make it very difficult to recover with some skimmer and pump systems. The characteristics of the oil may change so rapidly that by 15 hours after the spill occurs, it cannot be recovered with conventional skimmers. After just over two days, the oil may be so viscous that it cannot be recovered even by specially designed viscous oil skimming and pumping systems.

"If either viscosity or density limits are reached, then on-water recovery operations will essentially cease. Oil that is not removed from the environment with mechanical skimming systems may impact wildlife and habitat, and oil that reaches shorelines will require clean-up."

City of Vancouver Written Evidence - Appendix 68 - Part 2 Nuka –
[\(A4L9F5\)](#) at PDF pages 13 and 14

599. As discussed earlier in the City's Written Argument, Trans Mountain's evidence on spill modelling notes the critical importance of understanding the behavior of the oil slick in assessing the mitigation strategy. However, Trans Mountain's understanding of the behavior of diluted bitumen is based on the Gainford study experiments, which used unrealistically thick oil slicks thereby extending the period of time that the oil would remain floating. As a result, Trans Mountain's assessment of the effectiveness of its mitigation strategy is fundamentally flawed.

600. Had the Gainford study experiments used the correct slick or film thickness for unconstrained oil (a thickness of 0.4 instead of a 1.15 mm thick oil film) the time required to reach neutral buoyancy may have been as brief as 24 hours. As the Short Report explains, this is because evaporation rates from a natural 0.4 mm thick oil slick are about three times faster than from a 1.15 mm thick slick under identical ambient conditions.

601. Instead of reaching neutral buoyancy after 48 hours, as was observed in the Gainford Study experiments, an oil slick with a 0.4 mm thickness would reach neutral buoyancy after 24 hours. The faster evaporation rate and the corresponding shortened time to reach neutral buoyancy would apply to all volumes of oil that are released before booming is in place as well as to the volumes of oil that continue to escape following booming.

602. For example, in the Arachne Reef scenario, Trans Mountain's evidence is that 5,000 cubic metres of oil⁴³ is released at the outset of the spill, followed by the release of an additional 4,000 cubic metres (1,000 cubic metres per hour) within the first four hours while response is being mobilized, equipment transported to the site, and booming commences. Between hours 5 and 13, an additional 2,500 cubic metres escapes from the boomed area. In total, 11,500 cubic metres of oil could remain uncontained after the first 24 hours of response activity and, if conditions were such that the oil began to submerge, it would no longer be available for recovery. Leaving aside the factors of delay and oil stranding, this reduces the total estimated volume of oil recovered in Trans Mountain's scenario from 12,200 cubic metres (74% of 16,500 cubic metres) to less than 4,000 cubic metres (74% of 5,000 cubic metres) or approximately 25% of the spill.

603. Trans Mountain's reliance on the Gainford Study experiments significantly underestimates the risk of oil submergence and, therefore, overestimates the volume of oil that would be available on the water surface for recovery even under the most ideal conditions.

604. One final example of how Trans Mountain's oil recovery estimates greatly overstate the volume of oil that could be recovered by the proposed oil spill skimming

⁴³ This represents 25% of the impacted tank volume (see Volume 8c: Trans Mountain Expansion Project Oil Spill Response Simulation Study: Arachne reef and Westridge Marine Terminal at pdf 19) using DNV's estimate that 2 tanks would be impacted and each tank has a volume of 10,000 cubic metres (see DNV Report at page number 20) Application – TERMPOL 3.8-Casualty Data Survey: DNV Managing Risk – ([A3S4T1](#))

equipment. This is because the proposed oil spill skimming equipment is acknowledged by Trans Mountain to display much higher recovery rates when the skimmers encounter thicker oil slicks. The corollary to this admission is that skimming of the more realistic 0.4 mm thick oil slick will result in lower recovery rates than those relied on by Trans Mountain in its application.

