

**Hydro One Leave to Construct Application  
(Bruce – Milton) Transmission Reinforcement Project  
(EB-2007-0050)**

**Board Staff  
Interrogatory Set No. 1  
February 25, 2008-02-25**

Note: The number of questions for each of the main “Issues” are:

- 9 Questions covering 1.0 Project Need and Justification
  - 15 Questions covering 2.0 Project Alternatives
  - 5 Questions covering 3.0 Near Term and Interim Measures
  - 6 questions covering 4.0 Reliability and Quality of Electricity Service
  - 2 Questions covering 5.0 Land Matters
  - 1 Question covering 6.0 Aboriginal Peoples Consultations
- 38 Questions (for Interrogatory Set No. 1)**

**1.0 Project Need and Justification  
( 9 Questions)**

**Question No. 1.1**

Issue Number: 1.1

Issue: Has the need for the proposed project been established?

Ref.(a) Press Release by Bruce Power in Tiverton, Ontario dated August 29, 2007 in regard to “Bruce Power and the Ontario Power Authority (OPA) have amended their existing Bruce A agreement to allow for the complete refurbishment of Unit 4.

Ref.(b) Exh B/T 6/S 5/Appendix 2( Letter dated Dec 22, 2006 from OPA to Hydro One, IESO, and Bruce Power)/ p. 1/last paragraph

Preamble:

(a) Ref.(a) explains the additional scope of work to be carried out under the amendment to the agreement on unit 4. The announcement further indicated that Bruce Power expects to complete the work on Units 3 and 4 by 2013.

(b) Ref.(b) states in part:

*“....Bruce Power is refurbishing and returning into service the two “laid-up” generating units, Unit 1 and 2, at the Bruce A nuclear plant. These units, each rated at 725 MW are scheduled to be returned into service in 2009.....Coincidental to the return of the two Bruce units, Bruce Power is scheduling the outage of other units at the Bruce A plant for extended maintenance work from 2009 to 2011. Thus in effect, an equivalent of one Bruce unit is added between 2009 and end of 2011, and two units thereafter”*

Questions:

- (i) Does the amended agreement [see Ref.(a)] between Bruce Power and the OPA affect Hydro One's assessment of the amount and timing of additional transmission capacity required between Bruce and Milton?
- (ii) In Ref. (b) it is indicated that units 3 and 4 will be taken out of service, one unit at a time between 2009 and 2011. Please confirm from OPA and Bruce Power whether under the amended agreement units 3 and 4 will be taken out of service one at a time between 2009 and 2013 or both units 3 and 4 will be out of service for the entire period between 2009 and 2013.
- (iii) If there are expected changes in the amount or timing of new transmission capacity, please indicate when Hydro One expects to file updated evidence.

**Question No. 1.2**

Issue Number: 1.1

Issue: Has the need for the proposed project been established?

Ref.(a) Exh. A/T 2/S 1/pp. 1, 2 and 3

Ref.(b) Exh. B/T 1/S 3/pp. 1 and 2

Ref.(c) OEB Filing Requirements for Transmission and Distribution Applications (November 14, 2006)/section 5.2.2/pp. 33 and 34

Preamble:

- (a) In Ref.(a) and Ref.(b), the Applicant states that the project is needed in order to accommodate additional Bruce area generation and to satisfy IESO reliability requirements.
- (b) In Ref.(c), Section 5.2.2 "Project Need" outlines the various categories of triggers for Non-discretionary projects as well as examples of projects that are classed as discretionary projects.

Questions

With reference to Preamble (b), and Ref. (c), please indicate which categories of need that this project intended to meet? In the response, please provide a narrative explaining the justification for the category or categories of need identified.

**Question No. 1.3**

Issue Number: 1.1

Issue: Has the need for the proposed project been established?

Ref. Exh. B/T 1/S1/pp. 4 and 5

Preamble:

- (a) The noted Ref. it is stated that generation from the Bruce Power Complex and the general Bruce area is currently delivered to south/central Ontario via the following transmission facilities:

- the 500 kV Bruce - Milton SS and Claireville TS double circuit transmission line, B561M and B560V;
- the 500 kV Bruce - Longwood TS double circuit transmission line, B562L and B563L;
- the 230 kV Bruce - Orangeville TS double circuit transmission line, B4V and B5V;
- the 230 kV Bruce - Detweiler TS double circuit transmission line, B22D and B23D; and,
- the 230 kV Bruce - Owen Sound TS double circuit transmission line, B27S and B28S.

