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VIA ELECTRONIC FILING

British Columbia Utilities Commission
Sixth Floor
900 Howe Street
Box 250
Vancouver, BC V6Z 2N3

Attention: Rob Pellatt

Dear Mr. Pellatt:

Re: British Columbia Transmission Corporation ("BCTC") Certificate of Public Convenience and Necessity ("CPCN") Application Vancouver Island Transmission Reinforcement Project ("VITR") Project No. 3698395, Order No. G-70-05

We are counsel for BCTC in the above referenced proceeding. Please find attached for filing BCTC's Reply Argument. Twenty hard copies will be delivered via courier to the Commission.

Yours truly,

FASKEN MARTINEAU DuMOULIN LLP

(original signed by)

A.W. (Sandy) Carpenter

cc: Marcel Reghelini, British Columbia Transmission Corporation
Registered Intervenors

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BRITISH COLUMBIA UTILITIES COMMISSION

IN THE MATTER OF THE *UTILITIES COMMISSION ACT*
R.S.B.C. 1996, Chapter 473

and

Re: British Columbia Transmission Corporation ("BCTC")
Project No. 3698395 /Order No. G-70-05
Certificate of Public Convenience and Necessity ("CPCN")
Application Vancouver Island Transmission
Reinforcement Project ("VITR")

REPLY OF
BRITISH COLUMBIA TRANSMISSION CORPORATION ("BCTC")

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I. INTRODUCTION

1. This is BCTC's Reply to Intervenor Arguments.

2. BCTC has structured its Reply as follows. First, BCTC will respond to those issues that have broader application to the VITR Project and on which a number of Intervenors made final submissions. These issues are: BCTC's Assessment of Alternatives; System Planning; EMF; and Seismic Issues. BCTC will then respond to intervenors' submissions regarding the Tsawwassen Area Options; the Southern Gulf Islands Options; VIC; and JDF. BCTC then addresses the HTG's Submission and TRAHVOL's Complaint. BCTC provides its comments in response to Sea Breeze's Appendix C in Appendix A. BCTC provides its comments in response to Sea Breeze's Appendix E in Appendix B.

3. BCTC has not attempted to respond to every statement in the various Intervenor Arguments nor has it generally repeated the submissions set out in its Final Submission. In those instances where BCTC has not responded to an individual statement or submission this does not mean that BCTC agrees with these submissions and BCTC continues to rely on the whole of its submissions and the evidence in this proceeding.

4. Before addressing the substantive matters, BCTC wishes to address Sea Breeze[1] and Delta's[2] submissions that BCTC is attempting to split its case. BCTC submits that it did not improperly confined its Final Submissions nor is it attempting to split its case. This issue is fully addressed in the JIESC's Reply Argument at paragraph 12.

II. BCTC'S ASSESSMENT OF ALTERNATIVES

5. Various intervenors made comments in their submissions on BCTC's assessment of alternatives. BCTC's response to these is set out below

Are Transmission Lines Incompatible with Residential Neighbourhoods and the Gulf Islands?

6. A number of parties took the position that having transmission lines in residential neighbourhoods is "archaic"[3] or words to like effect.[4] Delta describes the existing lines as an aberration and submits that high voltage electric lines should be recognized as a land use that is "fundamentally incompatible" with residential uses.[5]

7. BCTC fundamentally disagrees with this premise. By necessity, transmission facilities need to be located in residential neighbourhoods to serve those and other neighbourhoods. Similarly, transmission lines need to traverse areas that would otherwise be undeveloped given the need to connect electrical generation to load. As Mr. Gabel candidly admitted, all other things being equal, BCTC would locate a transmission line outside of a residential neighbourhood.[6] However, as Mr. Barrett went on to indicate, he could not "imagine a

[1] Sea Breeze, para. 36-42.
[2] Delta, para. 16-17.
[3] Delta, para. 4.
[4] Campbell, para. 7.
[5] Delta, para. 8.
[6] TR 9, page 1269, line 24 to page 1270, line 3; TR 11, page 1784, line 21 to page 1785, line 16.

circumstance where all things would be equal if there was right of way in one location and no right of way in another location."[7]

8. Regarding Tsawwassen, the fact that there are transmission lines located close to houses is not unique. There are a number of other places on the transmission system where houses are located on the edge of a right of way and, in some cases, where EMFs are even higher than on the Tsawwassen ROW.[8] The only facilities that are unique regarding the Tsawwassen ROW is the number of yards which enclose the transmission line and the resulting barriers to access.[9] While this does create difficulties accessing these properties, and was one of the reasons BCTC proposed Option 2, BCTC does not believe that this should prohibit new transmission lines in this area. Each of the Tsawwassen homeowners believed that their residential use and the transmission facilities could co-exist when they purchased their properties, other residents in other neighbourhoods on transmission lines believe that these uses can co-exist, and those purchasers who have bought on the Tsawwassen ROW since the announcement of VITR clearly believe that these uses can co-exist.[10] In contrast, the ability to obtain new ROW for transmission lines is likely to become increasingly difficult and expensive.[11]

9. Somewhat similarly in the Southern Gulf Islands, BCTC does not accept the premise put forward by IRAHVOL and the Islands Trust that the existing transmission lines are an anomaly and, again, that the nature of certain areas is such that it should be an absolute bar to transmission facilities. The nature of BC's geography, and the cost associated with transmission facilities, simply does not allow for the luxury of such an approach. While the values expressly by IRAHVOL and the Islands Trust are important and need to be considered, the

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[7] TR. 11, page 1786, line 26 to page 1787, line 6.

[8] TR 8, page 1075, lines 4 to 16; TR 15, page 2506, line 10 to page 2507, line 20.

[9] TR 15, page 2506, line 21 to page 2507, line 10.

[10] Ex. C3-43, Working Notes of Ms. Newman, identifies the following sales: 1084 53A (Jun-05), 422 Shannon (July-05), 1072 53A (Aug-05).

[11] Ex. B1-6, BCUC 1.84.1; TR 18, page 3123, lines 5 to 17.

presence of transmission lines has not stopped boaters from making Montague Harbour one of the most popular moorages on the West Coast,[12] nor has it stopped the thousands of visitors who come to Salt Spring Island every year,[13] nor has it stopped people from moving to the Southern Gulf Islands.[14]

10. Accordingly, rather than approaching the assessment of alternatives with pre-established conditions, BCTC believes that the proper approach is to consider a broad range of attributes and then to consider the most favourable options based on those criteria.

Should BCTC Have Assessed Alternatives in More Detail?

11. BCTC also wishes to address the "frame of reference"[15] that some of the Intervenors appear to promote to assess alternatives. These Intervenors' general approach appears to be that, since they disagree with routes through Tsawwassen, therefore BCTC has an added onus to study and to pursue alternatives other than Options 1, 2 or 3. In many cases this was combined with personal attacks on BCTC and its employees.

12. For example, TRAHVOL submits that BCTC has not adequately explored alternatives to VITR and, in particular, the feasibility of supplying power to Vancouver Island by way of the JDF project.[16] TRAHVOL also submits that BCTC has failed to undertake a reasonable and meaningful examination of route alternatives through South Delta.[17] It relies on a single statement by Ms. Broadfoot - in juxtaposition to the volumes of evidence put forward by BCTC – to support its thesis.[18] TRAHVOL goes on to suggest that it was BCTC's

[12] Ex. C34-6, page 6; TR 22, page 4051, lines 1 to 9.
[13] Ex. C34-6, pages 5 to 6.
[14] TR 21, page 3881, line 2 to page 3882, line 18; Ex. C25-6, BCTC 1.1.1 and 1.2.1.
[15] As indicated above, BCTC will respond to Sea Breeze's submission on VIC and JDF further below.
[16] TRAHVOL, para. 2.
[17] TRAHVOL, para. 5.
[18] TRAHVOL, para. 120.

responsibility to study Options 4 or 5 in a significantly greater level of detail.[19] Overall, TRAHVOL argues that in the absence of a "proper examination of alternative routes" this Commission cannot approve the Application.[20]

13. Mr. Holmsen also suggests that BCTC has not conducted adequate due diligence and cost estimates for alternative routes and technologies. Mr. Holmsen therefore suggests that various suggestions and proposals ought to be re-examined and appropriately assessed before a CPCN is granted.[21]

14. BCTC disagrees with this frame of reference and the suggested approach of these Intervenors. As indicated in its Final Submission, BCTC submits that the appropriate method of studying alternatives is to start with a wide array of options and then to eliminate certain options as clearly preferable options emerge. BCTC submits that detailed, and costly, examination only needs to take place where this is necessary to distinguish between options.[22]

15. Accordingly, in the case of Options 4 and 5, for example, BCTC acknowledges that it could have studied each of these Options in a greater and greater level of detail. However, BCTC submits that this was not necessary. Based on the analysis that was undertaken, and when the appropriate criteria are considered, it is clear that Options 1, 2 and 3 are clearly preferable and further study is not warranted. Where such further study has taken place, it has simply confirmed this assessment.[23]

16. Delta was also critical of BCTC's approach.[24] It suggests that BCTC has squandered an opportunity[25] and that BCTC is a closed minded organization that is determined to follow its agenda only.[26]

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[19] TRAHVOL, para. 128-133.
[20] TRAHVOL, para.134.
[21] Holmsen, p.2.
[22] Ex. B1-11, IRAHVOL 1.31.1.
[23] Ex. B1-57, Attachment 1 and 2**].**
[24] Delta, para. 3 and 4.
[25] Delta, para. 4.

17. Whether one wishes to characterize BCTC's task as being thankless or an opportunity, rather than participate in the consultation process leading up to the VITR Application and this hearing process in an open and cooperative manner, Delta set out from the beginning not only to oppose but to actively frustrate BCTC's efforts. Delta's efforts included:

a) Delta Council passing a resolution opposing any routes through Delta prior to even receiving a briefing by Delta staff;[27]

b) Delta offering TRAHVOL, but not BCTC, the opportunity to review and comment on its staff reports;28

c) Delta Council passing a resolution agreeing that Mr. Bullock's petition opposing BCTC's preferred route could be placed in the Corporation of Delta's civil work areas;29

d) Suggesting that the lines through Tsawwassen were for back up supply only, when it had been previously informed by BC Hydro that the path was for bulk power supply to Vancouver Island and would be needed to be upgraded in the future;30

e) Promoting the view that there may be health concerns associated with EMFs when Delta itself does not have a policy regarding EMFs,31 and when no advice was sought from either Health Canada or the BC Cancer Agency;32

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[26] Delta, para. 4.

[27] TR 23, page 4220, line 1 to page 4225, line 9.

[28] TR 23, page 4231, lines 14 to 25; Ex. C5-20, Undertaking of the Corporation of Delta to Mr. Carpenter, Proceedings at Hearing, Vol. 23, Page 4231, Lines 14 to 25. TR 23, page 4238, lines 17 to 25.

[29] TR 23, page 4234, lines 5 to 17 and page 4239, lines 1 to 9.

[30] TR 23, page 4254, line, 16 to page 4255, line 14.

[31] TR 23, page 4194, line 11 to page 4195, line 23; Ex. C5-20, page 5.

[32] Ex. C5-20, Undertakings of the Corporation of Delta to Mr. Carpenter, Proceedings at Hearing, Vol. 23, Page 4245, Lines 13 to 18 and Vol. 23, Page 4246, Lines 5 to 15.

f) Refusing to provide BCTC with necessary information to allow it to fully consider Option 3;[33] and

g) directing staff resources towards route options that avoid residential areas by identifying deficiencies with BCTC's proposal and highlighting the benefits of alternative routes in the hearing process.[34]

18. BCTC categorically rejects Delta's suggestion that it came to this process with a closed mind and determined to follow its agenda only.[35] It is unfortunate the same cannot be said of Delta's behaviour.

19. Delta went on to suggest that BCTC only gave lip service to the process by proposing alternatives that were "seemingly set up to fail" but which could be vastly improved with minor variations.[36] BCTC agrees that there are deficiencies associated with Options 4 and 5 but categorically rejects that these were "set up to fail" and there is no evidence to support this accusation. BCTC also disagrees that these Options could be "vastly improved" with minor modifications. The only modification offered by Delta in evidence, Mr. Laprade's modified Option 4, improves one aspect of the seismic performance of Option 4 at the expense of greater environmental impacts and increased cost.[37]

Further Response to Mr. Holmsen

20. Finally, In BCTC's Final Submission, under the heading BCTC's Assessment to Alternatives to the VITR Project, BCTC indicated that, "[it would] not review the evidence regarding the majority of the alternatives considered in Exhibit B1-1. With the exception of HVDC Light™, none of the Intervenors suggested that any

[33] TR 23, page 4239, line 10 to page 4242, page 4; TR 23, page 4263, line 17 to page 4264, line 23. BCTC Final Argument, page 54, para. 153.

[34] Ex. B1-82, Tab 34, page 12 of 21.

[35] Delta, para. 4.

[36] Delta, para. 28.

[37] TR 20, page 3643, line 26 to page 3644, line 8; TR 23, page 4228, line 24 to page 4230, line 8; Ex. B1-54, BCUC 4.203.2 and BCUC 4.204.0.

of the other alternatives that BCTC assessed in more detail should be pursued, and there were very few IRs and virtually no cross-examination that took place on these alternatives. If any Intervenors address these alternatives in their submissions, BCTC will respond to these submissions in Reply."[38]

21. Mr. Holmsen took exception to this statement.[39] BCTC believes that this statement was clear but wishes to confirm that its statement was in relation to "Alternatives to the VITR Project" not the Route Options in South Delta as appears to have been assumed by Mr. Holmsen.

Summary

22. BCTC submits, contrary to the suggestions that its alternatives assessment process was flawed, that the assessment process that it undertook was appropriate and this assessment has been undertaken at a level of detail sufficient for the Commission to reach a determination on this Application. BCTC further submits that all Intervenors have had the opportunity to fully explore each of the various alternatives and route options in this proceeding and, if they wished to, to lead evidence on these alternatives and any other alternative they may have chosen to.

23. BCTC's Reply submissions on the various alternatives and route options are set out below.

III. SYSTEM PLANNING ISSUES

24. The only Intervenors who addressed system planning issues in any level of detail were Sea Breeze and IRAHVOL. BCTC's response to Sea Breeze's submissions is set out under the VIC and JDF headings.

25. IRAHVOL argues that the only way to ensure reliable and quality service to Vancouver Island and the Gulf Islands is to have not one, but two, new southern

[38] BCTC Final Submission, para. 28.
[39] Holmsen, page 3.

circuits in place, as well as generation on Vancouver Island.[40] IRAHVOL relies on various submissions in support of this argument[41] and ultimately asks that the Commission direct BCTC to enter into negotiations with Sea Breeze regarding the VIC and JDF circuits to satisfy this need.[42]

26. While having two additional circuits serving Vancouver Island would increase the reliability of supply, this is not necessary to meet NERC/WECC Planning Standards.[43]

27. At page 32, IRAHVOL states, "Because VI relies on transmission to supply about 70% of its peak load, the addition of the first VITR will not reduce the frequency, size, and duration of blackouts on VI. This is categorically false and not supported by the evidence.[44] Further, contrary to IRAHVOL'S statement, load-shedding is not a euphemistic term for a blackout.[45] Load-shedding is a planned and controlled response to a system contingency. Load-shedding will not be required under N-1 with VITR in place.[46] In addition, N-1-1 conditions at lighter load hours will also not require load shedding. Load shedding will be required during heavy load hours with two forced outages, which is what is intended by the NERC/WECC Planning Standards.

28. IRAHVOL goes on to state, "if, as expected, [VITR] fails because of its technical inadequacy e.g. the phase shifter, the size of the blackout will increase."[47] VITR is neither technically inadequate nor is it expected to fail.

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[40] IRAHVOL, p. vii, Item 1.

[41] IRAHVOL, pages 29-42.

[42] IRAHVOL, p. vii, Items 2 and 3.

[43] Exhibit B1-1, Appendix J. Note, on page 26 of IRAHVOL's submission, IRAHVOL suggests that WECC reliability criteria are being revised to include considerations on maximum load shedding during N-2 contingencies and rely on a Sea Breeze response to the undertaking at TR 40, p. 7482. The referenced proposal is not a WECC proposal, it is a BPA proposal.

[44] Ex. B1-47, BCUC 1.186.1, EENS Study for VITR Project.

[45] IRAHVOL, page 31.

[46] Exhibit B1-1; Appendix J; N-1-1 events were explained at TR 10, page 1560, lines 8 to 21.

[47] IRAHVOL, page 32.

29. IRAHVOL goes on to discuss various conditions in support of its submissions.[48] These appear to be based on a misunderstanding of what constitutes an N-1 contingency. The situation described by IRAHVOL is an N-1-1 condition at heavy load hours. There is nothing in the referenced discussion which suggests that, with VITR in place, the transmission system cannot meet an N-1 event. There was evidence that, depending on load conditions, there would have to be load shedding if a second circuit was lost such as suggested in the bottom paragraph on page 33 of IRAHVOL's submission.[49] However, this is an N-2, not an N-1 event. There was also evidence that, again depending on system conditions, BCTC may take operational steps to prepare for an N-2 event such as discussed in the transcript reference at the bottom of page 32 of IRAHVOL's submission.[50] However, again, in this situation the system has already "survived" the N-1 event.

30. There is no support for the proposition, which seems to be implied at the bottom of page 33 of IRAHVOL's submission that JDF or VIC would perform better than VITR under the system conditions outlined. If the load is greater than the remaining transmission capacity it will have to be shed regardless of whether VITR, VIC or JDF is in place. In fact, given the higher capacity of VITR, more load may have to be shed if VIC or JDF were in place. Either VIC or JDF would also need to have RAS schemes in place to protect the system in the even of contingencies.[51] Compared to VIC or JDF under multiple contingencies, VITR will result in less load shedding as VITR provides large continuous capacity as well as significant overload capability for a short term.[52]

31. BCTC will not respond to the remaining submissions in this part of IRAHVOL's submission. Many parts of this are not supported by the evidence

[48] IRAHVOL, pages 32-33.
[49] TR 37, page 7210, lines 2 to 19.
[50] TR 10, page 1583-84.
[51] TR 37, pages 7212-7213.
[52] TR. 37, page 7211 L8-22; Ex B1-6, BCUC IR 1.29.2, and 1.55.1; Ex. B1-17, IRAHVOL IR 1.31.2.

and, overall, IRAHVOL's comments on system planning appear to be as much directed at the system planning standards that are in effect as they are to VITR.

32. BCTC has planned VITR to meet the current NERC/WECC Planning Standards and submits that the evidence, when properly read, confirms that it will meet these standards. A combination of VIC and JDF is not necessary to meet the NERC/WECC Planning Standards.