Trans Mountain Pipeline ULC - *Response to City of Vancouver TERMPOL IR* – ([A417R6](#)) at PDF page 36

Trans Mountain has not properly assessed the extent to which an oil spill in the Fraser River can be mitigated

605. The Nuka Report analyses a range of spill transport speeds and considers optimistic timelines for mobilization and deployment of response equipment from Burnaby, Delta Port, and Hope to three hypothetical control points. For the Trans Mountain pipeline Lower Fraser River crossing spills modeled in this analysis, spills may migrate the length of the river all the way to the mouth in less than 2.5 hours under conditions where the oil moves at 12 kph (6.5 knots) or faster. This does not allow sufficient time to load equipment, transport it to control points, and deploy it ahead of the leading edge of the spill based on the location of existing equipment caches. Even under moderate transport conditions of 4kph to 8 kph, mobilization and deployment timing is tight. Any complications caused by spill detection delays, equipment malfunction, personnel activation, traffic or other unforeseen factors could allow the spill to migrate the entire 40 km of the Lower Fraser River from the pipeline crossing to the mouth contaminating river banks and river resources along the entire reach.

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at PDF page 41

606. In its Reply Evidence⁴⁴, Trans Mountain introduced new evidence regarding the

⁴⁴Trans Mountain Reply Evidence, *Reply to the City of Vancouver, Tsleil-Waututh Nation, City of Burnaby, Metro Vancouver “Technical Analysis of Oil Spill Response Capabilities and*

flow rates on the Fraser River which was prepared by Trans Mountain's consultant, Tetra Tech EBA. The flow data provided on page 32 of the Reply to Nuka Report is extremely limited in terms of the time period covered and no information has been provided about whether and to what extent the flow data is representative of maximum, minimum, and average velocities on the Lower Fraser River. Accordingly, this evidence should be given little or no weight by the Board and the flow rates relied on in the Nuka Report, which were obtained from published data, should be preferred.

607. In order for any of the response estimates presented here to be realized, oil spill detection must be nearly instantaneous. Given that spill detection and reporting delays have been well documented for past pipeline spills (e.g. NEB 2012) this is a significant consideration. Prompt detection of pipeline spills may be the deciding factor for the effectiveness of spill containment and recovery on the Lower Fraser River at low to medium currents. In medium to fast currents, no response will be possible either because there is insufficient time to reach the Control Points or because booming will not be effective in the faster currents. This latter point is discussed in more detail below.

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at PDF
page 41

TABLE 4.6. RESPONSE LOGISTICS TIMING FOR THREE CONTROL POINTS ON FRASER RIVER

Response Logistics Timing (Oil Transport vs. Equipment Mobilization)					
River State (Oil Transport)	Current Velocity	Control Point 1 (6.5 km)	Control Point 2 (24 km)	Control Point 3 (25 km)	Fraser Mouth ⁵¹ (40 km)
Slow Flow (Slow Transport)	Slack water	No transport; ordinary spreading			
	2 kph (1.1 kts)	3.3 hours	12.0 hours	12.8 hours	20.0 hours
Medium Flow (Medium Transport)	4 kph (2.2 kts)	1.6 hours	6.0 hours	6.3 hours	10.0 hours
	8 kph (4.3 kts)	0.8 hours	3.0 hours	3.2 hours	5.0 hours
Fast Flow (Fast Transport)	12 kph (6.5 kts)	0.5 hours	2.0 hours	2.1 hours	3.3 hours
	16 kph (8.6 kts)	0.4 hours	1.5 hours	1.6 hours	2.5 hours
First Responding Road Forces can arrive at all Control Points in roughly 2.4 hours without traffic.					
	Green: Forces arrive > 1 hour ahead of oil.				
	Yellow: Forces arrive ahead of oil, but with less than 1 hour.				
	Red: Forces arrive concurrent with or after oil.				

608. An inventory of equipment identified in project application materials and online databases show that Trans Mountain proposes to make approximately 30,000 feet of boom available in trailers and warehouses in Southern BC, along with approximately 19 skimmers. Approximately 17,000 feet of this boom will be stored in trailers that can be deployed to Lower Fraser River control points within 2 hours, assuming that all of this boom can be released from its storage location. However, depending upon the angle and configuration of booming arrays and the manner in which equipment is stored and transported, equipment availability could be a limiting factor for controlling river spills.

City of Vancouver Written Evidence - Appendix 68 - Part 2 Nuka –
[\(A4L9F5\)](#) at PDF page 41

609. Of the 17,450 feet of boom identified in the Trans Mountain project application materials, only 1,600 feet is identified as river boom, which means that it is specifically designed for deployment in river systems. River boom is typically smaller than boom

designed for protected or open water operating environments. The smaller size and draft make the boom work more effectively against a strong current. There are also specific fast water booming systems that are available on the market but none are identified as part of the proposed inventory in Trans Mountain's application.