It is also indicated that these circuits have only about 5,000 MW (5,060 MW) of transmission capacity to deliver the output from the Bruce Power complex and from nearby wind generation.

- (b) The full output of the Bruce A and the Bruce B complex were in the order of 6,560 MW ( $4 \times 890 \text{ MW} + 4 \times 750 \text{ MW}$ ) prior to the decision in the mid 1990s to lay up 2 of the Bruce A units of about 1500 MW of Capacity.

Questions:

- (i) Did Hydro One carry out analysis in regard to how the transmission facilities managed to deliver the entire capacity of the Bruce area generating facilities for that long period of time (period from in-service of all 8 generating units (6560 MW) in the Bruce Complex and the transmission lines that evacuated that generation until the laying up the two units)? If so please provide such analysis. If not, please provide explanation why Hydro One felt such analysis is not needed.
- (ii) Would it be possible to carry out such analysis? And if so, how long would it take to provide it?
- (iii) In carrying out the analysis identified in (i) above, if this is workable, please explain what has occurred to degrade the transmission delivery capability to 5,060 MW (a reduction of approximately 1,500MW)?

**Question No. 1.4**

Issue Number: 1.1

Issue: Has the need for the proposed project been established?

Ref. Exh. B/T 1/S 3/p. 2

Preamble:

- (a) The Applicant states that the new proposed line is needed to accommodate a shortfall of transmission capacity from the Bruce area that will reach 3,100 MW (2,100 MW by 2012 plus assuming the development of 1000 MW wind generation in the Bruce area).
- (b) It is important to examine the historical performance of the existing transmission system as well as the performance of the generation

rejection system (GR) in dealing with contingencies and consequential safe operation of the transmission lines.

Questions:

- (i) How many single circuit outages (classified as “momentary” - less than 1 minute, and “sustained” ) have occurred on the existing Bruce to Milton and Bruce to Claireville lines (B560V and B561M) since they went into service?
- (ii) How many simultaneous double circuit outages (classified as “momentary” - less than 1 minute, and “sustained” ) have occurred on these lines in the same time frame?
- (iii) In the various double circuit sections of the Hydro One 500 kV transmission system (excluding the Essa TS to Hamner TS section), what percentage of the “sustained” forced outages that occurred since the lines went into service involved outages of both lines simultaneously?
- (iv) Is there a “sustained” forced outage percentage beyond which Hydro One would consider double circuit lines built on separate towers to deal with the common mode failure scenario of constructing two lines on the same tower?
- (v) Please provide a full description of the Generation Rejection Scheme that was utilized during the period when all 8 units at the Bruce complex were operational delivering about 6,500 MW to the electricity system.
- (vi) Please explain whether or not the GR scheme identifies certain loads connected to the transmission network and would trip them off i.e., disconnect such a load in order to maintain stability of the system?.
- (vii) Please provide a complete history of all incidents from the in-service of the GR until it was taken out of service, providing for each incident the following information:
  - a. Date and Time;
  - b. The trigger event e.g., fault on certain system element (500 kV transmission line or Autotransformer) or false trip event of the protection scheme.
  - c. Cause of failure of the system element or the false trip of a protection scheme
  - d. Which generating units at the Bruce Complex were rejected

**Question No. 1.5**

Issue Number: 1.1

Issue: Has the need for the proposed project been established?

- Ref.(a) Exh. B/T 6/S 5/Appendix 1 (OPA Analysis of Need For the Proposed Facilities)/Section 2.2/pp. 3 to 5
- Ref.(b) Filing Requirements for Transmission and Distribution Applications (November 14, 2006)/p. 35/section 5.3.2/3<sup>rd</sup> paragraph

Preamble:

Congestion reduction attributable to the proposed project is one of the important benefits that need to be assessed on an annual basis over the period 2012 to 2016 inclusive i.e., covering a period of 5 years.