IV. EMFS

33. A number of Intervenors, including TRAHVOL, IRAHVOL, SDSSPAC, Delta, and various individual Tsawwassen residents, have argued, without citing any regulatory precedent to support their positions, that perceived health concerns associated with EMFs should be an absolute bar to the VITR Project being located on the existing ROW. BCTC submits that previous Utilities Commission Panels considering this issue were correct in finding that the weight of scientific opinion does not support a causal link between extremely low frequency EMF exposure and adverse health effects.[53] BCTC further submits that it has properly applied the precautionary principle, and relocating the Project from the ROW by reason of EMFs alone is unjustified. BCTC continues to rely on its Final Submissions. In these Reply Submissions BCTC will address some of the arguments made by Intervenors on the issue of EMFs.

34. Underlying the submissions of various Intervenors[54] is the incorrect premise that individuals living along the ROW or attending school in Tsawwassen will be exposed to EMFs above "typical" levels.[55] Considered in the context of the EMF exposure standards and guidelines established by ICNIRP (a residential

[53] See paras. 114 to 123 of BCTC's Final Submissions.

[54] TRAHVOL, at paras. 39, 40 and 44-46; SDSS PAC, paras. 30, 42, 46; Mr. Holmsen, page 29-30.

[55] TRAHVOL and IRAHVOL suggest the levels will be well over 15 mG on a daily basis, and SDSSPAC asserts that the range is 30-70 mG. These assertions are not supported by the evidence. For example, table 3 in Exhibit B1-101 shows that typical EMF levels for Option 2 at the east edge of the ROW would range between 9.9 and 10.9 mG and at the west edge from 3.2 to 3.3 mG. Evidence of Mr. Wong, TR 28, page 5274, lines 4 to 22; page 5276 line 21 – page 5277 line 23; page 5307 line 26

exposure limit of 833 mG and an occupational limit of 4200 mG),[56] which have been previously accepted by the Commission as an appropriate benchmark to follow,[57] and which have also been adopted by the majority of jurisdictions,[58] the people living and attending school along the ROW are presently exposed to EMF levels well within the acceptable range, and this will remain the case after the Project is completed.[59] The International Committee on Electromagnetic Safety (ICES) recommends that exposures be limited to 9040 mG.[60] Dr. Erdreich notes that, "The ICNIRP and ICES limits are conservative; they are set well below the value at which an adverse effect was observed because they incorporate *safety factors* to account for potential sources of uncertainty."[61]

35. TRAHVOL,[62] SDSSPAC,[63] and Delta,[64] have suggested that the ICNIRP guidelines are of no application to VITR because the guidelines were established with reference to short-term, acute exposure. To the contrary, the effects of long-term exposure to extremely low frequency EMFs were taken into account by ICNIRP in establishing the guidelines. As Dr. Erdreich explained in her Report, the ICNIRP guidelines reflect all of the evidence, including studies of the effects of long-term, low-level exposures on cancer and other diseases.[65] The guidelines are based on short-term effects because, despite a considerable body

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– page 5308 line 13; page 5313 line 11 – page 5314 line 3. Evidence of Dr. Erdreich, TR 28, page 5276 line 21 – page 5277 line 23.

[56] Exhibit B1-37, Erdreich Report, p.27.

[57] Exhibit A2-3, Decision re WKP Routing of Line No. 49 in the Vicinity of Penticton, B.C, January 14, 1998, Appendix B.

[58] Exhibit C3-19A, Wu, "Regulating Power Line EMF Exposure: International Precedents", page 4.

[59] Ex. B1-11, TRAHVOL IR 1.159.2 shows the typical plan of the ROW with the centre line of the ductbank being 21.67 m from the nearest edge of the right of way. Given this distance and the information in Exhibit B1-101, the exposure levels at the nearest edge of the right of way would typically be less than 4mG whether day or night, weekday or weekend, and whether Spring, Summer or Fall. Peak levels are under 6 mG as shown in Ex. B1-1, BCUC IR 1.104.1. On the side of the ROW where the 138 kV circuit remains, typical levels are approximately 11 mG and peak levels 22 mG.

[60] Exhibit B1-37, Erdreich Report, p.27.

[61] Exhibit B1-37, Erdreich Report, p.27.

[62] At para. 64.

[63] At para. 34.

[64] At para. 70.

[65] Exhibit B1-37, page 27.

of scientific research on EMFs, there is no convincing evidence that long-term exposures produce adverse effects regardless of their level of exposure.[66]

36. TRAHVOL cites the evidence of Dr. Havas that international organizations charged with establishing guidelines were not keeping up with the science.[67] This conclusion is not supported on the evidence. The last ICNIRP review took place in 2003[68] the FPTRPC undertook an update in 2005,[69] and other national organizations also continually update their reviews and findings.[70]

37. SDSSPAC[71] and TRAHVOL[72] refer to and seek leave to rely on an email from a Dr. Zeigelberger suggesting that ICNIRP's EMF guidelines "will be revisited". Assuming the authenticity of the email, this email is consistent with Dr. Erdreich's statement in her Report that, "ICNIRP continuously and systematically monitors the literature related to EMF and publishes independent reviews on the potential adverse health effects and guidelines related to EMF exposure limits,"[73] as they most recently did in 2003.[74] Dr. Zeigelberger's email does not suggest anything other than ICNIRP is continuing to stay abreast of current research. Any suggestion that ICNIRP's intention is to revise the guidelines *downward* (let alone revising them to the extent that the anticipated EMF levels associated with VITR would exceed the revised guidelines) is without basis in the evidence and is pure speculation.

38. Dr. Erdreich reviewed and evaluated the EMF research conducted since the recent ICNIRP reviews were completed in 2003 (SDSSPAC incorrectly implies

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[66] Exhibit B1-49, Response to Karow 1.4.0; Evidence of Dr. Erdreich, TR 28, page 5390 lines 7 to 23. Exhibit B1-37, Erdriech Report, p. 48, definition of "case-control study"; Evidence of Dr. Erdreich, TR 28, page 5302, line 2 – page 5303 line 4.

[67] TRAHVOL para. 67.

[68] Exhibit B1-37, page 21.

[69] Exhibit B1-37, page 22.

[70] Ex. B1-37, page 24-25.

[71] SDSSPAC, para. 36.

[72] TRAHVOL, para. 68.

[73] Exhibit B1-37, page 21.

[74] Exhibit B1-37, page 21.

that the guidelines have not been reviewed since they were established nine years ago).[75] Her conclusion was that the weight of evidence continues to support the absence of a causal link between EMFs and adverse health effects.[76] Dr. Havas has not reviewed recent research ("It wasn't what I was asked to do and it wasn't what I agreed to do.") and is therefore not in a position to opine on how those studies may affect the scientific consensus.[77]

39. Despite the fact that the EMF levels associated with VITR are well below the ICNIRP guidelines, TRAHVOL states, "There is no scientific consensus that there is not a cause and effect relationship between magnetic field exposure and childhood leukemia."[78] Delta similarly states: "…no one can provide an assurance that there is nothing to worry about."[79] As both TRAHVOL and Delta understand, the scientific approach is concerned with the weight of the evidence; scientists can never say with 100% certainty that an exposure is not the cause of a disease.[80] However, Dr. Erdreich's evidence was that scientific panels have concluded on the basis of a considerable body of quality studies extending back over thirty years[81] that the possibility that exposure to EMF causes adverse health risks is small, or that the body of evidence does not support the conclusion that the exposure causes adverse health risks.[82] For instance, ICNIRP concluded that there is no chronic disease outcome for which an aetiological relation to EMF is established.[83] FPTRPC came to the same conclusion,[84] as did

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[75] SDSSPAC, para. 36.

[76] Exhibit B1-37, Erdreich Report, page 45.

[77] Evidence of Dr. Havas, TR 27, page 5035, line 14 – page 5037, line 25.

[78] TRAHVOL, para. 43.

[79] Delta, para. 66.

[80] Exhibit B1-37, Erdreich Report, page 46; Evidence of Dr. Erdreich, TR 27, page 5134 lines 3-8.

[81] Dr. Nam argues that the scientific research timeline regarding EMFs was similar to that of cigarette smoking. There is no evidence to support this argument. In cross-examination, Dr. Havas conceded that she was unfamiliar with smoking research and was only able to offer her "feeling" as a "citizen", not as an expert. Evidence of Dr. Havas, TR 27, page 5068 line 19 to page 5070 line 23.

[82] Exhibit B1-37, Erdreich Report, page 46.

[83] Exhibit B1-37, Erdreich Report, page 21.

[84] Exhibit B1-37, Erdreich Report, page 22.

HCN,[85] and NRPB.[86] Based on their classification criteria, IARC[87] and NIEHS[88] went so far as to note "limited" evidence with respect to childhood leukemia and exposures above 3-4mG (long-term average) due to the existence of some case-control epidemiologic studies that note an association (which, as discussed below, is not the same as causation); however, no agency has concluded that the potential risk is substantial, known, or even probable.

40. Dr. Havas' singular focus on epidemiological studies that suggested associations between EMFs and adverse health effects[89] (which are now cited repeatedly by TRAHVOL,[90] SDSSPAC,[91] and others, as evidence that EMF can *cause* adverse health effects), and her disregard for the broad spectrum of opinion represented in consensus-based scientific organizations is misleading. Dr. Erdreich explained in her Report[92] and evidence[93] that, absent other information, scientists do not view statistical associations in case-control epidemiologic studies as evidence of causation; factors such as selection bias and confounding can produce such results. In part for this reason, the consensus-based scientific organizations such as ICNIRP have assessed health risks using a combination of epidemiologic research, animal research, and research on cells.[94]

41. Dr. Havas' opinion was inconsistent with the weight of scientific opinion and was rejected by the NEB in SE2.[95] SDSSPAC,[96] TRAHVOL[97] and IRAHVOL[98],

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[85] Exhibit B1-37, Erdreich Report, page. 25.

[86] Exhibit B1-37, Erdreich Report, page. 26.

[87] Exhibit B1-37, Erdreich Report, page. 20.

[88] Exhibit B1-37, Erdreich Report, page. 24.

[89] For instance, TR 27, page 5106 line 19 – page 5108, line 20.

[90] At para. 43.

[91] At para. 30.

[92] Exhibit B1-37, Erdreich Report, pages 8, 11, 33, 34, 45 and 46. Dr. Erdreich criticized Dr. Havas at pages 8, 12, 13 and 35 for drawing a conclusion of causation from epidemiological studies alone.

[93] Evidence of Dr. Erdreich, TR 28, page 5238, line 9 – page 5239 line 10; page 5391 lines 4-16.

[94] Exhibit B1-37, pages 6-7.

[95] Exhibit B1-103, SE2 Environmental Screening Report, page 21.

[96] SDSSPAC, para. 35.

and Delta[99] have sought to create the illusion of broader support for Dr. Havas' opinions by referring to an email, which suggested Dr. Ahlbom would try to avoid living in a house with young children where EMF levels were in the 10-20 mG range.[100] SDSSPAC has also referenced a single quotation from Dr. Gallagher's town hall presentation, in which he was referring to the conclusions of a particular study.[101] Delta suggests that Dr. Gallagher could have been "more categorical" in his discussion of the results of the study.[102] These Intervenors had every opportunity to file expert evidence from Dr. Gallagher and Dr. Ahlbom had they seriously believed that the evidence of these two gentlemen would differ materially from Dr. Erdreich's evidence. Notably, Dr. Gallagher opined in SE2 that if information bias was removed from consideration the "relative risk for childhood leukemia would drop".[103] The NEB concluded in the SE2 proceeding that the evidence does not establish a causal relationship between EMF exposure and significant health effects.[104] Dr. Gallagher was also retained by the Commission as an EMF expert in the Boundary Road proceedings, in which the Commission Panel ultimately determined that there was no evidence of a causal relationship between EMFs and adverse health effects.[105]

42. TRAHVOL cites anecdotal evidence of cancer and miscarriage among residents and pets along the ROW.[106] BCTC submits that this evidence is of no probative value, and the Commission should reject it. Cancer and miscarriage are unfortunate, but common occurrences in our population. Despite having

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[97] TRAHVOL, para. 62.

[98] IRAHVOL page 76.

[99] Delta, para. 66, 67.

[100] EMF levels at the homes will not be in the 10-20 mG range, but rather 11 mG or less. Evidence of Mr. Wong, TR 28, page 5274, lines 4-22; page 5276 line 21 – page 5277 line 23; page 5307 line 26 – page 5308 line 13; page 5313 line 11 – page 5314 line 3. TR 28, page 5276 line 21 – page 5277 line 23.

[101] SDSSPAC, para. 31.

[102] Delta, paras. 66-68.

[103] TR 28, page 5382 lines 4 to 18.

[104] BCTC Final Submission, p. 45.

[105] See BCTC's Final Submissions, paras. 116-117.

[106] TRAHVOL, para. 55 and 58.

every opportunity to do so, TRAHVOL placed absolutely no evidence before the Commission to demonstrate the normal frequency of occurrence of these diseases in the population generally, or that the number of cases of cancer or miscarriages in people or pets along the ROW over the (unspecified) time period, is even unusual. TRAHVOL has not provided any evidence on the types of cancer (even Dr. Havas does not suggest that EMFs are associated with all forms of cancer), and there is no comparison or control group that would allow scientific evaluation.

43. TRAHVOL is selective in its treatment of the scientific evidence. Dr. Erdreich noted that none of the most methodologically sound case-control studies to date reported a statistically significant association between leukemia and magnetic field exposure, aside from a small increase in the risk of acute lymphoblastic leukemia among children with an average magnetic field exposure of greater than 3 mG in the Linet study.[107] TRAHVOL refers to one study showing a 58 percent increase in breast cancer.[108] Dr. Erdreich indicated the lack of scientific validity in assuming that a single study indicates that there is a cause and effect link, and that the exposure increases the risk by that amount. This approach ignores scientific procedures for interpreting epidemiologic research, other relevant epidemiology and laboratory research, and the confidence intervals reported in the study.[109] TRAHVOL also cites[110] an eleven-year-old draft, unpublished report from the US Environmental Protection Agency (EPA).[111] While Dr. Havas testified that the EPA study had been suppressed,[112] the evidence does not support this conclusion.[113]

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[107] Exhibit B1-37, Erdreich Report, pages 31 and 32.

[108] TRAHVOL, para. 45.

[109] Evidence of Dr. Erdreich, TR 28, page 5336, line 10 – page 5340, line 4.

[110] TRAHVOL, para. 46.

[111] Exhibit B1-104.

[112] Evidence of Dr. Havas, TR 27, page 4995 lines 5 to 20.

[113] Evidence of Dr. Havas, TR 27, page 4996, line 12 to page 5001, line 18; evidence of Dr. Erdreich, TR 28, page 5319, line 20 to page 5320, line 11.

44. TRAHVOL, IRAHVOL and Delta relied heavily upon the California EMF Study. IRAHVOL, for instance, suggests that the Commission ought to discount the consistent conclusions and recommendations of scientific organizations based on consensus that the evidence does not support a causal link between EMFs and adverse health effects, on the basis that consensus-building requires findings to be based on the "lowest denominator." [114] IRAHVOL lauds the range of results from the small number of reviewers in the California EMF Study (three people) as being more "truthful". IRAHVOL's argument ignores, however, that scientific organizations operating on a consensus basis have clearly documented the basis for their conclusions.[115] The NIEHS report, for example, also clearly indicates the opinions of each of the reviewers' (which numbered about 26 on most issues) on each of the component issues regarding health.[116] Moreover, the opinions of the three California EMF Study reviewers regarding their certainty that exposure to EMF increased the risk of childhood leukemia, for example, covered a wide range, which for two of the three reviewers included 50 percent.

45. Dr. Erdreich testified that, whereas the consensus-based scientific organizations have assessed health risks using a combination of epidemiologic research, animal research, and research on cells,[117] the three California EMF Study reviewers failed to give appropriate consideration to the laboratory research considered by every other consensus review.[118] Although TRAHVOL notes that the study was referred to "a wide variety of experts", Dr. Erdreich testified that many reviewers had strong criticisms of the report, in particular the inappropriate use and analysis of laboratory data.[119] In light of this explanation, Delta's argument that Dr. Erdreich's treatment of the California EMF Study "casts some doubt on her impartiality" is not credible.[120]

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[114] IRAHVOL, page 76.
[115] Exhibit B1-37, pages 17 to 27.
[116] Ex. B1-37, Supplemental CD to Erdreich Report, NIEHS (1998), pages 395 and 396.
[117] Exhibit B1-37, Erdreich Report, pages 6 and 7.
[118] TR 27, page 5141 line 9 - page 5144 line 4; page 5149, line 23 – page 5151, line 1.
[119] Evidence of Erdreich, TR 27, page 5149, lines 16-20.
[120] Delta, para. 76.

46. The California Public Utilities Commission subsequently concluded that no direct causal link between exposure to EMF and human health effects has been demonstrated despite numerous studies "including a study ordered by this Commission and conducted by DHS."[121]

47. Ultimately, the essence of the position being asserted by the Intervenors is that the lack of 100 percent certainty warrants a decision not to use the ROW. This view is typified by Delta's argument that: (i) the issue for consideration by the Commission "should not so much be whether there is validity to the concerns that EMFs do or may adversely affect health, but on how to address the concerns and uncertainty that has been raised in this proceeding;"[122] and (ii) a proper application of the decision in *Hudson* to this Project would involve "shifting the burden of proof to the proponents of an activity."[123]

48. The submission that uncertainty alone justifies relocating the line is based on the fallacy that scientists are waiting for scientific certainty that will one day be revealed. BCTC submits that it is sufficient that the weight of scientific evidence developed over three decades does not support a link between EMFs and adverse effects on health, and that it would not be appropriate to place upon proponents the burden of proving something incapable of being proven through standard scientific methods.[124] Competent health authorities with jurisdiction have assessed the need for guidelines and standards and have made determinations based on those assessments. Those determinations are that there is no need to put in place standards limiting exposures to EMFs.[125]

49. Reliance on uncertainty as a reason not to approve VITR on the existing ROW would also amount to a *de facto* reduction in the ICNIRP guidelines. BCTC submits that the Commission ought to heed the warning of WHO that the ICNIRP

[121] Ex. C3-51, Order Instituting Rulemaking, at page 19.
[122] Delta, para. 65.
[123] Delta, para. 82.
[124] Exhibit B1-37, Erdreich Report, page 46.
[125] Ex. B1-37, page 22 and page 27, lines 8 to 16.

guidelines have been determined on the basis of science and are devalued by arbitrary exposure reductions in the name of precaution. As indicated in one of the passages Dr. Havas chose to leave out of her review of the WHO's draft guidelines:

> Guidelines setting quantitative limits on human exposures to environmental agents are normally introduced only on the basis of consistent, reproducible data, confirmed by different laboratories and clearly establishing the levels of exposure to physical, biological or chemical agents thought to be harmful to humans. In addition, exposure limits generally incorporate safety factors that allow for uncertainty in identified thresholds for established effects. Such approaches remain central to this Framework; guidelines should not be undermined by additional, arbitrary exposure reductions in the name of precaution, since this would devalue their scientific credibility.
>
> For the example of EMF, exposure limits in international guidelines (ICNIRP) have been determined on the basis of known health effects, using scientific criteria established over many decades. [126]

50. As significantly, while also ignored by Dr. Havas in her report,[127] WHO concluded that reduced exposure limits at 4 mG are not justified:

> WHO believes exposure limits should be based on effects conventionally regarded as established and are not an appropriate mechanism for implementing precautionary approaches. Therefore WHO does not recommend including exposure limits based on the childhood leukaemia data as an option.
>
> …
>
> In view of these factors, and even after fully allowing for the legitimate desire of society to err on the safe side, it seems likely that only very low-cost measures will be justified,

[126] WHO, June 2005, "Framework Guiding Public Health Policy, Options and Areas of Scientific Uncertainty Dealing with EMF"; Exhibit B1-109, p. 15, Section 4.1; Cross-examination of Dr. Havas, TR 27, page 5110, line 15 – page 5118, line 8.