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* –
[\(A4L9F5\)](#) at PDF page 35

610. 1,600 feet of river boom is not sufficient to properly boom either of Control Points 1 and 2, which are the only control points located on the main arm of the Fraser River and require between 2,200 feet and 12,000 feet of boom depending on the speed of the river current. In a slow to medium current there would be sufficient boom at Control Point 3, which is located on the narrower northern arm of the Fraser River, if only a single leg of boom were deployed. However, for currents greater than 3.7 kph (2 knots), 1,600 feet is insufficient even for Control Point 3.

611. The reason that more boom is required in faster currents is that the boom angle must be decreased in order to effectively contain the oil. Furthermore, it is common practice to use a double length of boom in high current environments, with the second leg serving as a back-up to catch oil that escapes from the first leg. Decreasing the boom angle and doubling up the boom are only effective measures in river currents up to 5.5 kph (3 knots). Faster currents will result in boom failures. Thus, although it might be possible for response forces to arrive at Control Points 2 and 3 slightly in advance of the leading edge of the oil spill in the case of river currents between 5.5 and 8 kph, those forces would not be effective in preventing the oil from reaching the mouth of the Fraser River and beyond.

TABLE 4.8. BOOM LENGTH ESTIMATES BY CONTROL POINT BASED ON BOOM ANGLE AND CONFIGURATION

Control Point	Width of River (approximate)	Boom Angle	Maximum current	Length of Boom ⁶¹ – Single Leg	Length of Boom – Double Leg
Control Point 1	1,900 ft	60	2 kph (1.1 kts)	2,200 ft	4,400 ft
Control Point 2	1,600 ft	40	2.8 kph (1.5 kts)	2,000 ft	4,000 ft
		30	3.7 kph (2 kts)	2,800 ft	5,600 ft
		20	4.6 kph (2.5 kts)	4,400 ft	8,800 ft
		15	5.5 kph (3 kts)	6,000 ft	12,000 ft
Control Point 3	800 ft	40	2.8 kph (1.5 kts)	1,000 ft	2,000 ft
		30	3.7 kph (2 kts)	1,400 ft	2,800 ft
		20	4.6 kph (2.5 kts)	2,200 ft	4,400 ft
		15	5.5 kph (3 kts)	3,000 ft	6,000 ft

City of Vancouver Written Evidence - Appendix 68 - Part 2 Nuka – ([A4L9F5](#)) at PDF page 36 and 37

612. Even if it could be assumed that containment and recovery resources can be deployed ahead of an oil spill into the Fraser River, it is unlikely that those resources will successfully contain and recover the full volume of on-water oil. Like marine spill response operations, on-water recovery in a riverine environment is also challenged by the limitations of mechanical oil recovery systems. Additional challenges of river spill response include:

1. Potential for oil submergence or sinking;
2. High currents; and
3. River bank access.

613. River waters typically have lower salinity than marine waters which means that some oils may sink more readily in river spills. High turbidity or suspended sediments may also contribute to potential submergence or sinking (NOAA, 2015; Short, 2015).

“The paramount concern here is not simply whether evaporation could cause diluted bitumen to sink to the seafloor in full-strength seawater, but whether it could submerge in the nearly fresh surface waters of the Fraser River freshet. The threshold for submergence

in fresh water is much lower than for sinking in seawater having salinities typical of the open ocean (density < 1,025 kg/m³), because the density of freshwater is substantially lower (1,000 kg/m³)."

"... other mechanisms such as contact with shoreline sediments or accumulation of small amounts of suspended inorganic material in the water column would increase the likelihood that spilled diluted bitumen could submerge in brackish receiving waters."

City of Vancouver Written Evidence – Appendix 3 – *Short, Jeffrey W., Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary* – ([A4L7W1](#)) at PDF page 28

614. The skimmers and boom included in Trans Mountain’s river response logistics analysis are designed to function on floating oils, and would not be effective in containing or recovering submerged or sunken oils in the Fraser River.