Question/Request:

- (i) Did Hydro One carry out such analysis? If so please provide the results. If not please provide the reasons such analysis was not carried out.
- (ii) If a study as prescribed in (i) above was not carried out, Is it possible to provide the results of such analysis by October 15 for the technical conference? If not please indicate when such results can be made available.
- (iii) In carrying out the analysis outlined above, please assume:
  - a. The Near Term measures are completed including the enhancements of the 230 kV circuits and installation of Shunt Capacitors and SVCs in the various stations as outlined in the evidence;
  - b. Please reflect Hydro One's response to Board staff Question No. 1 above in regard to the delay of the return to service of Bruce Units 3 and 4 to 2013, as well as reflecting whether in effect, an equivalent of one Bruce unit is added between 2009 and end of 2013, and two units thereafter; or in effect there is no new generation capacity addition at Bruce A until end of 2013.
  - c. Reflect the latest expectations regarding the potential 1000 MW of wind, to ensure that what is simulated in the assessment is reflective of the latest information.
- (iv) Repeat the same steps above i.e., steps (ii), and (iii) but with both Interim Measures in-service i.e., the GR scheme and the series compensation as outlined in Ref. (a), as well as assuming that the new double circuit 500 kV transmission line is not in service.

**Question No. 1.6**

Issue Number: 1.1

Issue: Has the need for the proposed project been established?

Ref.(a) Exh. B/T 6/S 5/Appendix 1 (OPA Analysis of Need For the Proposed Facilities)/Section 2.2/p.4 /lines 21 29

Ref.(b) Exh. B/T 6/S 4(the Ontario Reliability Outlook)/p. 5

Preamble:

- (a) In Ref.(a), OPA concludes that the transmission capacity shortfall would be 500 MW by 2009, 2,100 MW by 2012 and could be over 3,100 MW (assuming the 1000 MW of wind generation would be developed).
- (b) In Ref.(b), the evidence on the capacity factor of wind generation suggests that :
  - o a winter capacity factor for a wind farm would be in the order of 40%

- a summer capacity factor would be in the order of 20% (given that Ref.(b) indicate that the average annual Capacity Factor of all wind farms was 25 %)

Questions/Requests:

- (i) Please confirm that the OPA translated the committed wind capacity of 725 MW as well as the potential long term wind of 1000 MW assuming a capacity factor of 100 %;
- (ii) Please confirm that given the performance of wind generation it is reasonable to assume a capacity factor of about 20% for summer and 40% for winter, which reflect the capacity factors shown in Ref.(b).
- (iii) Please produce two "Power Flow Duration Curves or (PFDC)", one for Winter (5 months, Nov to March) and one for Summer (7 months, April to October), reflecting
  - the total generation in the Bruce Complex [Bruce A Units (1 and 2) back in service in 2009, with units 3 and 4 taken out one at a time till 2011]
  - the committed wind generation of 725 MW as well as the potential wind generation of 1000 MW, both assuming Capacity Factors of 20% in Summer and 40% in Winter.
- (iv) Based on the results of step (iii), please provide estimates of the shortfall for the summer and winter as defined above in MW in 2009 and in 2012 (with and without the 1000 MW of wind potential).

**Question No. 1.7**

Issue Number: 1.3

Issue: Have all appropriate project risk factors pertaining to the need and justification (including but not limited to forecasting, technical and financial risks) been taken into consideration in planning this project?

Ref. Exh. B/T 6/S 2 (IESO System Impact Assessment Report)/Sec. 9.1.2 /p. 9 and Diagram 5

Preamble:

With the preferred alternative in place and with the system loaded to projected 2012 levels and all circuits in-service as per the load flow sketch Diagram 5, the new double circuit Bruce Milton line and the existing Bruce Milton/Claireville double circuit lines (B560V and B561V) are projected to each carry 37 % of the Bruce area to GTA load flow and the adjacent 230kV double circuit lines (B4V and B5V) are projected to carry 9% of the load flow.

Questions:

- (i) Did Hydro One perform an evaluation of the prudence of the proposed project that will transmit about 83% of the Bruce-to- GTA load flow along one corridor when the other three available corridors are proposed to deliver only 9%, 7% and 1% of this load flow respectively?