[127] TR 27, page 5110, line 15 – page 5118, line 8.

> specifically exposure limits set at 4 microtesla or similar levels seem unlikely to be justifiable.[128]

51. Dr. Erdreich indicated that she disagreed with the approach taken in Europe to the precautionary principle, where jurisdictions have taken steps that are unsupported by the science.[129]

52. The "precautionary principle" has been identified in scientific literature as the appropriate response where adverse health effects have not been demonstrated, but where risk is perceived.[130] It has been endorsed by the Commission in a recent decision,[131] and is applied by other jurisdictions including the California Public Utilities Commission's ("CPUC"). Delta's submission that the issue is not whether there is a scientific basis for the perceived health risk disregards the fact that a proper application of the precautionary principle requires science to be used as the basis for measuring the risk.[132]

53. The only difference between the way in which this Commission has applied the precautionary principle and the way the CPUC has is that the CPUC has an arbitrary 4 percent guideline to project costs for EMF mitigation.[133] BCTC submits that, contrary to the urging of TRAHVOL,[134] this Commission's current practice of basing expenditures dedicated to prudent avoidance on an assessment of each particular project continues to be appropriate.

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[128] WHO, June 2005, *supra,* page 24.

[129] TRAHVOL suggest that Dr. Erdreich was, at one time, not fond of the precautionary principle. This submission, apart from being a "red herring", not only mischaracterizes Dr. Erdreich's statement on Larry King Live, but also completely ignores Dr. Erdreich's evidence to the contrary: TR 28, page 5259 line 11 – page 5260 line 2.

[130] Exhibit B1-37, Erdreich Report, page 28.

[131] BCUC General Order C-3-03.

[132] Exhibit B1-37, Erdreich Report, page 28. Dr. Erdreich's evidence on the precautionary principle is uncontroverted. Dr. Havas indicated that she did not feel qualified to apply the precautionary principle: TR 27 page 5110, lines 2 to 5.

[133] Evidence of Mr. Gabel, TR 10, page 1501 lines 2 to 20. TRAHVOL suggests at paragraph 50 that Dr. Erdreich was incorrect in stating that the California EMF Study did not change handling of EMFs. Dr. Erdreich explained, however, that the policy of spending a small percentage, about 4%, for mitigation did not change: TR 28, page 5236, lines 1 to 17

[134] At para. 75.

V. SEISMIC ISSUES

54. Depending on the perspective and objectives of different Intervenors, BCTC was accused of either ignoring or overstating the seismic risks of the VITR Project. IRAHVOL describes VITR as a seismic nightmare.[135] While not expressing their views in exactly the same terms, Sea Breeze also suggests that VITR presents unnecessary vulnerability to seismic events.[136] In contrast, Delta suggests that BCTC's concerns are overstated and Mr. Holmsen suggests that these claims are exaggerated.[137]

55. The major seismic issues raised by IRAHVOL and Sea Breeze were the vulnerability of the lines between ARN and ING, the vulnerability of ARN itself, the simultaneous failure on the northern and southern corridors, and the vulnerability of BCTC's preferred offshore route. BCTC will address each of these issues below. BCTC will address the comments of Delta and Mr. Holmsen in its submissions on Tsawwassen route Options 4 and 5.

The Vulnerability of the Transmission Lines Between ARN and ING

56. Sea Breeze and IRAHVOL both rely on BCTC's response to Sea Breeze IR 2.22[138] and Exhibit B1-75 in support of their submissions regarding the vulnerability of the lines between ING and ARN.[139] Based on these materials, Sea Breeze questions whether it is reasonable to rely on these lines as part of BCTC's contingency plan for bypassing ARN[140] and IRAHVOL submits that a speculative cost of $15 million should be added to the VITR Project costs.[141]

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[135] IRAHVOL, page iv, Item 10.
[136] Sea Breeze, para. 240 to 302.
[137] Holmsen, page 1.
[138] Exhibit B1-44.
[139] Sea Breeze, para. 293-294; IRAHVOL, pages 20-24.
[140] Sea Breeze, para. 302.
[141] IRAHVOL, p. 24.

57. BCTC submits that Sea Breeze and IRAHVOL stated risks to the ING-ARN lines are speculative, overstated and completely ignore BCTC's system planning criteria.

58. BCTC responded to ING-ARN issue as a result of questions raised by Sea Breeze in its Information Requests.[142] BCTC's assessment had been that it was unnecessary to conduct a detailed review of this issue given the general experience relating to the seismic vulnerability of overhead structures and previous assessments that had taken place. This information included:

a) The historical performance of overhead transmission lines under earthquake conditions has been very good;[143]

b) Although the existing transmission poles have not been designed specifically to the National Building Code of Canada seismic requirements, heavy transmission line lateral loading from wind and ice for which they have been designed normally exceeds the seismic requirements;[144]

c) Spot checks on various transmission structures and poles have confirmed their ability to meet seismic criteria;[145] and

d) Structural damage does not imply failure. Even in those instances where towers or footings sustain damage during a seismic event, in most cases this did not effect the conductors and they remained in-service.[146]

59. While the ability to assess variations of the ING-ARN footings was restricted as a result of accessibility, the further assessment that was undertaken confirms

[142] Eg. Exhibit B1-44, Sea Breeze IR. 2.22.11.
[143] Ex. B1-6, BCUC 1.9.1; Ex. B1-44, Sea Breeze 2.22.11, attached report.
[144] Ex. B1-11, Sea Breeze 1.3.1.
[145] Ibid.
[146] Ex. B1-44, Sea Breeze 2.22.11, attached report, pages 9-13.

that these structures should be able to withstand the majority of seismic events.[147] Any suggestions beyond this are purely speculative and ignore the other evidence on the record. As indicated, even if some damage to these structures occurs, in most circumstances the circuit itself is likely to remain in service. Neither Sea Breeze nor IRAHVOL has chosen to file any evidence on this issue.

60. Finally, both Sea Breeze and IRAHVOL's submissions ignore BCTC's Planning Criteria. The NERC/WECC Planning Criteria recognize that a transmission system is not immune from outages, whether these are the result of natural, mechanical or non-natural events. As a result, the standards provide for this by ensuring that there is available firm capacity during a system event. As indicated below, beyond the low seismic vulnerability of the ING-ARN circuits themselves, it is highly unlikely that a seismic even would affect both the 500 kV circuits and the VITR circuit at the same time.

The Vulnerability of ARN

61. Sea Breeze and IRAHVOL are also critical of BCTC's plans to connect the VITR circuit to ARN and not to upgrade the ARN substation.[148]

62. BCTC set out its submission on the seismic strengthening of ARN in its Final Submission.[149]

63. BCTC does not agree with Sea Breeze and IRAHVOL's submissions that it was under an obligation to present a detailed contingency plan and that it was necessary for that plan to address all of the apocalyptic scenarios suggested in their submissions.[150] BCTC has provided an overview of a plan that it and its consulting engineers believe is feasible if the ARN substation is damaged in a

[147] Ex. B1-75.

[148] Sea Breeze, para. 280-291; IRAHVOL, pages 14-24.

[149] Appendix B, para. 3 to 6.

[150] Parenthetically, contrary to IRAHVOL's submissions, the Golden Report did consider the risk of tsunamis. (see Ex. B1-1, Appendix F, p. 50)

seismic event and if, in turn, this affects the VITR circuit.[151] In a major event which could cause multi-line or station damage, priorities will be established based on need.[152] BCTC has also outlined other measures that could be taken if the Commission believes further measures are warranted.[153]

64. Again, Sea Breeze and IRAHVOL's submissions ignore BCTC's Planning Criteria and the likely availability of the northern 500 kV circuits.

The Simultaneous Failure on the Northern and Southern Corridors

65. Both Sea Breeze and IRAHVOL raise the spectre of an event affecting the northern and southern circuits at the same time.[154] Sea Breeze admits that this risk is remote but submits that it should still be taken seriously.[155] Neither Sea Breeze nor IRAHVOL filed evidence on this topic.

66. The possibility of a multiple failure of the cable circuits to Vancouver Island has been considered and has been taken seriously. As indicated by both Sea Breeze and IRAHVOL, this issue was initially addressed by Dr. Morgenstern. On the basis of that review Dr. Morgenstern concluded that, "simultaneous seabed failure affecting cables in both southern and northern corridors is *extremely unlikely*." (emphasis added)[156]

67. Dr. Morgenstern did indicate that additional fieldwork would be warranted to determine if the lobe at East Texada Island constituted a serious hazard to the cables traversing it.[157] This fieldwork has now taken place and has confirmed the stability of the "East Texada lobe."[158] Contrary to IRAHVOL's submission,[159] in

[151] BCTC Final Submission, Appendix B, para. 4; Ex. B1-17, Sea Breeze 1.5.1, Ex. B1-6, BCUC 1.32.1, 1.85.1 and 1.63.2.
[152] TR 13, page 2201 lines 9 to 211.
[153] BCTC Final Submission, Appendix B, para. 5.
[154] Sea Breeze, para. 275-279; IRAHVOL, p. 13 and pages 25-27.
[155] Sea Breeze, para. 276.
[156] Exhibit B1-6, BCUC IR 1.60.2, p. 11.
[157] Ex. B1-6, BCUC IR 1.60.2, p. 12.
[158] TR 19, p. 3363, line 16 to page 3364, line 11; TR 21, p. 3830, line 22 to p. 3831, line 26.

agreeing with Dr. Morganstern's assessment Dr. Bornhold specifically referred to the "subsequent" work that has undertaken after the 1998 workshop.[160]

68. IRAHVOL attempts to extrapolate Dr. Bornhold's evidence on damage to southern Vancouver Island in the event of an earthquake affecting the VITR cable to the terrestrial portion of the northern corridor.[161] Sea Breeze also raises this issue.[162] There is no evidence supporting this extrapolation and, if either IRAHVOL or Sea Breeze had serious concerns about this issue, they had every opportunity to raise these.

The Vulnerability of BCTC's Preferred Offshore Route

69. Sea Breeze states that the VITR cables are seismically vulnerable and that BCTC failed to adequately analyze or assess the risk of submarine cable failure.

70. Contrary to this submission, BCTC carried out an extensive analysis and assessment of the geohazard risks of the VITR Project.[163] This assessment was led by Golder Associates and carried out by a highly qualified and experienced team of professionals.[164]

71. BCTC has acknowledged, and does acknowledge that the process that was undertaken was a subjective probability risk assessment. This was explained in detail in response to a number of IRs.[165] However, contrary to Sea Breeze's suggestions, establishing the "absolute risk" of failure for cables located within geological materials comprising a mixture of solids, liquids, and gases, which are subject to naturally occurring and complex geological processes, would be virtually impossible.

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[159] IRAHVOL, page 26.
[160] TR 21, p. 3831, lines 15 to 20.
[161] IRAHVOL, pages 26-27.
[162] Sea Breeze, para. 279.
[163] Ex. B1-1, Appendix F.
[164] Ex. B1-1, Appendix F, p. 58.
[165] Ex. B1-11, Sea Breeze 1.15.1; Ex. B1-47, Sea Breeze 2.68.2.

72. Again, contrary to Sea Breeze's submissions, while one of the goals of the Geohazard Risk Assessment was to compare the alternative routes being considered, the subjective risks were designed to approach the likely risk of cable failure.[166]

73. While the origins of the Roberts Bank Failure Complex have been hypothesized, they have not been proven with an acceptable level of certainty. It was therefore considered that the risk analysis consider all possible hypotheses that exist with regards to the Failure Complex and weigh them appropriately based on the knowledge and data that exist at the present time.[167]

74. Adequate data and field work were carried out:

a) slope stability analysis was carried out based on data from the Deltaport area and field work was carried out off English Bluff to verify this analysis;[168]

b) the drilling and CPT programs were further complemented by extensive sub-bottom profiling using airgun technology;[169]

c) inclusion of the tidal flat where the drilling and CPT were carried out enabled calibration and the results inferred that the materials in the slope were substantially similar to those near Deltaport and the tidal flat;[170] and

d) the resulting analysis indicated that the strains induced on the VITR cable would be low.

75. The bore hole and CPT tests were not terminated too shallow. The information necessary for slope stability evaluations was compiled based on non-

[166] TR 21, page 3818, line 2 to page 3819, line 11.
[167] Ex. B1-11 Delta 1.6.0; TR 20, page 3542, line 5211.
[168] Ex. B1-1, Appendix F, pages 20 to 23, 32 to 36, and Appendices II and III.
[169] Ex. B1-1, Appendix F, page 21.
[170] TR 21, page 3772, line 9 to page 3773, line 6 and page 3869, lines 8 to 25.

intrusive geophysical profiling that was carried out over a large area of the seabed supplemented with intrusive borehole testing at a limited number of locations. The two data sets were correlated to establish consistency and engineering properties necessary for slope stability assessments.[171]

76. While the event tree analysis is subjective, a significant portion of the probability is based on non-subjective probability. The seismic performance of the VITR cable at Roberts Bank was analyzed based on slope failure due to earthquake ground motions resulting from 1:475 year and 1:2475 year return periods using soil information and a geological model developed for the specific area and the results show that the cable has a sufficient margin of safety.[172]

77. The Corporation of Delta's expert, Mr. Laprade, did not disagree with the assessment of Option A in the Golder Report.[173]

78. A number of parties addressed the issue of property values in their submissions.[174] A number of these submissions were critical of Mr. Dybvig's work.

79. This section provides a general response to the submissions on property value effects. In some cases, further submissions regarding the impact on property values of different options are presented separately in the discussion of those options.

VI. TSAWWASSEN AREA OPTIONS

Option 1

80. Various issues were raised in Intervenor's Arguments regarding Option 1. BCTC has attempted to consolidate these, and respond to them where necessary, below.

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[171] Ex. B1-1, Appendix F, pages 20 to 23.
[172] TR 21, page 3816, line 11 to page 3817, line 1; Ex. B1-1, Appendix F.
[173] Ex. C5-6, Evidence of Mr. Laprade, A5.

a) **BCTC's Representations**

81. TRAHVOL[175], Delta, SDSSPAC and Mr. Campbell have variously contended that BCTC has either:

i) changed its position;

ii) reneged on its commitment not to recommend Option 1 through Tsawwassen; or

iii) dealt with stakeholders in bad faith.

82. BCTC submits that the evidence does not support these characterizations of BCTC's actions.

83. BCTC's commitment was "to not recommend overhead construction through Segment 2 in Tsawwassen."[176] BCTC met this commitment by filing its VITR Application on July 7, 2005 seeking approval for underground construction on Segment 2.[177] BCTC has been consistent in recommending underground construction through Segment 2.[178]

84. TRAHVOL and SDSSPAC claim that they have not been able to cross-examine BCTC's witnesses over BCTC's alleged "change of position". However, BCTC stated in its Application that reversion to the use of overhead rights was a possibility due to the risk of cost escalation and schedule delay in obtaining underground rights in Tsawwassen.[179] In addition, BCTC has responded to Information Requests that make clear that, while Option 2 is BCTC's preferred option, there could come a point at which Option 2 would not be in the public

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[174] Campbell, para. 11-12.

[175] TRAHVOL, para.115(a).

[176] Exhibit B1-1, Appendix S-2, March 17, 2005 letter to Ms. Roddick and Mayor Jackson; B1-6, BCUC IR 1.87.0; Tr. 1795, l. 6-17

[177] Exhibit B1-1, p. 5.

[178] BCTC Final Argument, para. 3 and 197.

[179] Ex. B1-1, page 109, lines 13 to 19.

interest and at which the second best alternative would become preferred.[180] This issue is addressed further below.

85. Delta expressed surprise at Ms. Peverett's evidence that BCTC had not taken the overhead alternative through Tsawwassen off the table. There is no reason for such surprise. BCTC has consistently presented the options considered and measured them against the baseline option of overhead construction on the existing right of way.[181] While recommending underground construction, BCTC has always clearly stated that BCTC will still have to meet the public interest test of the Commission, which includes comparison against alternatives including the overhead construction alternative.[182]

86. TRAHVOL's submission that BCTC did nothing to correct the impressions left by the media that the use of the existing right of way was out of the picture is contradicted by the evidence of both Ms. Peverett and Mr. Barrett. [183] That BCTC was clarifying with the media that its commitment did not preclude underground construction is evident from the media articles submitted by TRAHVOL.[184]

b) **EMF Levels**

87. BCTC's general response on EMF issues is set out above. There is no support for TRAHVOL's statement that "EMF levels will increase over a wider area of the backyards, school grounds, public parks, and, perhaps most importantly, in the homes along the right of way."[185] Based on Exhibit B1-6, BCUC 1.104.1 and 1.104.2, there is no indication that overall EMF levels will be

[180] Exhibit B1-11, K. Holmsen 1.31.6 and TRAHVOL IR 1.92.4 and 1.92.5.

[181] Exhibit B1-57, attachment 4, p. 13 (Options presented at May 31, 2005, Tsawwassen Community Meeting), Exhibit B1-1, page 102, table 4-2, and page 103, Table 4-3, (Options presented in the Application)

[182] Tr. 11, pp.1807-1808; Exhibit B1-57, Attachment 4, transcript of Tsawwassen Community Meeting, p.p. 31-35; Exhibit B1-11, Karsten Holmsen IR 1.31.6, and TRAHVOL IR 1.92.5.