615. The 2010 diluted bitumen spill into the Kalamazoo River from Enbridge’s Line 68 (the “**Kalamazoo River Spill**”) illustrates the potential for diluted bitumen to submerge and sink under certain river conditions. The Kalamazoo River Spill migrated 65 km downriver from the pipeline release point before it was contained and a large volume of the spilled oil submerged, presenting a significant challenge to responders both in terms of locating the submerged oil and remediating it. By comparison, the Lower Fraser River runs approximately 40 km from the Port Mann bridge pipeline crossing to the mouth.

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at PDF page 38

616. Contrary to the assertion in Trans Mountain’s application materials that most of the spilled oil remained on the water surface, the Kalamazoo River Spill released 843,000 gallons of diluted bitumen into the river, with approximately 180,000 gallons remaining trapped in river sediments more than three years after the spill occurred.

Trans Mountain Pipeline ULC Application - *Volume 7: Risk Assessment and management of Pipeline and Facility Spills* – ([A3S4V6](#)) at PDF page 14

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at pdf page 42

City of Vancouver Written Evidence - Appendix 45 – *EPA Dredging begins on Kalamazoo River* – ([A4L9E1](#)) at PDF page 3

617. As noted above, high velocity river currents may cause booms and skimmers to fail or function at a low efficiency. There are no oil containment systems that have been proven effective in 12 kph currents and none of the equipment identified in Trans Mountain’s application materials is capable of containing oil at currents above 5.5 kph.

City of Vancouver Written Evidence - Appendix 68 - *Part 2 Nuka* – ([A4L9F5](#)) at PDF page 39

VI. CONCLUSION: RISK AND IMPACTS OF AN OIL SPILL (Issues 4, 5, 6, 7, 9, 10, 11 and 12)

618. If the Board is satisfied that the deficiencies in Trans Mountain’s application materials can be overlooked and finds that the requirements for an assessment under CEAA have been met, then the City of Vancouver submits that the Board must also find that:

- i. The evidence overwhelmingly demonstrates the TMEP is likely to cause significant adverse environmental effects; and
- ii. The TMEP is not in the Public Interest because adverse effects far outweigh any possible benefits.

i. The evidence demonstrates the TMEP is likely to cause significant adverse environmental effects

619. The purpose of CEAA is to protect components of the environment that are within federal legislative authority from significant adverse environmental effects caused by a

designated project.

CEAA 2012, s. 4(1)(a)

620. The “environmental effects” that are to be taken into account in relation to a designated project are enumerated in s. 5 of CEAA:

5. (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are

(a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

(i) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act,

(ii) aquatic species as defined in subsection 2(1) of the Species at Risk Act,

(iii) migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and

(iv) any other component of the environment that is set out in Schedule 2;

(b) a change that may be caused to the environment that would occur

(i) on federal lands,

(ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or

(iii) outside Canada; and

(c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on

(i) health and socio-economic conditions,

(ii) physical and cultural heritage,

(iii) the current use of lands and resources for traditional purposes, or

(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

(2) However, if the carrying out of the physical activity, the designated project or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also to be taken into account:

(a) a change, other than those referred to in paragraphs (1)(a) and (b), that may be caused to the environment and that is directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of the physical activity, the designated project or the project; and

(b) an effect, other than those referred to in paragraph (1)(c), of any change referred to in paragraph (a) on

(i) health and socio-economic conditions,

(ii) physical and cultural heritage, or

(iii) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

621. Section 19(1) of CEAA specifies that the environmental assessment of a designated project must take into account several enumerated factors, including “the environmental effects of the designated project, the environmental effects of malfunctions or accidents that may occur in connection with the designated project and any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out”.

CEAA 2012, s. 19(1)(a)

622. CEAA thus requires the environmental effects of accidents and malfunctions to “be considered in the assessment of cumulative environmental effects if they are likely to result from the designated project in combination with other physical activities that have been or will be carried out”.

Operational Policy Statement: Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012*, updated March, 2015

623. The scope of the factors is to be determined by the responsible authority, in this case the Board, pursuant to CEAA s. 19(2).

624. On April 2, 2014, the Board released a document entitled “Factors and Scope of the Factors for the Environmental Assessment” of the TMEP. The document states that,

... To the extent that there is potential for environmental effects of the designated project to interact with the effects of marine shipping, the Board will consider those effects under the cumulative effects portion of the CEAA 2012 environmental assessment.