- If so provide this evaluation. If not, please provide the reasons for not carrying out such an evaluation?
- (ii) If the evaluation discussed in (i) above was not carried out, can Hydro One provide such an evaluation by October 15 for the technical conference.

**Question No. 1.8**

Issue Number: 1.4

Issue: Is the project suitably chosen and sufficiently scalable so as to meet all reasonably foreseeable future needs of significantly increased or significantly reduced generation in the Bruce area?

Ref. Exh. B/T 1/S 1/pp. 4 and 5

Preamble:

The Applicant states that the project as defined can meet the requirements of refurbished Bruce A and Bruce B facilities, 725 MW of committed wind and a possible 1,000 MW of future wind for a total of 3,100 MW of additional generating capacity

Questions:

- (i) If the 1,000 MW of future wind doesn't materialize, can the project as put forward provide benefits related to increase reliability and security or reduction in transmission system losses? if so please describe these benefits and quantify where possible.
- (ii) If providing a response to (i) above in the technical conference is not possible, please indicate would Hydro One be able to prepare such an evaluation and whether it would be available during the round of interrogatories following the technical conference.
- (iii) If 3,100 MW of additional capacity does occur as noted above and in addition new nuclear facilities (Bruce C) are also constructed at the Bruce Nuclear Complex, can the transmission project as proposed accommodate this capacity? For the purpose of responding to this hypothetical question please consider first a single unit of 1000 MW capacity, and if workable assume a second unit of 1000 MW capacity, and then a third etc.
- (iv) Please repeat the same steps covered in (iii) above with the additional assumption that the interim measures involving installation of 30% Series Compensation is in service as well as the GR scheme, as outlined in Hydro One's evidence.

**Question No. 1.9**

Issue Number: 1.4

Issue: Is the project suitably chosen and sufficiently scalable so as to meet all reasonably foreseeable future needs of significantly increased or significantly reduced generation in the Bruce area?

Ref.(a) Exh. B/T 1/S 1/pp. 4 and 5

Ref.(b) Exh. B/T 6/S 2/p. 2/section 2/paragraph 2

Questions:

- (i) Is it feasible to install a transmission line with Quad 932.7 kcmil conductors instead of Quad 585.0 kcmil conductors as outlined in Ref.(b);
- (ii) If the assumption in (i) above is feasible, could additional new nuclear generation (assume one unit of 1000 MW) and if workable assume a second units of 1000 MW in addition to the projected 3,300 MW in the Bruce area be accommodated?
- (iii) If (ii) indicate that this is a workable option, what would be the estimated cost of a double circuit 500 kV transmission line utilizing this larger conductor arrangement?

**2.0 Project Alternatives**

(15 Questions)

**Question No. 2.1**

Issue Number: 2.1

Issue: Have all reasonable alternatives to the project been identified and considered?

Ref. Exh. B/T 3/S 1/p. 3

Preamble:

The Applicant states that a transmission line constructed along the existing Bruce to Milton corridor is the only alternative that meets the long term need and satisfies the other key objectives.

Questions/Requests:

- (i) Did Hydro One carry out a comparison of the reliability of the proposed line constructed along the Applicant's recommended route compared to a similar double circuit transmission line following routes tracking the B22D/B23D corridor and the D10H corridor? If yes, please provide that comparison. If not provide the reasons for not performing such a comparison.



- (ii) If the comparison discussed in (i) above was not carried out, can Hydro One provide such a comparison by October 15 for the technical conference. .

**Question No. 2.2**

Issue Number: 2.1

Issue: Have all reasonable alternatives to the project been identified and considered?

Ref. Exh. B/T 2/S 2/p. 1

Preamble:

The proposed 173 km double circuit transmission line from Bruce Junction to Milton SS is to be located on the north side of the existing ROW corridor from Bruce Junction to Colbeck Junction and on the east side of the existing ROW corridor from Colbeck Junction to Milton SS.

Question:

Why was this particular orientation selected, as opposed to a location on the south and west sides of the existing ROW corridors?

**Question No. 2.3**

Issue Number: 2.1

Issue: Have all reasonable alternatives to the project been identified and considered?