[183] Tr. 11, pp. 1800 and 1807-1808;Tr. 15, pp. 2505-2506; Tr. 16, pp. 2775-2776

[184] Exhibit C3-19B, Maureen Broadfoot Affidavit No. 3, page 45, Delta Optimist article dated March 19. Mr. Barrett says "BCTC is now considering seven other proposed routes, including the possibility of undergrounding the lines."

[185] TRAHVOL, para. 115 (b).

significantly different under Option 1 than with the existing 138 kV lines in place, and the effect of EMF levels in people's homes under Option 1 will be less than at present.[186]

c) **Property Values**

88. TRAHVOL and Delta attempt to challenge Mr. Dybvig's evidence on the basis he did not separately consider the impacts of EMFs.[187] However, as indicated by Mr. Dybvig, market values assimilate all negative and positive attributes.[188] Accordingly, to the extent that the issue of EMFs may affect the value of properties, these were taken into account.[189] Dr. Gregory gave evidence that the "stigma" associated with EMFs has existed since at least the late 1980's.[190] Many of the articles that Mr. Dybvig reviewed were written after this time and the majority of the property sales that Mr. Dybvig analyzed took place after this time.[191]

89. Delta suggests that Mr. Dybvig's report was inconclusive on Option 1.[192] This misinterprets Mr. Dybvig's statistical analysis of the North Delta and Nanaimo samples. The average effect of a project that converts from the old-style wood pole structure to a design with fewer but taller poles is a modest increase in property values.[193] Mr. Dybvig did indicate that the transactions that make up this average could involve properties that experience a modest decline in values and other properties that experience an increase in value materially greater than the average increase.[194] The more specific effects on difference properties,

[186] Ex. B1-6, BCUC 1.104.1 and 1.104.2.
[187] TRAHVOL, 115(c); Delta, para. 107.
[188] TR 24, page 4548, line 19 to page 4549, line 4.
[189] TR 25, page 4705, lines 2 to 15. TR 24, page 4548, line 19 to page 4549, line 4.
[190] Ex. C5-8, BCUC 1.3.3; TR 22, page 4139, lines 3 to 9.
[191] Grover Elliot Report, pages 30, 36 and 37.
[192] Delta, para. 34.
[193] Grover Elliot Report, p. 34, line 961 to 970.
[194] Grover Elliot Report, p. 34, line 970 to p. 34, line 972.

including those that can now "see" the poles, is discussed further at page 46 of Mr. Dybvig's Report.[195]

90. Delta submits that the evidence of Dr. Gregory showed a clear basis for concluding that, regardless of whether Option 1 or 2 is chosen, the VITR would have a negative effect on the value of property in Tsawwassen.[196] BCTC submits that this attempts to push Dr. Gregory's evidence too far. In fact, Dr. Gregory did not conduct a study to assess the impact of the Project on property values,[197] and could not say what the impact of the Project would be.[198] Further, in attempting to extrapolate Dr. Gregory's testimony, Delta ignores that EMF levels will not be dramatically different before and after the Project.[199] It also ignores the evidence that people who are concerned about EMFs do not make up the market for homes along a right of way.[200]

91. Delta then suggests that the negative property value effect may be in the order of $10 million.[201] There is no evidence whatsoever supporting this value. Delta was certainly in the position to seek evidence supporting this if it had been able to do so and, in fact, had authority from Delta Council to retain a professional appraiser.[202]

92. TRAHVOL suggests that the 2006 Notices of Assessment confirm that the CPCN Application, and the attendant publicity and stigma it has generated, has had a significant negative effect of property values.[203]

93. The 2006 Notices of Assessment do not confirm that the VITR Application has had a significant negative effect on property values:

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[195] Lines 1172 to 1185.
[196] Delta, para. 101.
[197] TR 22, page 4130, line 25 to page 4131, line 9.
[198] Ex. C5-10, BCTC 1.19.6.
[199] Ex. B1-101.
[200] Grover Elliot Report, page 9 lines 276 to 284.
[201] Delta, para 117.
[202] Ex. B1-82, Minutes of the Regular Meeting of Delta Municipal Council held August 29, 2005, Tab 34.
[203] TRAHVOL, para. 115 (c).

i) Ms. Newman indicated that the BC Assessment Authority had not looked at values on the right of way for a number of years;[204]

ii) The property tax assessments in British Columbia are done on a mass appraisal basis and have a number of weaknesses that makes them a less precise estimate than a full appraisal;[205]

iii) The property tax assessments in British Columbia are materially below market value and do not accurately reflect the market value of the homes on the Tsawwassen ROW;[206]

iv) The market data does not reflect a decrease in the value of the properties along the ROW.[207] Properties along the ROW in Tsawwassen have sold for well above the assessed value since the time BCTC filed its CPCN Application and in the midst of all the publicity;[208]

v) If there are any short-term effects on property values associated with the Project going through the approval process, these effects are transitory;[209] and

vi) If there are any short-term effects on property values, TRAHVOL and the other Tsawwassen intervenors do not acknowledge the role they may have played in any short-term effects.

94. Mr Campbell was critical of Mr. Dybvig for not being prepared to rely on an excerpt of an article.[210] As Mr. Dybvig explained, he did not rely on the excerpt because he attempted to locate the article in question and was unable to (as was

[204] TR 23, page 4421, lines 21 to 26 and page 4423, lines 18 to 24.
[205] Ex. B1-37, Report of Mr. Dybvig, page 50; TR 23, page 4430, lines 6 to 17.
[206] TR 24, page 4574, line 16 to page 4575, line 3. TR 24, page 4656, line 10 to page 4658, line 1.
[207] TR 25, page 4709, lines 4 to 8.
[208] TR 23, page 4428, line 3 to page 4432, line 7.
[209] TR 24, page 4651, line 25 to page 4652, line 9 and TR 25, page 4709, lines 16 to 20.
[210] Campbell, para. 12.

Mr. Campbell). In Mr. Dybvig's experience it can be misleading to rely on an excerpt from a study.[211] Mr. Dybvig did rely on the Kroll and Priestly article. Mr Dybvig also conducted his own analysis. This analysis did not support that apparent result of the study referred to by Mr. Campbell.

d) **Construction Impacts**

95. There is no evidence to support TRAHVOL's assertion that Option 1 will have greater impacts during construction than Option 3.[212] The evidence is to the contrary.[213] The new single pole in those backyards with existing poles would be installed in sections. The existing wood structures will be disassembled and removed.[214]

e) **Ongoing Maintenance Issues**

96. TRAHVOL[215] submits that Option 1 presents the greatest difficulty with ongoing maintenance and vegetation management and that is would entail significant restrictions on the vegetation that can be grown in backyards.[216]

97. BCTC has acknowledged that there are ongoing challenges associated with maintaining overhead lines on the Tsawwassen ROW and that this was one of the factors that caused it to recommend Option 2.[217] There would be fewer restrictions on vegetation on the ROW under Option 1 than there are at present.[218]

f) **Safety Concerns**

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[211] TR 24, page 4552, lines 9 to 14.
[212] TRAHVOL, para. 115(d).
[213] TR. 9, page 1233, line 14 to page 1234, line 2; Ex. B1-11, BCUC 2.127.1 and TRAHVOL 1.152.24; TR 15, page 2475, line 17 to page 2480 line 24.
[214] TR 15, page 2475, line 17 to page 2480 line 24.
[215] TRAHVOL, para. 115 (e).
[216] TRAHVOL, para. 115(e).
[217] Ex. B1-1, page 104, lines 6 to 20; Ex. B1-6, BCUC 1.99.3.
[218] Ex. B1-17, BCUC 1.127.3.

98. TRAHVOL expresses concerns with the safety of Option 1.[219] The SDSSPAC also express concerns with the safety of Option 1 and submit that Option 1 would endanger the health of the students at South Delta Secondary School.[220] The SDSSPAC go on to suggest that during a significant seismic event students may be barred from exiting from over seven emergency exits.[221] The SDSSPAC rely, *inter alia*, on a statement from Dr. Atukorala in support of this[222] and a number of other submissions that are not placed in evidence.[223]

99. Dr. Atukorala clearly indicated that electrical safety is not his area of expertise.[224] When asked what he would to if the transmission poles were compromised such that they were within 10 m of a school exit he offered his personal view that he would advise students not to take the exit routes in question.[225] However, Dr. Atukorala also suggested that this was something that needed to be addressed to another panel and that he could not say which direction the poles would fall, or whether they would fall.[226]

100. BCTC submits that the evidence does not support TRAHVOL and the SDSSPAC's concern regarding the seismic integrity of Option 1. The evidence indicates that:

i) The southern portion of Tsawwassen, where the SDSS is located, is not particularly vulnerable to seismic events;[227]

ii) Overhead transmission lines are not particularly vulnerable to seismic events;[228]

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[219] TRAHVOL, para. 115 (f).
[220] SDSSPAC, p. 3, para. 1.
[221] SDSSPAC, para. 14.
[222] SDSSPAC, para. 24.
[223] See in particular SDSSPAC, para. 27 and 28.
[224] TR 20, p. 3581, line 15 to p. 3581, line 4.
[225] TR 20, p. 3580, line 15 to p. 3581, line 6.
[226] TR 20, p. 3581, line 25 to p. 3582, line 5.
[227] Ex. B1-11, TRAHVOL 1.71.1.
[228] Ex. B1-1, page 44, lines 1 to 3.

iii) The transmission lines will be designed to withstand ice and wind loading, which generally exceeds seismic forces;[229] and

iv) The lines can be designed, if they were to fail, such that the upper portion remains suspended.[230]

g) **Seismic and Geophysical**

101. Mr. Holmsen raised the slope stability of English Bluff and the existing cable tunnel.[231] This issue was fully dealt with in BCTC's IR responses.[232]

h) **Right to Construct Option 1**

102. Mr. Holmsen suggests that BCTC may not have the legal right to install 230 kV overhead lines under the existing ROW agreements.[233] Mr. Holmsen did not raise this issue during the IR process or during cross-examination. This issue is fully dealt with in the British Columbia Court of Appeal's decision in *Hillside Farms Ltd. v. British Columbia Hydro & Power Authority*.[234]

Option 2

103. Various issues were raised in Intervenors' Arguments regarding Option 2. To the extent that these have not been addressed under Option, and if necessary, these are responded to below.

a) **EMFs**

104. As indicated, BCTC's general response on EMFs is set out above. TRAHVOL submits that, under Option 2, "EMF levels will be increasing in various

[229] BCTC Final Argument, para. 132.
[230] BCTC Final Argument, para. 133.
[231] Holmsen, page 35.
[232] Ex. B1-11, TRAHVOL 1.36.5 and 1.36.7; Ex. B1-17, K. Holmsen 1.42.5; Ex. B1-47, Sea Breeze 2.65.2; Ex. B1-56, Sea Breeze 2.65.1.
[233] Holmsen, page 35.
[234] [1997] 3 W.W.R. 749; [1997] B.C.J. No. 101 (QL).

parts of their community, including certain areas of their backyards, three local parks, a baseball field, a football field, and the local bike park."[235]

105. As indicated in BCTC's Final Submission, the EMF levels associated with Option 2 are set out in Exhibit B1-101. These levels would increase immediately above the proposed circuit and, while they fall off rapidly, would remain higher than existing levels for approximately 10 metres on either side of the underground circuit. Beyond this area, EMFs would continue to fall off rapidly and would be lower than existing levels.[236] BCTC has taken steps to minimize these levels and all levels would be well below established guidelines.[237]

b) **Impacts of Construction**[238]

106. TRAHVOL submits that it is not clear that BCTC has properly studied the attendant risks with this "unprecedented construction project."[239] If TRAHVOL had wanted to explore whether BCTC has properly studied aspects of Option 2 they could have done so. BCTC submits that it is too late to suggest that there are risks associated with Option 2 that were not raised in the IR process or properly put to BCTC's witnesses under cross-examination.

107. TRAHVOL further addressed the impacts of construction of Option 2 at paragraphs 89 to 99 of its submission. BCTC believes that residents' perception of the impacts of construction of Option 2 may be greater than the actual impacts given that most improvements will be able to be replaced[240] and that BCTC has indicated that it will do its best to avoid impacts.[241] However, BCTC appreciates that this is a personal issue.

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[235] TRAHVOL, para. 57.

[236] Ex. B1-101.

[237] Ex, B1-1, p. 85 line 18 to page 87, line 20; Ex. B1-6, BCUC 1.12.1 and 1.12.2; Ex. B1-17, IRAHVOL 1.52.1.

[238] TRAHVOL, para. 86-100.

[239] TRAHVOL, para. 87.

[240] TR 19, page 3486, lines 3 to 17; Ex. B1-11, K. Holmsen 1.38.4 and TRAHVOL 1.32.2; Ex. B1-17, K. Holmsen 1.31.8 and TRAHVOL 1.30.7.

[241] Ex. B1-11, K. Holmsen 1.38.1.

c) **Restrictions on the Use of Private Property**

108. TRAHVOL raises concerns with the restrictions on the use of private property under Option 2.[242] There will be fewer restrictions on the use of the ROW under Option 2 than there are with the existing facilities in place.[243]

d) **The Cost of Option 2**

109. TRAHVOL[244] and Delta[245] submit that BCTC has underestimated ROW acquisition costs for Option 2, including any expropriation costs. BCTC has always acknowledged that there could be additional costs if it was forced to expropriate underground rights.[246] BCTC has also indicated that it would not pursue Option 2 at any cost.[247]

110. TRAHVOL also argues that BCTC has underestimated the restoration costs associated with Option 2.[248] BCTC submits that there is no basis for TRAHVOL's reliance on Ms. Clark's estimate. Ms. Clark did not review all of the properties on the ROW,[249] she did not provide an estimate for the restoration costs on the ROW as a whole (although TRAHVOL now suggests a number for this),[250] she would not provide a breakdown that would allow a better understanding of how she arrived at her numbers,[251] she included contingency and GST which are captured in other places in the project estimate,[252] and she has no experience in large-scale ROW restoration projects.[253] On the basis of the above, BCTC submits that there is no basis for preferring Ms. Clark's

[242] TRAHVOL, para. 101 to 104.
[243] BCTC Final Argument, page 51, paragraph 141.
[244] TRAHVOL, para. 105-106.
[245] Delta, paras. 93 to 97.
[246] Ex. B1-6, BCUC 1.108.2.
[247] Ex. B1-6, BCUC 1.3.10; B1-11, TRAHVOL 1.92.4.
[248] TRAHVOL, para. 108 to 113.
[249] Ex, C3-19, Report of Ms. Clark, page 1.
[250] TR 18, page 3167, lines 1 to 11 TRAHVOL Final Argument, page 34.
[251] Ex. C3-24, BCTC 1.2.15.
[252] TR 17, page 2886, lines 9 to 18;TR 18, page 3184, line 18 to page 3185, line 4.

estimate over ENVIROW's estimate or for TRAHVOL'S speculation regarding ROW restoration costs.

The Order Sought Regarding Option 2

111. Various parties made submissions on the Order sought by BCTC at paragraph 3 of BCTC's Final Submission.

112. TRAHVOL opposes the Order sought and argues that it is, in substance, a recommendation for Option 1. Based on this characterization, TRAHVOL then submits that BCTC has not acted in good faith, and that its proposal constitutes an abuse of the Commission's process that runs afoul of the rules of procedural fairness and the doctrine of legitimate expectations. On this basis TRAHVOL submits that the Commission must reject both Options 1 and 2 and that BCTC should be directed to fully indemnify TRAHVOL for all costs incurred in connection with its participation in the proceeding.[254]

113. This characterization of the Order sought was also put forward by other parties.

114. BCTC submits that its request is clear. BCTC is requesting approval for Option 2 underground construction on Segment 2 through Tsawwassen.[255] BCTC acknowledges that this request is conditional upon obtaining a threshold level of underground rights, however that does not negate the fact that BCTC has sought approval for underground construction consistent with its commitment.[256] BCTC considered the need for such conditions because it recognized that it was alone in recommending Option 2, with the ratepayer intervenors apparently favouring Option 1 and in the absence of any expressed preference from the affected landowners.

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[253] Ex. C3-24, BCTC 1.2.1.
[254] TRAHVOL, para. 4, para. 8-22.
[255] BCTC Final Argument, paragraph 3, item b).
[256] Exhibit B1-1, Appendix S-1, March 17, 2005 letter to Ms. Roddick and Mayor Jackson

115. In support of its procedural argument, TRAHVOL complains that its cross-examination of Ms. Peverett was limited to a set time and that further cross-examination of Ms. Peverett is now both necessary and appropriate.[257] In considering this request, BCTC respectfully submits that the Commission should keep in mind:

a) TRAHVOL was advised, prior to the cross-examination of Ms. Peverett, that parties would have a set amount of time to cross-examine;[258]

b) At no time, prior to the cross-examination of Ms. Peverett, did TRAHVOL seek to have the Commission reconsider this decision;

c) TRAHVOL only complained about the time allotted at the end of its cross-examination, and after if had been afforded further time by the Chair;[259] and

d) TRAHVOL had full, unlimited opportunity to cross-examine other BCTC witnesses including BCTC's policy witness, Mr. Gabel, and the VITR Program Mr. Barrett.

116. TRAHVOL also argues that in the absence of providing an opportunity for further cross-examination it would be a significant breach of the rules of natural justice for the Commission to approve BCTC's "new proposal." TRAHVOL goes on to suggest that the Commission is precluded from entertaining the proposed Order, and BCTC is estopped from seeking it, on the basis of the doctrine of legitimate expectations.[260]

117. TRAHVOL does not cite any authority for its proposition that the rules of natural justice would be breached if BCTC's Order sought were adopted and

[257] TRAHVOL, para. 17.
[258] TR 12, page 1964, line 15 to page 1965, line 5.
[259] TR 16, page 2757, lines 3 to page 2758, line 26.
[260] TRAHVOL, para. 18.

BCTC submits that TRAHVOL's position is wholly without merit. TRAHVOL's position relies on a mischaracterization of the Order BCTC is seeking; it ignores that it has always been clear the Commission has the jurisdiction to approve Option 1;[261] TRAHVOL was directly advised by the Commission that the Commission would be considering Option 1;[262] and TRAHVOL had the full opportunity to cross-examine and lead evidence on the relative merits of Options 1 and 2 and did so.