“Factors and Scope of the Factors for the Environmental Assessment pursuant to the *Canadian Environmental Assessment Act, 2012*”, April 2, 2014, CEAA Registry Doc #7

625. Ultimately, the Board must decide if, taking into account any appropriate mitigation measures, the TMEP is likely to cause significant adverse environmental effects referred to in ss. 5(1) or (2); if so, the Board must “refer to the Governor in Council the matter of whether those effects are justified in the circumstances”.

CEAA 2012, s. 27(1), 52(1), (2)

626. “Significant adverse environmental effect” is not defined in *CEAA*. Applying the regulatory guidance from the Federal Environmental Assessment Office (“FEARO”) to the evidence demonstrates that the TMEP is likely to cause significant adverse environmental effects in and around the Vancouver area, including health and socio-economic effects caused by a change in the environment due to the TMEP.

FEARO (1994), *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*, Hull, QC: Federal Environmental Assessment Review Office, at p. 184

CEAA 2012, s. 5(2)(b)

627. First and with regard to deciding whether the environmental effects are adverse, FEARO’s guidance document lists the following as among “the major factors that should be used to determine whether environmental effects are adverse”:

- threat to rare or endangered species;
- reductions in species diversity or disruption of food webs;
- discharges or release of persistent and/or toxic chemicals, microbiological agents, nutrients (e.g., nitrogen, phosphorus), radiation, or thermal energy (e.g., cooling wastewater);
- negative effects on the quality and/or quantity of the biophysical environment (e.g., surface water, groundwater, soil, land and air)
- negative effects on human health, well-being or quality of life;
- reduction of the quality or quantity of recreational opportunities or amenities;

FEARO (1994), *supra*, at p. 187-189

628. The evidence that Vancouver has put before the Board demonstrates the following:

- a. Pipeline, tank farm and marine-based oil spills have happened in the past and will continue to happen.
- b. The risk of oil spills into Burrard Inlet and the Fraser River are sufficiently high to require an assessment of the impacts of an oil spill on the City of Vancouver, something which Trans Mountain has failed to do. In particular:
 1. the Vancouver Harbour has been identified by Trans Mountain's own expert as an area with an above average hazard rating "due to draft and tidal restriction obstructions from the first and second narrows and the high density traffic within the harbor area";
 2. based on Trans Mountain's own evidence, the risk of a tanker spill in Vancouver Harbour is significant, with a 65.5% risk of a terminal or tanker spill in Vancouver Harbour within the first 30 years, increasing to 83% over a 50-year period;

3. The independent risk assessment prepared by Gunton and Broadbent calculates the risk of a marine-based oil spill in Vancouver Harbour with a volume greater than 1,000 barrels to be 87.4% based on the OSRA model; and
4. It is virtually guaranteed (99.9% probability) that there will be an oil spill from the pipeline itself during operations, and it is likely that there will be multiple spills over the lifetime of the Project.

Table 5.15. Comparison of Return Periods and Spill Probabilities for TMEP Terminal and Inner Harbour Spills

Method	Size and Type of Spill	Return Period (in years)	Spill Probability (%)	
			30 Years	50 Years
TMEP Application	Any size tanker spill (Inner Harbour)	580	5.0	8.3
	Terminal spill < 63 bbl	34	58.6	77.0
	Terminal spill < 629 bbl	234	11.6	18.6
	Spill in Inner Harbour (terminal or tanker)	29	65.5	83.0
OSRA Model (International)	Tanker spill in port ≥ 1,000 bbl	25	71.1	87.4
	Tanker spill in port ≥ 10,000 bbl	109	24.1	36.9

Note: Spill probabilities for TMEP application computed based on return periods from TM (2013, Termpol 3.15) and Trans Mountain (2015). The Inner Harbour in the TMEP application represents segments 1 and 2 in the Termpol 3.15 study; this corresponds to the geographic region between English Bay and Westridge Terminal. The category Spill in Inner Harbour estimated based on the TMEP application represents a terminal spill < 63 bbl, a terminal spill < 629 bbl, and any size tanker spill that occurs in the Inner Harbour. Spill probabilities for OSRA model computed from Anderson et al. (2012).