Ref. Exh. B/T 3/S 1/pp. 1 to 6

Preamble:

It is important to demonstrate the advantages and disadvantages of the following Alternatives, each selected on an existing ROW corridor and each involving a 500 kV double circuit transmission lines between the Bruce area and the GTA:

- (a) the 230 kV Bruce - Detweiler TS double circuit transmission line, B22D and B23D corridor and Kitchener to the GTA via widened existing 230 kV or 500 kV corridors;
- (b) the 230 kV Bruce - Owen Sound TS double circuit transmission line, B27S and B28S corridor and Owen Sound to Essa and Essa to the GTA via existing 115 kV and 500 kV corridors; and
- (c) the 115 kV Hanover - Detweiler TS single circuit transmission line, D10H corridor and Kitchener to the GTA via widened existing 230 kV or 500 kV corridors.

Requests:

For each of the noted alternative, please provide:

- (i) the estimated cost of constructing the 500 kV double circuit transmission lines.
- (ii) the advantages and disadvantages of these alternatives in terms of flexibility to operate the transmission system when contingencies occur, flexibility in scheduling maintenance outages, and general requirements.
- (iii) The reliability and quality advantages and disadvantages of each alternative.

**Question No. 2.4**

Issue Number: 2.2

Issue: Has an appropriate evaluation methodology been applied to all the alternatives considered?

Ref. Exh. B/T 3/S1/p. 3

Preamble:

In the Ref. above, the Applicant stated that the proposed solution to the problem of inadequate transmission delivery from the Bruce Complex had to satisfy four key objectives as follows:

- a proposal that is consistent with provincial land use policies for optimizing the use of existing transmission line ROWs;
- a proposal that can be constructed and in-service as soon as possible;
- a proposal that makes use of proven and widely used technology; and
- a proposal that can be constructed with a reasonable cost.

Questions:

- (i) How did the OPA arrive at these four objectives and why were they the only objectives that were selected?
- (ii) Why were no objectives selected that relate to power system reliability (including security) and quality of electricity service ?
- (iii) What weightings have the OPA ascribed to each of the four objectives?

**Question No. 2.5**

Issue Number: 2.2

Issue: Has an appropriate evaluation methodology been applied to all the alternatives considered?

Ref. Exh. B/T 3/S 1/p. 4/lines 9 to 23

Preamble:

- (a) In regard to Alternative 1 ( 500 kV double circuit transmission line from Bruce to Highway 9 Junction to Essa TS), the Applicant states that only 7,300 MW can be delivered over this route.
- (b) The applicant also states that another reason that Alternative 1 is undesirable is that it would use approximately 1,000 MW of the available transfer capacity between Essa TS and Claireville TS and this capacity reduction would limit the development of northern generation.

Questions:

- (i) What are the limitations to increasing the delivery along this route to the desired 8,100 MW level?
- (ii) How can these limitations be mitigated or removed and what is the estimated cost of the mitigation/removal?
- (iii) Keeping in mind item (b) in the Preamble and considering that the distance between Essa TS and Claireville TS is only 70 km and space is available on the existing ROW, why was this not considered by the Applicant (or the OPA) in the evidence?
- (iv) What would be the estimated cost of constructing a 500 kV double circuit transmission line from Essa TS to Claireville TS?

**Question No. 2.6**

Issue Number: 2.2

Issue: Has an appropriate evaluation methodology been applied to all the alternatives considered?

Ref. Exh. B/T 3/S 1/pp. 5 and 6/p.5 (lines 25-58) and p.6(lines 1-8)

Preamble:

The Applicant states that Alternative 4 would provide less transfer capacity than the preferred option. Alternative 4 is a 500 kV double circuit transmission line from Bruce to Longwood TS and a 500 kV double circuit transmission line from Longwood TS to Middleport TS all along existing ROW corridors.

Questions:

- (i) How much transfer capability does the applicant, the IESO and the OPA believe can be provided utilizing this alternative?
- (ii) What are the limitations to increasing the transmission delivery with this alternative to the desired 8,100 MW level?
- (iii) How can these limitations be mitigated or removed and what is the estimated cost of the mitigation/removal?
- (iv) Assuming that the both interim measures(the Generation Rejection and the Series Compensation) are implemented, what would be the total transfer capability of the modified Alternative 4?