118. BCTC submits that TRAHVOL's position regarding the doctrine of legitimate expectations is also without merit. Regardless of the characterization of BCTC's conduct, the doctrine of legitimate expectations only arises where a party is, or is in the position to bind, the decision-maker in question.[263] BCTC has no power to bind the Commission and its Application was framed in a manner that supports the Order sought.[264] In turn, the Commission has not done anything to suggest in any way that it could not consider Option 1 and, in fact, has indicated the contrary.[265] Moreover, when the Commission gave TRAHVOL an opportunity to make submissions as to whether the Commission was precluded from considering Option 1, TRAHVOL indicated that it would be not be taking a contrary position.[266]

119. Finally, TRAHVOL suggests BCTC is acting in bad faith and its proposal constitutes an abuse of the Commission's process.[267] BCTC is in no way attempting to use the negotiations to acquire underground rights as a tactic to retreat to Option 1. To the contrary, if the Commission grants the Order BCTC is seeking – or some modified version of it – BCTC will undertake good faith efforts to acquire the rights in question and hopes that it is able to achieve the level of

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[261] Ex. B1-1, page 109, line 19; Ex. B1-11, 1.92.5

[262] TR 8, page 996, lines 12 to 26.

[263] *Apotex Inc*. v. *Canada (Attorney General),* [2000] 4 F-C 264, para. 18*; Treaty Eight First Nations v. Canada (Attorney Genera)*, 2003 FCT 782, [2003] 4 C.N.L.R. 349, 236 F.T.R. 65, at para. 86 to 87.

[264] Ex. B1-1, page 6, lines 19 to 26.

[265] TR 8, page 996, lines 12 to 26.

[266] TR 8, page 998, lines 26 to page 999, line 5.

[267] TRAHVOL, para. 20.

support required. As indicated in BCTC's Final Submission, BCTC continues to believe that Option 2 is preferable in the long-term to Option 1.[268] However, in light of the position taken by TRAHVOL and the SDSSPAC in these proceedings, and the absence of other support for Option 2, if these efforts are not successful BCTC does not believe proceeding with Option 2 is prudent.

120. The SSDSPAC also suggest that BCTC has changes its position regarding Option 1.[269] The SDSSPAC go on to suggest that on the basis of certain answers given during the proceeding they "very reasonably assumed" that Option 1 would not be recommended.[270] The evidence does not support this suggestion. In fact, the SDSSPAC asked questions of each of BCTC's Panel 1 and Panel 3 on Option 1.[271] If the SDSSPAC did assume that the Commission could not approve Option 1, this assumption was unreasonable. BCTC indicated on more than one occasion that the Commission has the power, notwithstanding that BCTC was recommending Option 2, to approve Option 1.[272] As indicated, the Commission also expressly confirmed this in ruling on TRAHVOL's proposed additions to the hearing issues list.[273]

121. Bradley Campbell claims that BCTC is placing landowners in an inequitable bargaining position. Delta says BCTC is forcing landowners to choose between unacceptable options without knowledge of superior alternatives available. With respect, this hearing has been the examination of the spectrum of alternatives. If the Commission agrees with BCTC's conclusion that Options 1 and 2 through Tsawwassen are superior to the other options reviewed, then there are no superior options available. It is precisely because, until now, Tsawwassen residents have had the broad spectrum of alternatives before them that they have declined to express a preference between Options 1 and 2. They

[268] BCTC Final Argument, page 69, para. 197.
[269] SDSS, para.3.
[270] SDSS, para. 6.
[271] E,g, TR 9, page 1239, lines 23 to 25; TR 20, page 3564, lines 4 to 12.
[272] Ex. B1-11, K. Holmsen, 1.31.6 and TRAHVOL 1.92.5; TR 11, page 1810, lines 2 to 13.
[273] TR 8, page 996, lines 12 to 26.

have simply chosen not to accept BCTC's assessment that Options 1 and 2 are superior to the other options from a public interest perspective (as opposed to from the perspective of their private interest). BCTC submits, that if the Commission agrees that Options 1 and 2 are the best options from a public interest perspective, then it is entirely appropriate to give landowners one last opportunity to express a preference between them because at this point the choice will be clear between the only two options remaining. Either they will express a preference for underground construction though entering into agreements placed before them by BCTC, or they will decline with full knowledge that in that event the likelihood is that overhead construction will be used. Far from being an exercise in bad faith, giving the opportunity to express a preference now provides landowners with a fair process with a clear understanding of what the alternatives really are.

122. Mr. Holmsen also criticizes BCTC's proposal to exchange overhead for underground rights and concludes that it is difficult to accept that BCTC's proposal is sincere.[274] This view is echoed by Delta.[275] While Mr. Holmsen does not accurately describe the proposed "exchange", more significantly he ignores the fundamental nature of BCTC's proposal. As explained by Mr. Barrett, the proposal is for an exchange to take place that would allow the acquisition of underground rights so as to allow Option 2, rather than Option 1, to proceed,[276] not to attempt to equate value solely between the exchange of rights.[277] BCTC has no motivation to conduct these negotiations in bad faith, it has maintained its position that it believes Option 2 is the preferable solution in the face of significant opposition, it sincerely believes that Option 2 is the best long-term solution, it will be acting according to a Commission Order and, the more properties it is able to acquire through negotiations the less opposition and risk the project faces.

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[274] Holmsen, page 25.
[275] Delta, para. 28.
[276] TR 8, page 1158, lines 4 to 16 and page 1182 lines 8 to 15; TR 9, page 1367, lines 12 to 26.

123. Delta also expressed a view on the Order sought.[278] In doing so, Delta states that BCTC knew going into the hearing that there was no local support for Option 2.[279] This is not the case and is not supported by Delta's references. The evidence is that there was initial support for underground construction in Tsawwassen.[280] It was only after TRAHVOL and Delta resolved to oppose any option through Tsawwassen that there was little further discussion of Option 2.

124. Delta suggests that reaching an agreement with property owners was not ever a requirement of BCTC's original proposal.[281] It does not provide any references in support of this. To the contrary, BCTC indicated on numerous occasions that it would have to reach agreement with landowners to acquire underground rights for Option 2 to proceed and that, while it was prepared to resort to expropriation if necessary, if it was forced to do so this may affect the viability of Option 2.[282] Under the Order sought, BCTC may still need to resort to expropriation and is still prepared to do so. However, as indicated above, there may still be circumstances where this results in Option 2 ceasing to be a viable option.

125. In contrast, BC Hydro agreed in broad terms with BCTC's approach concerning Option 2. However, it disagreed with BCTC's suggested order regarding the mechanism to show a justifiable level of support for the extra expenditures with Option 2. BC Hydro submits, at paragraph 23 of its Argument, that the Order sought by BCTC be varied to provide that BCTC be permitted to proceed with Option 2 if it has provided the Commission with proof that it has

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[277] TR 16, page 2816, lines 5 to 14. E.g., TR 8, page 1158, lines 4 to 16 and page 1182 lines 8 to 15; TR 9, page 1367, lines 12 to 26.

[278] Note, Delta offer an abbreviated review of BCTC's proposal in its Argument. This does not accurately reflect BCTC's position or its proposal. Delta's submissions on this point are also inconsistent with its later statement, "BCTC initially sought approval for Option 2, but left open the possibility that the Commission might approve VITR in a modified form, which BCTC has now sought with the contingent approval of Option 1." (Delta, para. 48.)

[279] Delta, para. 22.

[280] TR 8, page 1156, lines 9 to 18; TR 15, page 2502, line 5 to page 2503, line 15.

[281] Delta, para. 27.

[282] Ex. B1-6, BCUC 1.3.9; Ex. B1-11, TRAHVOL 1.92.4; Ex. B1-17, Delta 1.19.0.

acquired, or will be able to acquire, sufficient rights of entry to allow it to complete construction of VITR by October 2008. If the Commission is not satisfied with this proof, BC Hydro submits that it should require BCTC to construct Option 1.

126. BCOAPO and JIESC take issue with BCTC's proposal that 51 percent of landowners entering into right of way agreements be made a condition of the approval to use underground construction on segment 2. BCOAPO offers a 100 percent threshold and JIESC a 75 percent threshold if the Commission accepts BCTC's proposal to use underground construction subject to obtaining sufficient necessary rights of way. BCTC understands that different parties might consider a different threshold appropriate. BCTC chose its 51 percent threshold because it considers the community interest to be more than simply the private landowners on the right of way. Both Ms. Peverett and Mr. Barrett testified that during the public consultation phase, BCTC members of the community, not immediately on the right of way, asked why the facility could not be built underground rather than overhead to avoid aesthetic concerns.[283] BCTC considers that with 51% of the landowners expressing a preference for underground construction through entering into the necessary right of way agreements, together with the apparent support of those elsewhere in the community for underground construction, then there would be sufficient community support to warrant spending the additional $13.8 million to address some of the community's concerns.

Option 3

127. Delta is opposed to Option 3 and still suggests that Option 3 may be infeasible.[284]

128. The existence of other underground utilities when installing underground circuits is not unusual. BCTC routinely deals with other utilities when underground circuits are installed.[285]

[283] Tr. 15, pp. 2502-2504; Tr. 16, 2714-2715

129. The estimate for Option 3 includes costs, based on previous experience, of undergrounding with other utilities in place.[286]

130. TRAHVOL'S comparisons of costs between Option 2 and Option 3 are not entirely accurate:[287]

i) Contrary to paragraph 124 of TRAHVOL's submission, BCTC did not concede a $650,000 deficiency in the restoration costs for Option 2. Rather, it indicated that, based on its review, this was the maximum likely magnitude of difference between the ENVIROW estimate and Ms. Clark's estimate if the difference between the properties Ms. Clark did review were extrapolated over the properties as a whole.[288] BCTC did not and does not accept Ms. Clark's estimate as an accurate estimate of the costs of restoring the properties in question;

ii) the costs associated with Option 3 are planning level estimates for one circuit located in city streets.[289] The costs for Option 2 include one full circuit plus pre-building the duct banks for the majority of a second circuit along the existing ROW;[290] and

iii) BCTC submits that the appropriate comparison is to Option 1, not to Option 2. Option 2 already includes an extra amount to attempt to address community issues in Tsawwassen. If TRAHVOL believes that Option 3 better addresses these concerns, BCTC believes that this should be compared to the lowest cost option.

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[284] Delta, para. 173.
[285] TR 13, page 2262, line 20 to page 2263, line 11; TR 19, page 341, line 19 to page 3412, line 15..
[286] TR 13, page 2261, line 7 to page 2263, line 10.
[287] TRAHVOL, para. 124.
[288] TR 18, page 3184 line 2 to 3186 line 9.
[289] TR 13, Page 2261, lines 7 to 17; TR 15, page 2562, lines 1 to 13; TR 15, page 2567, lines 10 to 18.
[290] TR 13, Page 2261, lines 7 to 17.

131. Mr. Holmsen indicated that he is prepared to buyback the ROW on his property.[291] He also indicated that, in discussions with his neighbours, a substantial number of other landowners on the ROW had also expressed an interest in doing so.[292] Without commenting on the adequacy of Mr. Holmsen's offer, the only other property owner who expressed some interest in this was Mr. Campbell.[293] BCTC attempted to elicit support for a community proposal that would see the lines removed from the ROW.[294] This support did not materialize.

Option 4

132. The main proponents of Option 4 are Delta and Mr. Holmsen.

133. Delta suggests that there are several benefits to Option 4 over the routings in Tsawwassen:

a) The line would avoid a residential area.

b) The line would be located in a linear corridor containing transportation and other utility issues.

c) Concerns over potential health effects would be significantly reduced.

d) The negative impacts on property values would be minimized.[295]

134. BCTC submits that these suggested benefits reflect Delta's perspective rather than an objective assessment of the evidence. It also reflects a static view rather than considering the impact of the lines over lifetime.

135. Option 4 would avoid a residential area in Tsawwassen; however, there are residences in the vicinity of Option 4 and the TFN have indicated they plan

[291] Ex. C1-13, pages 3.7 to 3.11.
[292] TR 24, page 4493, line 10 to page 4494, line 22.
[293] Campbell, para. 17; Campbell Reply Argument, page 2.
[294] Ex. B1-6, BCUC 1.11.1 to 1.11.3, 1.88.1 and 1.91.2; Ex. B1-11,TRAHVOL 1.1 to 1.3

on developing this area.[296] The line would be located in the vicinity of Highway 17 and the existing HVDC Pole 1. However, Delta's own consultant, Dr. Gregory, warned against the inequities of routing facilities through the lands of poorer individuals, ethic minorities, and First Nations, who have had more than their fair share of public infrastructure imposed on them.[297] While BCTC does not share Dr. Gregory's characterization of "risks" and "potentially hazardous technologies", given that Delta's arguments in favour of Option 4 are based primarily on concerns related to the impacts of the lines on Tsawwassen residents, BCTC still believes this is a valid consideration.

136. Presumably, the property owners on the ROW would have fewer concerns about EMFs if the lines were moved elsewhere. However, this simply shifts this issue elsewhere.[298]

137. Similarly, while removing one of the existing 138 kV lines would likely have a positive impact on property values in Tsawwassen, but moving the line would just shift these impacts elsewhere.[299]

138. Ultimately, Delta does not offer any explanation for why it is more in the public convenience and necessity to benefit people in Tsawwassen, and particularly people who purchased homes with the ROW in place, at the expense of others.

139. Delta also attempts to discount the potential impacts associated with Option 4. BCTC submits that, in most cases, its submissions are not supported by the evidence:

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[295] Delta, para. 187.

[296] TR 9, page 1215, lines 3 to 15; Ex. C6-8, Exhibit K; TR 24, page 4174, lines 21 to 24.

[297] Ex. C5-6, Pre-Filed Evidence of Robin Gregory, page 11; Ex, C5-8, BCUC 1.3.5 and 1.3.6; TR 22 , page 4155, line 25 to page 4156, line 24; TR 23, page 4280, lines 2 to 17.

[298] Ex. B1-54, BCUC 4.204.2 Ranking Summary (11 EMF); TR 9, page 1233, lines 6 to 13.

[299] Ex. B1-54, BCUC 4.204.2 Ranking Summary (10 Property Values).

a) The TFN did appear before the Commission.[300] The TFN also expressly and consistently made their concerns known to BCTC and BC Hydro;[301]

b) Delta cross-examined BCTC on the relative impacts of Options 2 and 4 from an archaeological perspective.[302] Mr. Barrett's testimony fully addressed counsel for Delta's suggestion that somehow the archaeological impacts of Option 2 could be greater than Option 4.[303] This evidence was supported by the email from the BC Archaeological Branch, that, given the potential archaeological impacts of Option 4, there was a real possibility that they would refuse to issue a permit for Option 4.[304] No such concerns were expressed regarding Option 2;

c) Delta offers no support for its assertion that what has occurred on other projects in areas of archaeological significance is "simply irrelevant."[305] Mr. Barrett testified that, even if Option 4 were permitted, depending on what happens during the construction phase there is a risk that the project could be delayed, could incur increased costs or, in a worst case scenario, could need to be moved.[306] These are real risks of Option 4 and Delta did not lead any evidence to contradict them;

d) BCTC was clear in its evidence that it would have to acquire new rights through the TFN reserve for Option 4 and, if the TFN did not agree to this, BCTC's assessment was that acquiring these rights would be virtually impossible given the existence of other

[300] TR 5, pages 651 to page 655; Ex. E-59.
[301] TR 18, page 3201, lines 4 to 11; Ex. C6-8, Page 9 and Exhibit K.
[302] TR 10, page 1480, line 14 to page 1495, line 15.
[303] TR 10, page 1483, line 16 to page1484, line 13.
[304] TR 10, page 1489, line 24 to page 1490, line 22.
[305] Delta, para. 197.

options.[307] Delta had a copy of the ROW agreement.[308] If Delta had wished to challenge BCTC's evidence on this topic it had every ability to do so;

e) BCTC has never suggested that Option 4 was infeasible from a seismic perspective,[309] contrary to what appears to be suggested in paragraph 201 of Delta's submission. BCTC has only indicated that there are seismic issues and the costs of addressing these issues are uncertain. Delta's suggestion that BCTC should have investigated these issues further, at ratepayer expense, again simply reflects its perspective. While this further work may have refined the cost estimate for Option 4 BCTC submits that it would not change the comparison with Options 1, 2 and 3; and

f) BCTC does believe that the submarine cables could withstand the seismic forces associated with its original Option 4. However, as indicated above, this does not change the fact that the seismic risks associated with the marine portion of Option 4 are greater than Options 1, 2 and 3.[310]

140. Delta also suggests that Mr. Laprade's modified version of Option 4 would be seismically equal to Options 1-3, with no significant disadvantages.[311]

141. Mr. Laprade's modified Option 4 may mitigate some of the seismic risks associated with Option 4; however, it does this at the expense of greater environmental impacts and higher cost. Delta has previously expressed

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[306] TR 9, page 1213, line 10 to page 1214, line 10.

[307] Ex. B1-6, BCUC 1.56.1; Ex. B1-11, K. Holmsen 1.31.12; Ex. B1-17, K. Holmsen 1.31.11 and 1.31.13; TR 18, page 3201, line 16 to page 3202, line 14.

[308] TR 22, page 4171, line 18 to page 4172, line 3.

[309] TR 12, page 2050, lines 19 to 21.

[310] Ex. B1-1, Appendix F, pages 55 and 56.

[311] Delta, para. 9.

concerns with the environmental values in this area.[312] Whether the loss of eelgrass and other environmental issues associated with a modified Option 4 could be mitigated or not or whether these impacts would be acceptable to the relevant provincial and federal agencies, again, these impacts would be greater than Options 1, 2 and 3.[313]

142. Mr. Holmsen appeared to suggest that since the TFN only appeared at the community hearing portion of the hearing that their opposition to Option 4 should somehow be given less weight.[314] BCTC disagrees with this perspective. BCTC and BC Hydro have met with the TFN on numerous occasions and in these meetings and their participation in this process they have consistently expressed their opposition to Option 4[315] and, from BCTC's perspective, their property and ambitions deserve valid consideration. Beyond this, BCTC has simply addressed First Nation issues as a potential but, given the position of the TFN, very real risk associated with Option 4. The uncontradicted evidence on this topic is that BCTC would have to acquire new ROW through the TFN reserve.[316] This would be virtually impossible without cooperation from the TFN itself.[317] There is also a real possibility that BCTC would not be able to acquire the necessary permits to construction Option 4 due to the archaeological[318] and environmental[319] concerns.

143. Mr. Holmsen also made submissions in support of his Option 4 (modified). Mr. Holmsen appears to suggest that BCTC failed to consider locating the Option 4 alignment under Highway 17 and that this would having to locate the lines on

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[312] Ex. B1-82, Delta Materials, Tab 17, Letter to Michael Costello, dated February 11, 2005.

[313] Ex. B1-54, BCUC 4.204.0, Non-Financial Rankings of Project Alternatives – Tsawwassen.

[314] Holmsen, page 7.