Tsleil-Waututh Nation Written Evidence - Volume 5 Tab 4A Appendix 1 - *Assessment of Spill Risk Report – (A4L6A6)* at PDF pages 114 and 117

- c. A reasonable worst-case oil spill in the Vancouver Harbour or into the Fraser River will have devastating consequences for Vancouver, its residents and businesses and for the environment.

d. The consequences of a marine-based oil spill into Burrard Inlet or a spill from the pipeline into the Fraser River cannot be sufficiently mitigated. In particular:

1. Proposed mitigation measures are not clearly explained, have many gaps, and do not include training and exercises. There is no evidence that Trans Mountain, its contractors (WCMRC) and the government agencies that it relies on, including the Canadian Coast Guard, Environment Canada, and Transport Canada, have developed appropriate plans or programs to minimize the impacts of an oil spill on the City of Vancouver. The evidence before the Board is that existing plans and programs are undergoing revisions, but there is no evidence on which the Board can conclude that any future plans or programs will sufficiently mitigate the impacts of a spill of diluted bitumen from a tanker on the City, the public, the environment and the economy.
2. Accordingly, the impacts of an oil spill must be assessed based on the following evidence discussed in detail above:
 - Oil spilled from a tanker in Burrard Inlet is likely to impact the shoreline within hours of a spill, and shoreline impacts will be widespread throughout Burrard Inlet.
 - The oil will likely sink or submerge, especially after contact with shoreline.
 - Oil will linger on shorelines well past the end of active clean-up.
 - A spill of diluted bitumen will result in a vapour plume with benzene levels above acute exposure limits putting exposed members of the public and first responders at risk.
 - Explosive or flammability risks will cause delays in response.

- TMP has no capacity or plans to immediately deploy air quality monitoring equipment for the general public. As such First Responders will be forced to make critical life-safety decisions without adequate data.
- Municipal first responders will be forced to initiate major emergency response operations on land, including evacuation, shelter-in-place, transportation closures, public notification, and health response, well in advance of marine-based response or the establishment of an ICP.
- Thousands of untrained members of the public will converge as volunteers to help clean-up a spill and respond to wildlife.
- There are no plans for the protection or prioritization of protection of shorelines for the majority of Burrard Inlet or the Fraser River.
- It is impossible to fully contain and recover a worst-case or lesser oil spill. Even under the best conditions, a significant amount of oil will remain unrecovered, persisting potentially for decades on beaches and in the marine ecosystem, with significant impacts on the health and well-being of Vancouver residents and significant economic impacts on the City of Vancouver and its businesses.

629. In the case of an oil spill in Burrard Inlet, oil will quickly strand on Vancouver's beaches and shoreline, resulting in much more difficult and costly clean-up efforts. Further, diluted bitumen can be expected to submerge within a short period of time, as little as 24 hours after the spill, and, given the current lack of recovery technology for submerged oil, has the potential to remain in the marine environment indefinitely.

630. With respect to an oil spill near the Fraser River Estuary, the Short Report finds that a plausible worst-case scenario oil spill could jeopardize the viability of the southern resident killer whale population, an endangered species. Moreover, the Short Report

concludes that even a small spill can cause substantial mortalities of sea birds and could de-stabilize or permanently alter the food web of Burrard Inlet and the Fraser River estuary. Dr. Short also finds that small, medium or credible worst-case scenario spill has the potential to contaminate tens of kilometers of shorelines - important for both ecological and recreational purposes - on a timescale of decades.

City of Vancouver Written Evidence – *Appendix 3 – Jeffrey Short: Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary* – ([A4L7W1](#)), at PDF page 10-12 and 72-84

631. With regard to effects on people resulting from environmental changes, the Levelton Air Quality Study finds that an oil spill in English Bay or Burrard Inlet would have negative effects on human health, including predicted exceedances of several different chemicals, including exceedance of the TECQ acute inhalation exposure benzene limit in large areas affecting 133,100 to 1,077,700 people within the model domain for all spill locations and scenarios studied.

City of Vancouver Written Evidence – *Appendix 52 – Levelton Consultants Ltd. Report* – ([A4L7L1](#)), at PDF page 44-45

632. Moreover, the evidence of Vancouver Coastal Health and Fraser Health Authority demonstrates a range negative effects of oil spills on human health including respiratory , endocrine, immunological, and genotoxic effects; physical injuries related to clean-up; and mental health impacts including anxiety, depression, and post-traumatic stress disorder.