**Question No. 2.7**

Issue Number: 2.2

Issue: Has an appropriate evaluation methodology been applied to all the alternatives considered?

Ref. Exh. B/T 3/S 1/p. 6

Preamble:

- (a) The applicant states that Alternative 5 would cost between \$1.5 B and \$2.0 B. Alternative 5 is a High Voltage Direct Current (HVDC) overhead transmission line from Bruce to Milton.
- (b) The conventional HVDC technology would reasonably be used for an application such as this, (noting that HVDC Light technology is only suitable for relatively low power applications), and it is common knowledge that this equipment has been in-service in North America for more than 30 years.

Questions/Requests:

- (i) Please provide cost breakdown supporting this cost estimate.
- (ii) Did Hydro One carry out an evaluation to quantify the benefits provided by a HVDC line (compared to an equivalent AC line) with respect to improved stability, reliability and controllability and ROW requirements. If yes, please provide such an evaluation. If not provide the rationale for not providing such analysis.
- (iii) If the evaluation described in (ii) above was not carried out, can Hydro One provide such an evaluation by October 15 for the technical conference.
- (iv) Given the status of the technology in Preamble (b) please provide the rationale for Applicant's statement that "there are technology risks associated with this alternative".

**Question No. 2.8**

Issue Number: 2.2

Issue: Has an appropriate evaluation methodology been applied to all the alternatives considered?

Ref. Exh. B/T 3/S 1/pp. 5 and 6  
IESO System Impact Assessment Report CAA ID No. 2005-200

Preamble:

An alternative involving a 500 kV single circuit transmission line from Longwood TS to Nanticoke GS or Middleport TS along an existing ROW corridor may be viewed as a workable alternative. For example if the M31W – M32W – M33W corridor could be used and if one of the existing 230 kV lines could be removed,

a new 500 kV line could likely be installed without the requirement to acquire any additional property.

Request/Questions:

- (i) Did Hydro One carry out such an evaluation? If yes, please provide it.
- (ii) If the answer to (i) above is negative, please provide the following assuming that a line such as noted above could be constructed:
  - a. How much transfer capability does the Applicant believe can be provided by an alternative such as this?
  - b. What are the limitations to increasing the delivery utilizing this alternative to the desired 8,100 MW level?
  - c. How can these limitations be mitigated or removed and what is the estimated cost of the mitigation/removal?
  - d. Assuming that the both interim measures are implemented, what would be the total transfer capability of the modification to this Alternative?

**Question No. 2.9**

Issue Number: 2.3

Issue: For all of the considered alternatives, does the evaluation methodology utilized include a cost benefit comparison as well as a comparison of all quantitative and qualitative benefits?

Ref. Exh. B/T 3/S 1/pp. 3 to 6

Preamble:

Page 3, lines 14 to 16, of the above noted reference states that "The OPA concluded that the only alternative that meets the long-term need and satisfies the other key objectives is a new double-circuit 500 kV line from Bruce to Milton within a widened existing Bruce to Milton corridor". Pages 4-6 describe four other alternatives that were considered and rejected. It is further stated that: the "Bruce to Essa TS" alternative was rejected for failing to meet the needed transfer capability; the "Bruce to Kleinburg TS" was rejected because over 52 km of new transmission corridor is required; and, the "Bruce to Guelph area" alternative was rejected because at least 30 km of new transmission corridor is required.

Questions / Requests:

- (i) Has the OPA or Hydro One carried out any comparative cost benefit analysis of the alternatives considered covering all quantitative and qualitative benefits? If so, please provide the results. If not please provide the reasons for not carrying out such an evaluation.
- (ii) If the response to (i) above is negative, please indicate if such evaluations on the 5 alternatives can be carried out and the results presented in the evidence, if possible at the technical conference, to allow for meaningful comparison.