[315] TR 5, pages 651 to page 655; Ex. E-59; Ex. B1-18, IRAHVOL 1.12.1; TR 18, page 3201, lines 4 to 11; Ex. C6-8, Page 9 and Exhibit K.

[316] Ex. B1-6, BCUC 1.56.1; Ex. B1-11, K. Holmsen 1.31.12; Ex. B1-17, K. Holmsen 1.31.11 and 1.31.13.

[317] TR 18, page 3201, line 16 to page 3202, line 14.

[318] TR 10, page 1489, line 24 to page 1490, line 22.

[319] Ex. B1-17, TRAHVOL 1.152.22.

the TFN reserve.[320] This is not the case. First, locating the lines under Highway 17 would not necessarily address ownership issues and who BCTC would need to acquire these rights from. As indicated in the TFN AIP, the parties to the AIP express different positions regarding the ownership of Highway 17.[321] Secondly, BCTC would not want to locate the lines under Highway 17 or in the embankments in any event because the whole embankment is subject to movement in a seismic event.[322] Finally, Mr. Holmsen's speculation that this location may be more seismically stable is not supported by the evidence.[323]

144. All geotechnical experts agreed that the area near Highway 17 from its intersection with 52nd Street to the shoreline is the same general composition as the remainder of the low lying areas of Delta and is subject to the same general issues and risks. It is only in the area closer to the shoreline that conditions may change.

145. BCTC has never indicated that Option 4 or Option 4 (modified-Holmsen) is infeasible from a seismic perspective,[324] it has simply indicated that the seismic risks are greater than Options 1, 2 and 3 and that, while these risks may be able to be mitigated, the costs of doing so are highly uncertain.[325]

146. Mr. Holmsen goes on to submit that his Option 4 (modified) may only impact 1.2 km of areas with high archaeological potential and a portion of site DgRs-2. BCTC does not understand how this would significantly address this issue and, in particular, how this would change the relative ranking of Option 4.

147. Mr. Holmsen goes on to suggest that if deemed necessary, the archaeological concerns can be mitigated through Horizontal Direct Drilling

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[320] Holmsen, page 5.
[321] Ex. B1-89, Chapter 3, section 3 (page 21 of 117).
[322] TR 9, page 1216, line 20 to page 1217, line 11; TR 16, page 2658 line 20 to page 2659, lines 22.
[323] Holmsen, page 6.
[324] TR 12, page 2050, lines 19 to 21.
[325] Ex. B1-6, BCUC 1.56.2; Ex. B1-11, Delta 1.9.0; Ex. B1-18, TRAHVOL. 1.152.6.

through the "critical" 218 metres through Site DgRs-2.[326] In making this suggestion, which was not addressed to BCTC's witnesses, Mr. Holmsen misconstrues the difference between Site DgRs-2 and the areas of high potential identified in Millennia Research's Archaeological Report. Site DgRs-2 is simply the presently known bounds of the site.[327] While this area is clearly critical, from an archaeological impact perspective there is no distinction between it and the neighbouring areas of high potential.[328] Accordingly, to fully mitigate archaeological concerns, if possible, HDD would have to be employed for the entire length of the area. Further, HDD presents its own issues such as the disruption caused by digging the pits and footprint of the drill rigs. It also means that steps cannot be taken to improve seismic conditions.

148. BCTC does not make these submissions to suggest that there are no conditions under which Option 4 could be undertaken. Rather, BCTC wishes the record to be clear that the types of suggestions that Mr. Holmsen has raised have been considered and, while there may be steps that can be taken to mitigate for some of these impacts, often these steps simply create new impacts in another area.[329] In total, BCTC submits that regardless of the steps taken to minimize certain impacts, Option 4 is still a less desirable alternative than Options 1, 2 and 3.

149. In response to Mr. Holmsen's submissions regarding Pole 1, Pole 1 is part of the bridging measures necessary to secure Vancouver Island after Pole 2 is de-rated.[330] Accordingly, BCTC has no intention of removing Pole 1.[331]

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[326] Holmsen, p. 8.

[327] TR 10, page 1487, lines 3 to 17.

[328] TR 10, page 1487, lines 18 to 26.

[329] Such as seismic improvements raising archaeological issues; as mentioned, HDD may raise seismic issues; Mr. Laprade's route, while mitigating some seismic issues raises further environmental issues, etc.

[330] TR 16, page 2664, line 23 to page 2665, line 10 and page 2666, lines 6 to 16.

[331] Ibid.

150. In paragraph 128(d) of TRAHVOL's submission, TRAHVOL seems to suggest that BCTC conceded that more work on the seismic conditions associated with Option 4 needs to be done for the purposes of this Application.

151. BCTC did not concede this and, in fact, Mr. Barrett expressly rejected this proposition in cross-examination by Mr. Underhill.[332] Mr. Barrett did indicate that if the Commission were to direct BCTC to build Option 4 on the Highway 17 ROW allowance that more work would be required but this was not necessary for comparison purposes.

152. BCTC also does not concede that it did not undertake a detailed examination of the gaseous sediments associated with Option 4 beyond the estimated mapped limits of gaseous soils, a review of the published literature and personal communications with Dr. Bern who has been researching in this area.[333] However, that does not change the fact that gaseous soils on slopes contribute to soil instability in seismic events[334] and that the offshore geographical conditions associated with Options 1, 2 and 3 are much better than those associated with Option 4.[335]

153. Again, contrary to TRAHVOL's submission, the potential environmental impacts of Option 4 have been considered.[336] BCTC is also well aware of the means by which these impacts might be mitigated.[337] However, regardless of the level of detail of these analyses, again the important point is that there will be more environmental impact associated with Option 4 than Options 1, 2 or 3.[338] This also raises the risk that Option 4 would not be granted on Environmental

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[332] TR 12, p.2052, line 1 to p. 2053, line 13.

[333] TR 20, p. 3689, line 21 to p. 3690, line 8.

[334] Ex. B1-1, Appendix F, page 31; TR 23, page 4229, lines 19 to 23; Ex. C5-6, evidence of Mr. Laprade.

[335] Ex. B1-1, Appendix F, Table 10-4, page 55 and Table 10-5, page 56.

[336] Ex. B1-6, BCUC 1.56.2; Ex. B1-11, TRAHVOL 1.51.2 and 1.79.1; Ex. B1-17, K. Holmsen 1.31.25; Ex. B1-68.

[337] TR 9, page 1210, lines 4 to page 1211, line 6.

[338] Ex. B1-6, BCUC 1.56.2; Ex. B1-11, TRAHVOL 1.51.2 and 1.79.1; Ex. B1-17, K. Holmsen 1.31.25; Ex. B1-68.

Assessment Certificate because other, less environmentally harmful, routes are available.[339]

154. The Corporation of Delta has proposed modifications to route Option 4 along Hwy 17, through the TFN Reserve. Delta states that the proposed modifications would address BCTC's concerns for the base Option 4 with regard to seismic stability described in the record by BCTC and its experts. Evidence has not been introduced to support this assertion.

155. Delta's Modified Option 4 would move the submarine cable south of the BC Ferries causeway closer to the beach in order to avoid gaseous sediments is the area.

156. Delta's Modified Option 4 does not address any of other deficiencies documented on the record including on-land seismic risks along Hwy 17 and crossing under the BC Ferries causeway, First Nations concerns, archaeological concerns, or rights-of-way. It is BCTC's position, uncontradicted in the record, that Delta's proposed modifications to Option 4 would not materially affect the comparisons made of the base Option 4 with Options 1, 2 and 3 and that most of the evidence and argument related to the base Option 4 would apply to the modified route as well.

- Delta's proposed modifications for Option 4 would have little effect on the overall seismic stability of the base Option 4.
- First Nations concerns, potential archaeological effects and right-of-way issues would not alleviated through Modified Option 4.
- There would be no material effect on the significant cost and schedule risks of the base Option 4 for the Modified Option 4 proposed by Delta.

[339] Ex. B1-17, TRAHVOL 1.152.22.

Option 5

157. Delta and Mr. Holmsen also promoted Option 5.

158. Delta suggests a modified version of Option 5 in which the VITR follows the alignment proposed by BCTC onshore, but then heads in a southwest direction from where the Deltaport causeway meets the shoreline, and proceeds under the BC Ferries causeway to meet the alignment suggested by Mr. Laprade.[340] This route was previously considered by BCTC and found unsuitable as described in BCTC's response to John Cross IR 1.1.0.[341]

159. Mr. Holmsen pursued an Option 5 (modified) in his final submission. Mr. Holmsen contends that BCTC did not assess particular variation of Option 5 that he considers addresses BCTC's concerns with its own Option 5. This is not true. BCTC considered a number of variations of Option 4 and Option 5 on its own initiative and in response to suggestions of intervenors. Mr. Holmsen notes the evidence of Mr. Williams, at Transcript 20, page 3538, lines 2 to 7, that if you went straight out from the Canoe Pass terminal you would reduce some of the problems encountered by going along the dyke. BCTC does not take issue with this evidence; however, it does not mean that Mr. Holmsen's modified Option 5 becomes a feasible option.

160. BCTC commented why the Option 5 it presented followed the existing HVDC route along the dyke, east and north of the existing HVDC Pole 2 cables, in its response to Ex. B1-11, TRAHVOL IR 1.83.3. Moving to Mr. Holmsen's modified Option 5 would engage the two issues identified in that response (anchor damage and crossing of existing cables) which would render Mr. Holmsen's modified Option 5 infeasible as was the Option 5 BCTC presented in Exhibit B1-1.

[340] Delta, para. 11.

[341] Ex. B1-11. See Ex. C16-2.

161. Mr. Holmsen's contention that the risk of anchor damage would be reduced by moving away from the Deltaport does not remove the risk of anchor damage because, as Mr. Nelson testified, the anchorage area is in fact not at the Deltaport.[342]

VII. GULF ISLAND OPTIONS

162. The Islands Trust, IRAHVOL, and Maracaibo Estates addressed the project alternatives in the Southern Gulf Islands in their submissions.

163. The Islands Trust rely on concerns regarding EMFs[343] and generally, its mandate to preserve and protect the Islands Trust area in support of their submission.[344] The EMF issue has been fully addressed in BCTC's Final Submission[345] and in its further submissions above.

164. BCTC also believes that it has responded fully to the remainder of the Islands Trust submissions in its Final Submission.[346] The Islands Trust submits that BCTC inadequately considered and integrated the Islands Trust's stated policy objective in its assessment of the VITR Project.[347] BCTC disagrees with this. Notwithstanding that BCTC is not subject to the *Islands Trust Act*, BCTC was alive to the objects of the *Islands Trust Act* during its planning process and reviewed a number of alternatives that would both avoid and lessen the impact on the Southern Gulf Islands.[348] Unfortunately, as indicated in BCTC's Final Submission, the alternatives that avoid Galiano and Salt Spring Islands cost significantly more than the proposed alternative and, in many cases, simply transfer the impacts associated with the alternative facilities to other places.[349]

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[342] TR 16, page 2676 line 18 to page 2677 line 7 and TR 17, page 2950 lines 3 to 19. Ex. B1-66, Figure 2.

[343] Islands Trust, para. 5 and 11.

[344] Islands Trust, para. 5.

[345] Paragraphs 110 to 127; para. 207.

[346] BCTC Final Submission, para. 200-207.

[347] Islands Trust, para. 12.

[348] BCTC Final Submissions, para. 200-202.

[349] BCTC Final Argument, page 70, para 70.

BCTC indicated that it does not believe that these additional costs can be justified. BCTC submits that the Islands Trust's submission does not identify any overwhelming benefit(s) that would justify this level of expenditure.

165. In contrast, the proposed VITR facilities are an improvement over the existing facilities and BCTC submits that they are consistent with the Official Community Plan. These facilities were specifically planned to reduce impacts on the Gulf Islands.

166. In response to some of the comments in IRAHVOL's submissions[350] BCTC submits as follows:[351]

i. BCTC's full response to IRAHVOL's HVDC Light™ alternatives was fully addressed in BCTC's response to IRAHVOL 1.13.1.[352] The costs presented by ABB at the July 18 meeting did not include costs for land cable installation.[353] Contrary to what appears to be suggested by IRAHVOL, BCTC used cost information from ABB in evaluating the HVDC Light™ alternatives;[354] and

ii. As indicated above, BCTC does not agree that it has shown "complete disregard" for the aesthetic, environmental and socio-economic value of the Gulf Islands. Further, there is no evidence that the existing transmission facilities has hampered the development of the Gulf Islands or is having an effect on its tourist industry as suggested in IRAHVOL's submission.

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[350] IRAHVOL, pages 84-87.

[351] Note that BCTC has not expressly responded to all of those submissions. Many of the submissions are argumentative and BCTC relies on other portions of its Final Submission and the record in the proceeding in response to those.

[352] Exhibit B1-11.

[353] Ex. B1-6, BCUC 1.132.1, ABB Presentation at page 22.

[354] Ex. B1-6, BCUC 1.11.3; Ex. B1-11, Sea Breeze 1.22.3.

167. IRAHVOL attempts to suggest that Mr. Dybvig's report has no relevance to the Southern Gulf Islands.[355] To the contrary, Mr. Dybvig expressly considered the potential impact on property values of the proposed facilities. Mr. Dybvig's conclusion was that, primarily because of the reduction in the number and type of towers on average, there would likely be a small positive effect on property values in the Gulf Islands.[356] This is consistent with common sense and with both Mr. Bazzard and Ms. Adams perceptions of the new lines.[357] There is no evidence to support IRAHVOL's assertion that property values in the Gulf Islands "will be further reduced because of VITR."[358]

168. Maracaibo also raised the issue of the effect on property values of the existing ROW and how the VITR Project will effect property values, land use and development issues.[359]

169. In general response to Maracaibo's issues, there are only two properties at Maracaibo Estates that are located on the existing AC ROW.[360] All other Maracaibo properties - that are along a ROW - are on the HVDC ROW.[361] Maracaibo Estates was formed and all of the properties in Maracaibo were purchased after the ROW was in place.[362] This occurred with full knowledge of the ROW, the existing facilities, and the terms of the easement.[363] In fact, there was evidence that the properties that overlooked the ROW were consciously oriented to take advantage of the views created by the ROW.[364]

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[355] IRAHVOL, page 57.

[356] Ex. B1-37, Report of Mr. Dybvig, page 46, lines 1172 to 1180. Note, there will be some places on the Gulf Islands where there will be towers added. This does not take away from the general conclusion and, these areas are not generally in proximity to people's homes

[357] TR 21, page 3885, line 3 to page 3887, line 4 and page 3889, lines 7 to 14; TR 22, page 4092, line 6 to page 4093, line 25.

[358] IRAHVOL, page 61.

[359] Maracaibo, p.1, Item 3.

[360] Ex. B1-1, Appendix A, Sheets 11 and 12 of 24; TR 22, page 4096, lines 5 to 12.

[361] TR 22, page 4095, line 7 to page 4096, line 12.

[362] Ex. C25-6, BCTC 1.2.1 and 1.2.2; TR 22, page 4074, line 10 to page 4075, line 6.

[363] Ex. C25-6, BCTC 1.2.1 to 1.2.4.

[364] TR 22, page 4087, line 7 to page 4088, line 9.

170. Removal of the existing facilities and abandonment of the existing ROW would likely result in a substantial benefit to Maracaibo and its private landowners.[365] BCTC submits that given these benefits would not accrue to ratepayers, and the overwhelming cost of achieving these benefits,[366] these benefits do not outweigh the additional costs associated with them.

171. Maracaibo also continues to raise BCTC's ROW maintenance practices,[367] notwithstanding BCTC's efforts to address this issue with Maracaibo.[368] BCTC provided a response to this issue in correspondence with Maracaibo prior to the VITR Application being filed.[369] BCTC also addressed this matter in IR responses.[370] BCTC has no further submissions on this topic.

VIII. VIC

172. BCTC submissions on the VIC Project are set out in paragraphs 52 to 55 of its Final Submission. Sea Breeze was the only Intervenor who made detailed submissions in support of the VIC Project.[371] Delta and the Islands Trust support the VIC Project but did not address BCTC's analysis of the VIC Project.[372] IRAHVOL submits that a combination of VIC, JDF and additional on-Island generation is required to meet Vancouver Island's requirements.[373] BC Hydro, BCOAPO, CEC and JEISC all oppose the VIC Project.[374]

173. In this portion of intervenors' submissions, Intervenors generally also addressed the "cost of service" analysis of capital projects and whether the Commission has the power to grant a CPCN to BCTC for the VIC Project. BCTC

[365] TR 22, page 4089, line 6 to 4091, line 26.
[366] Ex. B1-1, page 106, Table 4-4 and page 107, Table 4-5.
[367] Maracaibo, p.1.
[368] Ex. C25-3, Maracaibo Direct Evidence, Item 1.
[369] Ex. C25-3, Item 1, references to BCTC correspondence.
[370] Ex. B1-11, TRAHVOL 1.3.1 and 1.22.1.
[371] Sea Breeze, para. 303 to 383.
[372] Delta, para. 236; Islands Trust, para. 5 and 12.
[373] IRAHVOL, p. vii, para. 1.
[374] BC Hydro, para. 57; BCOAPO, p. 5, CEC, para. 60; JIESC para. 77-90.

has no further submissions on these issues. In its submission, BC Hydro suggests the capital structure issue and the comparison of projects take place in BC Hydro's IEP application.[375] If the Commission considers that the IEP is the appropriate place to address this questions BCTC is content with this.

174. Some intervenors also addressed certain incentive mechanisms that could be put in place.[376] BCTC expressly adapts the Reply Argument of BC Hydro on this issue[377] and continues to rely on the testimony of Mr. Gabel in this proceeding.[378]

175. The majority of Sea Breeze's submissions on VIC either have been or will be addressed elsewhere.[379] BCTC continues to rely on its analysis that the VIC Project has substantially greater capital costs, higher O & M costs, significantly greater losses, provides less capacity, and does not offer any material non-financial advantages, if any, that would address the difference in costs between VIC and VITR.[380]

176. In addition to the above comments:

[375] BC Hydro Reply Argument, page 18, para. 50..

[376] Eg. BCOAPO, page 19.

[377] BC Hydro reply, para. 24-29.

[378] TR 15, page 2532, line 22 to page 2440, line 18 and page 2444, line 7 to page 2445, line 26.