City of Vancouver Written Evidence – *Appendix 50 - Vancouver Coastal Health and Fraser Health Authority “Guidance to Metro Vancouver and Fraser River Municipalities to Assist in Reviewing the Trans Mountain Pipeline Expansion Project from a Public Health Perspective* – ([A4L7K0](#)), at PDF page 32-69

633. FEARO’s guidance document directs that in deciding whether adverse environmental effects are significant, the following criteria should be taken into account: magnitude of the adverse environmental effect; geographic extent of the adverse environmental effect; duration and frequency of the adverse environmental effects; degree to which the adverse environmental effects are reversible or irreversible and ecological context. Effects that are major or catastrophic, widespread, long term and/or

frequent, irreversible, or occur in areas or regions that are ecologically fragile may be more significant than those that are not.

FEARO (1994), *supra*, at p. 188, 190

634. Here, the identified adverse environmental effects are significant. The Short Report concludes that a credible, worst-case scenario oil spill would “rank within the top ten bird mortality events from an oil spill”, and that even a “considerably smaller” spill can cause substantial mortalities to seabirds, and estimated effects for small to medium spills in Canada and in Alaska have the potential to contaminate tens of kilometers of shorelines on time scales of decades”. Moreover, a worst-case scenario spill could “disrupt ecosystem functioning for years or even permanently, and... affect other distant habitats occupied seasonally by migratory species”. Diluted bitumen stranded on shorelines from an accidental spill may persist for up to a century under worst-case scenario conditions.

City of Vancouver Written Evidence – *Appendix 3 – Jeffrey Short: Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary* – ([A4L7W1](#)), at PDF page 10-12, 72-74, 81-84

635. With regard to the identified adverse effects on people, the Levelton Air Quality Study found that the TECQ “acute inhalation exposure benzene limit was exceeded in large areas of the study domain affecting a range of 133,100 to 1,077,700 people” and “the acute inhalation exposure limit contour extends beyond the model domain for all spill locations and therefore these are likely underestimates of the potential population affected”.

City of Vancouver Written Evidence – *Appendix 52 – Levelton Consultants Ltd. Report* – ([A4L7L1](#)), at PDF page 44

636. Moreover, the Vancouver Coastal Health and Fraser Health Authority’s evidence demonstrates that while some adverse health effects could be appreciable but reversible and short term (such as impacts on residents living in the impact zone), “an extended range of impacts with potentially longer duration for workers engaged in clean-up including respiratory, endocrine, immunological and genotoxic effects... may persist for

years". Moreover, "mental health impacts... tend to persist or worsen over years, including increased anxiety, depression and post-traumatic stress disorder".

City of Vancouver Written Evidence – *Appendix 50 - Vancouver Coastal Health and Fraser Health Authority "Guidance to Metro Vancouver and Fraser River Municipalities to Assist in Reviewing the Trans Mountain Pipeline Expansion Project from a Public Health Perspective – (A4L7K0)*, at PDF page 32-69

ii. The TMEP is not in the Public Interest because adverse effects far outweigh any possible benefits

637. Vancouver's Written Evidence includes extensive expert evidence about the response gaps and oil spill risks and impacts posed by the TMEP, summarized above. Further, the Information Request process and the significant volume of information that Trans Mountain was unable or refused to disclose further highlights the lack of preparedness and capacity of Trans Mountain and the response organizations that it relies on to mitigate the devastating consequences of an oil spill.

638. Based on the significant adverse effects identified in the evidence that are likely to arise from the TMEP, either as a result of a pipeline spill (the occurrence of which all parties agree is a virtual certainty) or a tanker spill, the probability of which is also very high, it is clear that to the extent that Trans Mountain is able to establish actual economic benefits from the project, those benefits are far outweighed by the risks posed by the project and the devastating impacts that a spill in Burrard Inlet or into the Lower Fraser River would have on the City of Vancouver.

VII. CONCLUSION

639. Based on all of the evidence, Vancouver submits that the Board must find that the TMEP is not in the public interest and, in accordance with the Board's obligations under Section 52 of the *NEB Act*, recommend against approval of the project.

ALL OF WHICH IS RESPECTFULLY SUBMITTED