- (iii) Please indicate whether Hydro One carried out loss of load probability evaluation on all five Alternatives? If so please provide such evaluation. \
- (iv) If the answer to (iii) above is negative, please indicate whether Hydro One can carry out loss of load probability evaluation on all five Alternatives, and provide the results either at the technical conference or in response to an interrogatory during the round of interrogatories phase of this proceeding. In carrying such a study, please consider evaluating an average financial impact on transmission customers expressed in dollars(also commonly known as customer damage cost) of each Alternative using typical values per customer from older studies that Ontario Hydro had completed and would be adjusted for inflation. If such studies are not available to Hydro One, please use other industry sources from the electricity industry in U.S.A.
- (v) Is it normal practice to rule out alternatives that require new transmission corridor when an existing corridor is available? If so:
  - please provide details of Ontario's land use policy that would require this;and, if not:
  - Please explain further why the "Bruce to Kleinburg TS" and the "Bruce to Guelph area" alternatives were discarded.

**Question No. 2.10**

Issue Number: 2.3

Issue: For all of the considered alternatives, does the evaluation methodology utilized include a cost benefit comparison as well as a comparison of all quantitative and qualitative benefits?

Ref.(a) Exh. B/T 6/S 2

Ref.(b) Filing Requirements for Transmission and Distribution Applications  
(November 14, 2006)/p. 35/section 5.3.2/3<sup>rd</sup> paragraph

Preamble:

- (a) In Ref.(a), second paragraph on page 1, it is stated that "Under the OEB Act, 1998, s. 96 (2), "public interest" is defined to mean the interests of consumers with respect to prices and the reliability and quality of electricity service".
- (b) In Ref.(b), it is stated that: *"One way for an Applicant to demonstrate that that a preferred option is the best option is to show that it has the highest net present value as compared to the other viable alternatives. However, this net present value need not be shown to be greater than zero. In the case of an internally set project, "doing nothing" would count as a viable option."*

Questions / Requests:

- (i) Given the Preambles (a) and (b), has the OPA or Hydro One carried out a comparative analysis of the alternatives considered in terms of

prices, reliability and quality of electrical service? If not why not? If so, please provide a summary of the results.

- (ii) Has the OPA or Hydro One considered the reliability impact of adding transmission to an existing corridor vs. a new corridor or a corridor where multiple line outages would less impactful? If not why not? If so, please provide results of any analysis that was done.

**Question No. 2.11**

Issue Number: 2.4 a)

Issue: Have appropriate evaluation criteria and criteria weightings been utilized in the evaluation process for the alternatives and the proposed project and what additional criteria/weightings could be considered?

Ref. Exh. B/T 6/S 2 (IESO System Impact Assessment Report)/Sec. 8/p. 9 and Diagram 5

Preamble:

- (a) The IESO states that with the proposed 500 kV double circuit Bruce to Milton line in service, the existing 500 kV line, M585M, from Middleport TS to Milton SS is projected to carry out virtually no power delivery (load flow of 5.1 MW) under normal conditions.
- (b) The IESO further explains that the proposed 500 kV double circuit line provides valuable voltage support by delivering reactive power to Milton SS. In the IESO's SIA report, Diagram 5 indicates that with all transmission circuits in service and the system loaded at 28,400 MW, the reactive power delivered by the M585M transmission line is projected to be 219.5 MVARs.

Questions:

- (i) In regard to Preamble (a), and since practically no power delivery is projected for this scenario, does the Applicant and the IESO believe that the other benefits provided justify the transmission line arrangement and location as proposed? and if so, please provide detailed description of these other benefits and quantification of these benefits where feasible.
- (ii) In regard to Preamble (b), what would be the estimated cost of a shunt capacitor installation at Milton SS that could provide an equivalent amount of reactive power (i.e. 220 MVARs)

**Question No. 2.12**

Issue Number: 2.6

Issue: Are the project's rate impacts and costs reasonable for:

- the transmission line;
- the station modifications; and

- the estimated Operating, Maintenance and Administration requirements.

Ref. Exh. B/T 4/S 2/p. 1/Table 1

Preamble: The foot note for Table 1 indicate that carrying costs are included in the cost estimates

Questions/Requests:

- (i) Please clarify whether the carrying costs referred to in Table 1 are the AFUDC amounts that are shown in Table 2 (page 2) and in Table 4 (page 3)?
- (ii) If the carrying costs are not those reflected in the AFUDC amounts, please provide a Table (replacing Table 1) depicting the three categories of cost estimates without the carrying cost, and identify for each on separate line the corresponding carrying costs for each.
- (iii) In reference to (ii) above, please provide adequate detailed explanation of how the carrying costs were calculated.