[379]

Sea Breeze Final Submission	Reference
Paragraph 308 and App. C (Assessment of HDVC Light™ technology and system benefits)	BCTC Final Submission para. 30-38; BCTC Final Submission, Appendix B; BCTC Reply, Appendices A and B.
Paragraph 309 [1] (EMF)	BCTC Final Submission, para. 110-126; BCTC Reply, EMF.
Paragraph 309 [2] and related paragraphs (seismic) (Q. is this both VITR and VIC?)	BCTC Final Submission, Appendix B, paras. 3 to 6; BCTC Reply, Seismic.
Paragraph 309 [4] (PST)	BCTC Final Submission, Appendix B, para. 13;BCTC Reply, para. 202(b).
Paragraph 309 [5] (Interconnection Points)	Exhibit B1-39, sections 2.1 and sections 2.3; Ex. B1-44, Sea Breeze 2.17.1.
Paragraph 309 [6] (Bi-directional control and black start capability)	Exhibit B1-39, section 2.15; Ex. B2-11, BCTC 1.30.2 (VITR); Ex. B1-6, BCUC 1.4.1 and 1.7.1.

[380] BCTC Final Submission, para. 55.

i) Sea Breeze did not respond to BCTC's submissions on the capital costs of VIC.[381] BCTC submits that this supports its assessment that the capital costs of VIC are likely significantly more than $377 million;

ii) BCTC submits, despite Sea Breeze's suggestions to be contrary, that the best that can be said of the VIC route from a geo-hazard perspective is that the geo-hazard risks associated with this route are unknown: these risks were not assessed in detail and questions regarding the seismic withstand capability were responded to as being "detailed design issues",[382] concerns regarding the seismic capability of the converter stations, cables, and joints were glossed over;[383] Sea Breeze's initial marine assessment needed to be revised when errors were pointed out with it;[384] Sea Breeze was unable to indicate where the cable would be placed in the Boundary Pass area;[385] Sea Breeze never addressed liquefaction risks for the marine route because they based their analysis on the (wrong) assumption that steeper slopes did not exist in this area;[386] and Sea Breeze never undertook any assessment of the seismic performance of Victoria clays on the Saanich Peninsula;[387]

iii) As indicated in BCTC's Final Submission, and not addressed in Sea Breeze's argument, Sea Breeze has not identified a feasible

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[381] BCTC Final Submission, para. 52 and 53; Sea Breeze, para. 360.

[382] Ex. B2-8, BCUC 1.14.3 (VIC); Ex. B2-17, BCUC 2.145.1 (VIC); Ex. B2-21, BCTC 1.16.1, 1.75.1 and 1.174.2 (VIC); Ex. B2-24, BCTC 1.64.1 and 1.77.1 (VIC).

[383] Ex. B2-24, BCTC 1.64.1 (VIC); Ex. B2-8, BCUC 1.14.4 and 1.53.1; Ex. C31-57, Sea Breeze Undertaking, Transcript, Volume 34, Page 6432 to 6434; Ex. C31-37, Undertaking Response from Page 6021 line 24,

[384] Ex. B1-39, App. B, page 6. TR 33, page 6232, lines 9 to 20.

[385] TR 34, page 6465, line 25 to page 6366, line 24 and page 6470, line 6 to page 6472, line 9.

[386] Ex. B1-128, page 22, Table 3.2-2.

[387] Ex. B2-24, BCTC 1.77.1; TR 34, page 6429, lines 11 to 25. Ex, B2-8, BCTC 1.173.1, Appendix 1.173.1A; Ex. B2-50, BCTC 17.

converter site at PIK and has not identified a contingency plan for this;[388]

iv) There has only been a preliminary assessment of the ability to conduct HDD at the landfalls (and therefore avoid certain environmental issues);[389] and

v) There is no acknowledgment that the VIC route has encountered at least equal, if not greater, public opposition than the VITR route.[390]

IX. JDF

177. Sea Breeze continues to submit that the Commission should order BCTC and BC Hydro to negotiate with it regarding the JDF to serve Vancouver Island.[391] A number of other parties support this.[392]

178. This section of BCTC's Reply responds to Sea Breeze's submissions on the JDF Project. BCTC has not found it necessary to respond to many of these submissions. This does not indicate acceptance of these submissions. BCTC will use Sea Breeze's outline to respond to its submissions.

BCTC Did Not Adequately Consider JDF as a Solution to Vancouver Island's Transmission Needs

179. Sea Breeze submits that BCTC made no efforts to "truly consider" whether JDF could be used to meet the needs of Vancouver Island better than VITR.[393] It then sets out various arguments in support of this view.

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[388] BCTC Final Submission, para. 54 (iii).
[389] Ex. B2-8, BCUC 1.14.1, Appendix 1.14.1B: EBA Letter, BCUC 1.14.3 (VIC).
[390] TR 33, page 6243, line 26 to page 6248, line 7.
[391] Sea Breeze, page 14, para. 43(II).
[392] Delta, para. 15, TRAHVOL Final Argument, page 1, para. 3 and IRAHVOL Final Argument, page vii.
[393] Sea Breeze, para. 56.

180. As submitted by BC Hydro, it seems to have not occurred to Sea Breeze that an objective review was done and simply concluded that the JDF project was not the right project.[394]

181. Sea Breeze suggests that since BCTC has been aware of the JDF project since March 2004, BCTC should also have been aware of Sea Breeze's recent ambitions for JDF to be a substitute for VITR.[395] BCTC categorically rejects this suggestion. Sea Breeze originally proposed the JDF project as a merchant proposal and maintained this position in its discussions with BCTC until shortly before the VITR hearing.[396] As indicated by Mr. Choudury in cross examination:

> "…in all the discussions we had with Sea Breeze on the proposed use of the Juan de Fuca project and in all the studies we did, we were asked to include our VITR project along with the Juan de Fuca project. It was clear from the studies that we were doing that Sea Breeze was looking at determining import and export capabilities all the way right into the B.C. Hydro system off the Vancouver Island…"[397]

> "Sea Breeze was proposing a merchant transmission project and they were coming to us to engage on studies through ABB to evaluate the use of that project. They provided the scope of the studies that they wanted us to do. We agreed to the scope of the studies. And in all the press releases that's going on at the time and all the conversations at the time, there was no mention of the use of Juan de Fuca for anything other than as a project to move the renewable energy in B.C. out to markets in the U.S. That was what Sea Breeze said they were doing."[398]

182. All of the studies that Sea Breeze requested BCTC to do of the JDF project were in combination with VITR.[399] In Exhibit C6-18, the Development Loan Agreement dated April 6, 2005, there is no mention of an agreement between Sea Breeze and BCTC for south to north capacity on JDF to serve

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[394] BC Hydro, para. 3.

[395] Sea Breeze, para. 56 and 57.

[396] TR 13, page 2158, line 26 to page 2159, line 14; TR 13, page 2162 lines 1 to 14.

[397] TR 13, page 2156, line 26 to page 2157, line 7.

[398] TR 13, page 2157, lines 13 to 23.

[399] TR 31, page 5769, lines 11 to 17.

Vancouver Island or an agreement with BCTC for system benefits.[400] Given the significance that Sea Breeze now places on an agreement with BCTC, it is clear that if all this had been in Sea Breeze's mind in April 2005, this would have been a Development Milestone. Interestingly, completion of negotiations with BPA over compensation for major system benefits on the BPA system is identified as a Development Milestone.[401]

183. Sea Breeze then submits that if BCTC only became aware of these ambitions recently BCTC must admit that it did not seriously consider JDF or Sea Breeze seriously before that time.[402]

184. As indicated in BCTC's Final Submission, BCTC has had fundamental concerns from the time when Sea Breeze first raised the JDF project.[403] BCTC continued to have these concerns along with concerns related to connecting two capacity deficient regions to provide reliability benefits. Contrary to Sea Breeze's submissions, BCTC's analysis did not support the view that Sea Breeze's proposal was capable of meeting the needs on Vancouver Island.

185. Again contrary to Sea Breeze's submissions, BCTC does not rely simply on its list of correspondence with Sea Breeze to show that it took Sea Breeze's proposal seriously.[404] BCTC relies on its evidence in this proceeding. As indicated in BCTC's Final Submission, BCTC's current analysis continues to support this position.

186. BCTC also doesn't rely on the quantity of correspondence to assure the Commission that if followed its direction in the 2004 Capital Plan decision.[405] BCTC relies on its specific responses to the Commission's Directions as evidence that it met these directions.

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[400] Schedule 1.3, page 204-207.
[401] Exhibit C6-18, Schedule 1.3, page 207, item 41.
[402] Sea Breeze, para. 57.
[403] Para. 60.
[404] Sea Breeze, para. 59.
[405] Sea Breeze, para. 60.

JDF is Conceptually a Better Solution

187. Sea Breeze submits that JDF is conceptually a better solution than VITR to meet Vancouver Island's needs.[406] This submission is based on Sea Breeze's claim that JDF will provide "guaranteed savings" to ratepayers,[407] that it will result in substantially enhanced OATT revenues and revenues to Powerex,[408] and that it will provide other "very significant advantages" over VITR.[409]

188. This section of BCTC's Reply will address the conceptual reality of the JDF project and Sea Breeze's claims of guaranteed savings and enhanced revenues. Sea Breeze's other claimed significant advantages are discussed elsewhere in BCTC's Reply.

189. Sea Breeze submits that Sea Breeze's proposal will produce guaranteed savings to ratepayers.[410] As outlined in BCTC's Final Submission, BCTC's analyses indicate that this is not the case.[411] Sea Breeze also says that its proposals also specifically contemplate that to the extent that any wheeling costs may need to be incurred, such costs should be taken into account to ensure that ratepayers will still realize overall cost savings.[412] Notwithstanding this, Sea Breeze's analysis does not take these costs into account.[413]

190. Sea Breeze also submits that an assessment of the overall economics of the JDF Project should also take into account the "substantially enhanced OATT revenues" that BCTC could expect to enjoy, as well as the substantially enhanced revenues which Powerex could expect to earn, and estimates that the total values of those benefits to be in the range of $27.5 to 50.5 million.[414] If Sea

[406] Sea Breeze, para. 63-73.
[407] Sea Breeze, para. 66.
[408] Sea Breeze, para. 70.
[409] Sea Breeze, para. 72.
[410] Sea Breeze, para. 66.
[411] Para. 68-77.
[412] Sea Breeze, para. 67.
[413] Exhibit B2-64, BCUC 4.155.1
[414] Sea Breeze, para. 70.

Breeze truly believed there were benefits of this magnitude associated with JDF, BCTC submits that it would not have waited until after the evidentiary phase of the hearing was over to put forward these numbers.

191. BCTC specifically asked Sea Breeze to address these questions as follows:

> **1.8.0 Reference: VIC Application, Section 1.4, page 6, lines 28 to 32**
>
> "[…] the Commission should consider and take into account anticipated increases in demand for transmission service that may result from the construction and operation of the Juan de Fuca Project as well as the benefits related to enhanced access to, and expansion of, electricity markets that could be expected to flow from the combined operation of both Projects."
>
> *1.8.1 Please provide copies of all studies analyzing the anticipated increases in demand for transmission service that may result from the construction and operation of the Juan de Fuca Project as well as the benefits related to enhanced access to, and expansion of, electricity market that could be expected to flow from the combined operation of both Projects.*
>
> **RESPONSE:**
>
> Sea Breeze has not quantified the increase in demand. See the excerpts from the JdF Marketing Study in Appendices 1.25.1A and 1.25.1B, which were attached to Sea Breeze's response to BCTC IR 1.25.1 (VITR).

192. Sea Breeze had the opportunity to put forward considered evidence on this issue so this could be explored by other parties. It did not do so. There is no support on the record of any third party interest in JDF that would give rise to the type and magnitude of benefits now suggested by Sea Breeze.[415]

[415] BCTC Final Submission, para. 91-93; BC Hydro Reply, para. 54.

The Level of Confidence that the Commission Should Have

193. In this section of Sea Breeze's Intervenor Argument, Sea Breeze addresses the standard that Sea Breeze submits the Commission should apply to the JDF project and suggests that BCTC is proposing a higher standard for JDF than VITR.

194. As expressly stated in BCTC's Opening Submission, BCTC is not proposing a different standard for JDF than VITR.[416] BCTC submits that, based on the record in this proceeding, the Order sought by BCTC, and the Commission's ongoing powers under the *Utilities Commission Act* over public utilities subject to its jurisdiction, the Commission can be virtually certain that the VITR Project will be built. As indicated by BC Hydro in its Reply submission, Sea Breeze's submissions on this issue appear to rest on a misunderstanding of the Commission's powers under the *Utilities Commission Act*.[417] BCTC expressly adopts BC Hydro's submissions in this regard.

195. BCTC continues to rely on its submissions in its Final Argument on the appropriate standard to apply.[418]

The Commission Can be Confident that JDF will be Constructed as Proposed

196. BCTC continues to rely on its Final Submissions on this issue. BCTC also expresses adopts the Reply argument of BC Hydro on this issue.

Ability to Ensure a Firm Supply of Power at Port Angeles to Enable JDF to be Used

197. In this section of its Intervenor Argument, Sea Breeze submits that the Commission should have confidence not only that JDF will be financed and constructed, but also that a sufficiently secure supply of power can always be

[416] TR 6, page 846, line 21 to page 849, line 11.
[417] BC Hydro Reply Submission, para. 10 to 11.
[418] BCTC Final Submission, para. 62-66.

arranged at Port Angeles and in a way that allows ratepayers to realize an overall cost savings.[419] Sea Breeze then attempts to argue how this would be achieved.

198. Without re-arguing the level of confidence that the Commission should apply or Sea Breeze's characterization of these issues, as indicated in BCTC's Final Submission, the availability of capacity and energy at Port Angeles and the cost of these arrangements are fundamental to any consideration of JDF.

199. Sea Breeze begins this portion of its analysis criticizing BCTC's "preconceived and overly simplistic scenarios"[420] and, while acknowledging that there will "undoubtedly be complicated issues" in working out the details of how power would be delivered to the line,[421] that this would obviously be done in an "optimal way"[422] and that they are sure that the details could be worked out by the parties.[423] BCTC does not take a lot of comfort from this.

200. What Sea Breeze failed to acknowledge was that BCTC's "scenarios" were taken from Sea Breeze's own evidence of the ways in which service could be provided over JDF to Vancouver Island.[424] What Sea Breeze also failed to acknowledge was that, regardless of where Sea Breeze's undefined "optimal way" may be: (1) it lies within the bookends explored by BCTC; and (2) however JDF is used, appropriate arrangements need to be in place on the BPA system. BCTC intentionally explored these bookends because they represented the range of alternatives put forward:[425] long term energy use with capacity available for contingencies; short-term capacity/reliability use; and long term capacity/reliability use.

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[419] Sea Breeze, para. 147.

[420] Sea Breeze, para 148.

[421] Sea Breeze, para. 149.

[422] Sea Breeze, para. 148 and 149.

[423] Sea Breeze, para. 149.

[424] See BCTC Final Submission, Footnote 102 – Exhibit B2-8, Exhibit B2-17, BCUC 2.133.1; Ex. B2-17, BCUC 2.122.1; BCUC 1.6.2; Evidence of Mr. Charnack and Dr. EL-Remly, TR. 36, p. 6938, ll. 9-26.

[425] BCTC Final Submission, para. 68-78.

201. As indicated by Sea Breeze, ultimately BCTC needs to be assured that, under N-1 conditions, the JDF line can provide the support required to ensure reliable supply for the Vancouver Island load.[426] Sea Breeze then proposes further ways that they suggest this could be achieved.

202. In paragraph 151 of their submission they indicate that power would only actually be required to be carried to Vancouver Island via JDF during those periods of the year that Vancouver Island demand exceeds the total dependable generation and that this would only occur at or near peak (and possibly during schedules maintenance).

203. This scenario was specifically addressed in Exhibit B1-39. As indicated, the proposal that BCTC contract for capacity on an as-needed basis and supply Vancouver Island through the 500 kV lines would not satisfy NERC/WECC Planning Standards. Capacity needs to be available to meet an N-1 contingency whenever this occurs. In addition, relying on the existing 500 kV lines would increase system losses and require BCTC to address the Cutplane D issue.[427] However, regardless of this, Sea Breeze still does not address the fundamental issue of how BCTC and its customers are assured that this power will be available when needed. Sea Breeze seems to suggest that BCTC could contract for firm capacity on BPA only during certain months of the year and for a limited amount. Even if short-term firm service for a limited quantity on BPA was available, this ignores the fact that this would not provide BCTC with any assurance that this capacity would be available the next year or the years after that.[428] It also ignores that the load and system requirements on Vancouver Island are growing and BCTC needs to plan a reasonable time in the future to

[426] Although this ignores that VITR is also proposed to provide long-term energy supplies to Vancouver Island which, under the JDF scenario would have to be provided over the 500 KV circuit, contributing to losses and system upgrades.

[427] Exhibit B1-39, page 27.

[428] As indicated in paragraph 166 of its Argument, Sea Breeze has also suggested that BCTC could acquire network service. This issue is addressed in paragraph 76 of BCTC's Final Submission. NITS service is more expensive than PTP service and is not available on a short-term basis. (Exhibit C31-57, Sea Breeze Undertaking, Transcript, Volume 36, Page 7080, BPA OATT. Also see Ex. B1-39, Appendix E, BPA 2006 Transmission And Ancillary Service Rates.)

ensure adequate alternatives are available, an issue expressly addressed in Exhibit B1-39 and BCTC's IRs.[429] Finally, Sea Breeze ignores Mr. Choudhury's evidence that BCTC could not rely on contingency resources for transmission related outages.[430]

204. At paragraph 158 of its Intervenor Argument, Sea Breeze suggests yet another option for obtaining a supply of power at Port Angeles that was not raised during the hearing. Sea Breeze suggests that Powerex could elect to receive a portion of the DSB entitlement directly at one or more of the US hydroelectric facilities on the Columbia River.[431] However, as acknowledged by Sea Breeze, this still does not avoid BCTC having to incur wheeling charges on the BPA system.[432] As discussed above, it also does not address how to ensure energy is available immediately on a contingency on the system. Finally, it fails to address the economic ramifications of taking delivery of this energy as suggested and then potentially needing to make arrangements for it other than at Port Angeles.

Reliance on JDF Instead of VITR Would Have Additional Benefits

205. At paragraphs 170 to 191 Sea Breeze addressed other "significant benefits" that it submits are attributable to the JDF project. Many of these have been addressed elsewhere.[433] BCTC has the following comments regarding the remainder of these:

a) While the threat of public opposition and legal challenges associated with transmission development cannot be ignored, BCTC has addressed this issue in its VITR evidence.[434] BCTC submits that Sea Breeze may, once again, be being to hasty in

[429] Ex. B1-39, page 26, item (e).
[430] BCTC Final Submission, para. 77.
[431] Sea Breeze, para. 158.
[432] Sea Breeze, para. 159.
[433] See footnote 379.
[434] Ex. B1-1, page 109. lines 13 to 19.

suggesting that JDF, or the other system enhancements necessary to allow it to be used such as the BPA upgrades, will not be subject to legal challenges and opposition. As with VIC, Sea Breeze cannot guarantee this will be the case and it does appear there could be opposition to the upgrades on the Olympic Peninsula;[435]

b) Sea Breeze submits that the reliability of the phase shifter is unknown and unproven.[436] This is not true. Phase shifters are extremely reliable, as witnessed by BCC's experience with the existing phase shifter on the transmission system. This phase shifter has an availability of greater than 99%.[437] If Sea Breeze has wished to lead evidence on this issue, it could have;

c) There is no evidence to support Sea Breeze's assertion that the fluid-filled cables that BCTC proposes to use for VITR present a significant environmental risk as submitted at paragraph 189 of Sea Breeze's Argument. The risk of a cable failure is small and, in the unlikely even of a leak, the fluid has low toxicity and high biodegradability and evaporates quickly;[438]

d) The VITR Project does traverse an area of eel grass. Ensuring that there is no net loss of marine habitat is one aspect of the project planning from an environmental perspective and the final requirements will be addressed as part of the EAC and environmental management plans.[439] BCTC has had no indication

[435] TR 36, page 6996, pages 2 to 13.

[436] Sea Breeze, para. 187.

[437] Ex. B1-47, BCUC 1.186.1, EENS Study for VITR Project; Ex. B1-1, Appendix M, pp. 9 to 10; Ex. B1-44, Sea Breeze 2.23.2.

[438] Ex. B1-39, page 9, lines 24 to 27; Ex. B1-44, BCUC 3.187.5..

[439] TR 16, page 2810, lines 4 to page 2812, line 2; Ex. B1-17, K. Holmsen 1.31.50; Ex. B1-11, K. Holmsen, 1.31.48 and 1.31.49; Ex. B1-44, Sea Breeze 2.67.2, Approved Terms of Reference, Section 7.4.

that the impact of the Project on eel grass or its plans to mitigate this impact are unacceptable.[440]

The Commission has the Jurisdiction to Grant a CPCN to VITR Subject to CPCN to VITR Subject to BCTC Negotiating with Sea Breeze for the use of JDF

206. BCTC agrees that the Commission has this jurisdiction. BCTC believes that this would properly lie as a condition on an Order under section 46 approving VITR.

X. HTG

207. The HTG continue to rely on their argument that separate Crown consultation and accommodation processes must take place for each individual Crown authorization and that those processes must be complete before any individual authorization can be granted.[441] While the HTG rely on *Haida*[442] as authority for when Crown consultation is triggered, they do not provide any authority to support their compartmentalized view of consultation or their submissions on when this process needs to be completed, particularly given that BCTC is expressly prohibited from proceeding with VITR until it has received an environmental approval certificate under the *Environmental Assessment Act*.[443]

208. BCTC continues to rely on its Final Submission in response to the HTG's Final Argument and relies on BC Hydro's submissions at paragraphs 33 to 49 of BC Hydro's Final Argument and paragraphs 30 to 35 of BC Hydro's Reply Submission.

XI. TRAHVOL'S COMPLAINT

[440] TR 8, page 1089, lines 7 to 15; TR 15, page 2462, lines 6 to 21.
[441] HTG Final Argument, para. 18.
[442] *Haida Nation* v. *British Columbia (Minister of Forrests)*, [2004] 3 S.C.R. 511.
[443] SBC 2002, c. 43, s. 8(1).

209. BCTC agrees with BCOAPO that the only possible basis on which TRAHVOL may bring its Complaint is with respect to the issue of safety.[444] TRAHVOL does not offer any submissions in support of its assertions that the continued operation of the 138 kV lines is "unreasonable", "inadequate", or "unreasonably discriminatory".

210. As the party filing a Complaint BCTC submits that the onus is on TRAHVOL to establish the basis for their Complaint. BCTC submits that TRAHVOL has not satisfied this onus. However, regardless of whether TRAHVOL has this onus, BCTC submits that there is no merit to TRAHVOL's complaint and it should be dismissed.

211. In specific response to TRAHVOL's submissions:[445]

a) The EMFs from the existing lines are well within international standards.[446]

b) Health Canada, the government agency responsible for public safety in relation to EMFs, has chosen not to put in place any standards on the basis these are not necessary.[447]

c) The Commission has not found that EMFs associated with overhead transmission lines constitute a health hazard. While it has a policy of prudent avoidance, regarding existing facilities the Commission's previous direction suggest that these facilities would not be moved at ratepayer expense.[448]

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[444] BCOAPO Reply Argument, page 3, para. 14.

[445] This also responds to SDSSPAC's submissions in support of TRAHVOL's complaint at paragraph 43 to 47 of SDSSPAC's submission.

[446] Ex. B1-6, BCUC 1.16.1, 1.16.2 and 1.104.1 to 1.104.3; Ex. B1-101.

[447] Ex. B1-37, Erdreich Report, page 27, lines 12 to 16.

[448] *In the Matter of the Utilities Commission Act, S.B.C. 1980, c. 60, as amended and A Joint Application by the Cities of Vancouver and Burnaby for an Order Requiring British Columbia Hydro and Power Authority to Underground the 230 kV Transmission Line along Boundary Road* (June 9, 1995) Order G-48-95 (B.C.U.C.).

d) These was no evidence led during this proceeding that suggests any need for the Commission to reconsider its previous rulings on EMFs and, to the contrary, BCTC submits that the EMF evidence confirms those rulings.[449]

e) With the exception of Earl Bowling, landowners along the ROW in Tsawwassen all bought their properties with the existing lines in place.[450]

f) The Tsawwassen ROW is not unique from an EMF perspective.[451]

g) The ROW in Tsawwassen is not particularly vulnerable to seismic events.[452]

h) Overhead transmission lines are, in turn, not particularly vulnerable to seismic events.[453]

i) Overhead lines are designed to withstand ice and wind loadings. These forces tend to be greater than seismic forces.[454]

j) If the H-frame structures were to fail during a seismic event, they will tend to fail parallel to the line of the circuit because of the geometry of the structure.[455]

k) TRAHVOL could have sought and filed expert evidence on the seismic withstand capability of the existing structures. They could have also sought and filed evidence regarding what would happen if the structures fail. It did not do so.

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[449] Section IV and V above and BCTC Final Argument, paras. 110 to 127.
[450] Ex. C3-19B.
[451] TR 15, page 2506, line 17 to page 2507, line 20.
[452] Ex. B1-11, TRAHVOL 1.71.1.
[453] Ex. B1-1, page 44, lines 1 to 3.
[454] BCTC Final Argument, para. 132.
[455] Exhibit B1-83.

l) TRAHVOL did not lead any evidence and did not seek to adduce the cost of removing the existing 138 kV facilities. Their comments regarding these costs at this point in time are pure speculation.

ALL OF WHICH IS RESPECTFULLY SUBMITTED

"*original signed by*"

A.W. (Sandy) Carpenter

"*original signed by*"

Chris Bystrom

Appendix A
Sea Breeze's Comments on BCTC's Analysis of HVDC Light™ (Sea Breeze Appendix C)

1. The following provides BCTC's response to Sea Breeze's comments on BCTC's analysis of HVDC Light™.[456]

2. Many of these comments are in support of Sea Breeze's accusations of bias directed at Dr. Rashwan, while not attacking his character,[457] and Sea Breeze's allegations that BCTC and Dr. Rashwan conspired to produce a fabricated analysis of HVDC Light ™ with the sole goal of defending BCTC's much earlier decision to proceed with 230 kV AC technology.[458]

3. BCTC believes that the record on these issues speaks for itself and will limit its reply to Sea Breeze substantive comments. In many instances these issues have been already adequately addressed. The headings below correspond to the remaining headings in Sea Breeze's Appendix C.

Higher Capital and O&M Costs

4. As indicated in Dr. Rashwan's Report and the VITR CPCN Application, BCTC did consider the attributes of HVDC Light™ and whether these provided any additional benefits in the Vancouver Island application.[459] Sea Breeze's suggestion to the contrary is not supported by the evidence. BCTC has also considered other claimed benefits associated with HVDC Light™ in its Application, throughout the hearing process, and in its Final Submissions many of these are discussed elsewhere in this Reply.

[456] Sea Breeze, App. C.
[457] Sea Breeze, App. C, para. 8.
[458] Sea Breeze, App. C, para. 2, para. 8, and para. 9.
[459] Exhibit B1-1, Appendices J and Q.

Higher Losses

5. BCTC does not understand how Sea Breeze arrived at its 1.06% figure.[460] VIC project losses are 110% higher than VITR (based on energy). After deducting system loss reductions, VIC losses are 75% higher than VITR (based on energy).[461] BCTC believes that absolute numbers are more relevant than percentages.

Unknown Useful Life

6. At no point has BCTC suggested that there needed to be a "lock, stock and barrel" replacement of an entire converter station. Clearly a major refurbishment can encompass the replacement or overhaul of components whose life expectancy is less than that of the station as a whole.[462] It may be that what is perceived as a major refurbishment differs between who is paying for the refurbishment and who is getting paid.

System Stability Advantages

7. BCTC does not understand what Sea Breeze means when it says BCTC "now recognizes" that HVDC Light™ would alleviate the lower mainland requirement for additional VAR support.[463] BCTC indicated in the VITR Application that if there was a need for additional VAR support in the Lower Mainland, and HVDC Light™ converter station could help alleviate this.[464] BCTC believes that it is likely the Lower Mainland will require additional VAR support but the necessary studies have not been done to confirm this.[465]

8. Sea Breeze's comments regarding the Vancouver Island synchronas condensors and Cut Place D are responded to in Appendix B.

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[460] Sea Breeze, App. C, para. 29.
[461] Ex. B1-47, BCUC IR 3.184.3.
[462] TR 32, p. 6039, lines 10 to 24.
[463] Sea Breeze, App. C, para. 42.
[464] Ex. B1-1, App. J, p. 9.

Cables May Not Meet Depth Requirements

9. BCTC identified this concern in the VITR Application.[466] BCTC continued to attempt to address this concern throughout the hearing process.[467] Sea Breeze and ABB had every opportunity to address these concerns through the provision of the actual certification test results. Having not done so, and not providing any explanation for this refusal, BCTC's concerns remain unanswered.

[465] Ex. B1-39, p. 6, lines 7-22.
[466] Ex. B1-1, App. J, p. 7 (rev 11 Jul 05).
[467] Eg. B1-39, item 2.9, page 10.

Appendix B
Sea Breeze Appendix E:
System Benefits

1. This Appendix responds to Sea Breeze's remaining claimed "System Benefits" in Appendix E of its Intervenor Argument.

2. As usual, Sea Breeze is critical of BCTC's analysis of its claimed benefits.[468] Despite Sea Breeze's submission that it expended considerable resources in assessing the system benefits that HVDC Light™ may offer, it argues that if the system benefits have not been sufficiently proven that the Commission should re-open this issue and order BCTC to study those benefits further.[469]

3. As indicated above, BCTC did consider the attributes of HVDC Light™ and the application of those attributes, to the transmission system in preparing its VITR Application. BCTC submits that Sea Breeze has had more than a fair opportunity to "prove" these asserted benefits including requesting, if it had chosen to do so, to have BCTC conduct studies on any of these issues. BCTC believes that there is enough information on the record to make a determination regarding the system benefits and requests that the Commission do so.

4. BCTC provided evidence on Sea Breeze's System Cost/Benefits in Exhibit B1-39 and addressed these issues in App. B of its Final Submission. BCTC's response, to the extent is was considered necessary, to Sea Breeze's Appendix E is set out below.

[468] Sea Breeze, App. E, para. 1-2.
[469] Sea Breeze, App. E, para. 3.

Cut Plane D Upgrades

5. BCTC will not respond in detail to Sea Breeze's further submissions on its "Cut Plane D" issue. Contrary to Sea Breeze's submissions:

i. BCTC has not "recognized that voltage stability on Vancouver Island might be a problem and that specific studies were required."[470] The disclaimer on the October 28. 2005 Information Release is a standard form disclaimer;

ii. BCTC did not submit "its own load flow studies" on the day that it cross-examined Sea Breeze's Engineering and System Planning Panel.[471] BCTC was forced, due to the unwillingness of Sea Breeze to provide support for their study results, to attempt to replicate Sea Breeze's results; results which turned out to be invalid;[472]

iii. Sea Breeze seems to suggest that BCTC's studies may have added shunt capacitors that were not already on the system.[473] As indicated in Ex. B1-122, BCTC only added one resource, at the end of the study period, that does not currently exist on the system.[474]

6. Sea Breeze's "studies" on this issue are unreliable.[475] BCTC's study shows that there is no current problem with voltage stability on Vancouver Island.[476] Mr. Choudhury has further testified that there are enough reactive reserves in the system.[477]

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[470] Sea Breeze, App. E, para. 5 and 6.
[471] Sea Breeze, App. E, para. 9.
[472] BCTC Final Submission, para. 20 and 21.
[473] Sea Breeze, App. E, para 9.
[474] Ex. B1-122; TR 37, page 7201, lines 2 to 6.
[475] BCTC Final Submission, para. 19-22.
[476] Ex. B1-122; TR 37, page 7195, lines 1 to 7..
[477] TR 37, page 7207, lines 5 to 7.

7. BCTC has indicated that it undertakes studies every year to ensure that adequate reactive resources are on the system.[478]

8. If, at some point in the future, a voltage stability issue arises, BCTC will address this. This would be required regardless of whether VITR, VIC or JDF was put in place since BCTC must plan for the worst single contingency. As indicated previously, in the case of VIC or JDF this would be the loss of the "PIK" converter station. In this event, these converter stations cannot provide either static or dynamic voltage resources.

9. Based on the above, there is no voltage stability problem with VITR and neither VIC nor JDF provide any benefit from this perspective.

Elimination of VIT Synchronous Condensers

10. Sea Breeze states that "BCTC admits that additional reactive power support is required on Vancouver Island for the VITR project."[479] This is a misstatement. What BCTC said was, "Based on the above, there is a need to provide VAR support on Vancouver Island even with the VIC or JDF Projects in place."[480]

11. This statement was not made in the context of normal system conditions as suggested by Sea Breeze at paragraphs 17 and 18 of Appendix E. It was made in the context of planning for the worst single contingency on Vancouver Island from a voltage support perspective.[481]

12. Sea Breeze's statements that the "VIT Synchronous Condensers need to be kept in service to meet contingencies such as an outage of a converter at PIK is incorrect" and "[l]oss of VITR or loss of VIC or JDF does not present a voltage problem on Vancouver Island because all Vancouver Island transmission lines

[478] TR 37, page 7199.
[479] Sea Breeze, App. E, para. 16.
[480] BCTC Final Submission, App. B, para. 10.
[481] BCTC Final Submission, App. B, para. 8.

would be in service in those situations" are not correct and are not supported by any evidence.[482]

13. BCTC did not accept that Vancouver Island could survive an outage of VIC even without the synchronous condensers in place.[483] BCTC indicated, consistent with Appendix O of the VITR Application, that voltage support for the worst single contingency under either VIC or VITR was not necessary in 2008 but that these needs will increase as loads grow.[484] BCTC's studies confirm the eventual need for contingency voltage support based on the loss of either the VITR circuit or the VIC PIK converter station and, by extension, the JDF converter station.[485]

14. In the event of this contingency, BCTC would rely on the SVCs to provide static, not dynamic, VAR support. Shunt capacitors can provide static VAR support. BCTC has adequate dynamic VAR capabilities in the absence of the SVCs.[486] However, regardless of what might eventually be used to replace the SVCs when they are retired, as indicated above, this need would exist under any of VITR, VIC or JDF.

Retirement of HVDC Pole 1

15. Sea Breeze indicates that it continues to rely on its analysis in its Rebuttal Evidence.[487] This analysis relies on BCTC keeping the HVDC system in service as a back-up for the phase shifter.[488] This is not the case.[489]

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[482] Sea Breeze, App. E, para. 19.
[483] Sea Breeze, App. E, para. 19.
[484] Ex. B1-49, BCUC IR 3.188.1; Ex. B1-1, Appendix O. Ex. B1-44, BCUC 1.190.1.
[485] Ex. B1-1, Appendix O; Ex. B1-49, BCUC IR 3.188.1.
[486] Ex. B1-44, BCUC 3.190.1.
[487] Sea Breeze, App. E, para. 25.
[488] Ex. B2-62, p. 4.
[489] Ex. B1-39, page 11, lines 21 to 22.

16. Sea Breeze goes on to assert that VIC offers greater reliability than VITR and that maintaining the HVDC Pole 1 would be one way of narrowing the "reliability gap."[490] Sea Breeze does not cite any evidence supporting this.

17. BCTC's studies do not support this conclusion.[491] While Sea Breeze indicates that it categorically rejects BCTC's EENS analysis, it has not conducted or filed any studies contradicting this.

18. Sea Breeze suggests that in BCTC's Intervenor Evidence that it recognized the limitations of the phase shifter.[492] More accurately put, BCTC indicated that, even though the HVDC system is not necessary to meet BCTC's planning criteria or as back-up for the phase shifter, it may be "economic" to continue to maintain the HVDC system for some further period of time. As indicated in the continuation of the quote that Sea Breeze did not reproduce, this would be a standalone analysis of the value of the HVDC system and BCTC would undertake this analysis if VIC or JDF were put in place as well.[493]

19. Sea Breeze concludes by submitting there must be some benefit attributes to JDF or VIC for avoiding reliance on the phase shifter and again suggests that further studies be conducted to attempt to determine this "benefit."[494]

20. BCTC submits that there is no need for further studies. Sea Breeze's claim of benefits from retiring the existing HVDC system was based on the mistaken assumption that BCTC intended to keep this system in place as part of VITR. Having realized that this assumption was incorrect they now claim there are reliability benefits associated with VIC or JDF. As indicated above, BCTC's studies of the comparable reliability of the VITR and VIC projects, as measure by EENS, is that the VITR Project is more reliable.[495] BCTC also testified that due

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[490] Sea Breeze, App. E, para. 25.
[491] Ex. B1-47, BCUC IR 3.186.2.
[492] Sea Breeze, App. E, para. 26.
[493] Ex. B1-39, p. 12, lines 2-3.
[494] Sea Breeze , App. E, para. 27.
[495] Ex. B1-47, BCUC 1.186.1, EENS Study for VITR Project.

to the nature of the BPA system and the location of JDF it is less reliable than VITR.[496] If Sea Breeze had wanted to prepare its own reliability studies it had the full opportunity to do so. Having not done so, BCTC submits that it is not in a position to suggest that further studies need to take place at this time.

[496] BCTC Final Submission, para. 79.