**Question No. 2.13**

Issue Number: 2.6

Issue: Are the project's rate impacts and costs reasonable for:

- the transmission line;
- the station modifications; and
- the estimated Operating, Maintenance and Administration requirements.

Ref. Exh. B/T 4/S 2/p. 2/Tables 2 and 3

Questions/Requests:

- (i) Please provide for each of the two tables the costs broken down by each of the Stations (Bruce A, Bruce B, Milton SS);
- (ii) Please provide the basis for the overheads amounts, and provide a break down of each of the two overhead amounts into direct overhead (field supervision...etc) and indirect overhead (cover head office functions ...etc.).

**Question No. 2.14**

Issue Number: 2.6

Issue: Are the project's rate impacts and costs reasonable for:

- the transmission line;
- the station modifications; and
- the estimated Operating, Maintenance and Administration requirements.

Ref. Exh. B/T 4/S 2/p. 3/Table 4

Questions/Requests:



Please provide the basis for the overheads amounts, and provide a break down of that overhead into direct overhead (field supervision...etc) and indirect overhead (cover head office functions ...etc.).

**Question No. 2.15**

Issue Number: 2.6

Issue: Are the project's rate impacts and costs reasonable for:

- the transmission line;
- the station modifications; and
- the estimated Operating, Maintenance and Administration requirements.

Ref. Exh. B/T 4/S 2/pp. 4 and 5 and Table 5

Preamble:

- (a) The evidence regarding Cost of Comparable Projects is shown in Table 5, featuring comparable projects constructed in the early to mid 1990's.
- (b) There is a need to compare the projects on constant dollar value basis and per kilometre basis.

Questions/Requests:

In order to compare the projects on constant dollar value basis and per kilometre basis, please carry out the following steps and provide the answer in a tabular form:

- (i) use the in-service date of 1990-07-01 for the "Bruce x Longwood" project as a reference point and adjust the costs of the three other projects down by the appropriate blended deflation rate.
- (ii) The blended deflation rate would have two parts (one for Labour and the other for Material) and weighed by the Portion of each of the two Cost Components.
- (iii) Use the corresponding Length in kilometres to produce a \$/km for each of the four projects. Please list all the assumptions and show details of the calculations.
- (iv) Please carry out the same steps to arrive at a cost in \$/km (1990) of the original project [the Bruce x Milton 500 kV double circuit transmission line], which was in-service at the time the Bruce Complex was commissioned. In this case inflation rates would be used in similar manner to achieve this step.

**3.0 Near Term and Interim Measures**  
(5 Questions)

**Question No. 3.1**

Issue Number: 3.1

Issue: Are the proposed near term and interim measures as outlined in the application appropriate?

- Ref.(a) Exh. B/T 1/S 3/p. 1/section 2.0 "Need for the Project"
- Ref (b) Hydro One's response to Board Staff interrogatory No. 84 [Exh J/T 1/S 84] - the "2007 and 2008 Electricity Transmission Revenue Requirements Hearing" (EB-2006-0501) – the interrogatory response included a copy of the Report titled "Series Capacitor Application in Ontario:SSR Mitigation Final Report; Electric Systems Consulting, ABB Inc., Raleigh, NC, March 30, 2006".
- Ref.(c) Exh. B/T 6/S 5/Appendix 2(letter dated December 22, 2006 from OPA)/p. 3/last paragraph
- Ref.(d) Exh. B/T 6/S 5/Appendix 5/ OPA's Transmission Discussion Paper No. 5/pp. 50 to 53

Preamble:

- (a) In Ref. (a) the applicant identifies its reliance on the OPA Materials for justification of Need and indicate the location of that material in the evidence to be in Exh. B/T 6/S 5.
- (b) In Reference (b), ABB state in the Conclusions and Recommendations on page 50 that...the problem of SSR is manageable and can be mitigated for all units with a combination of operating strategies and the application of Thyristor Controlled Series Capacitors (TCSC)
- (c) In Ref.(c), OPA stated in part that  
*"With regard to series compensation, a new technology for Ontario, for increasing transmission capacity out of Bruce, Hydro One Networks has expressed concern regarding the system and equipment risks". The OPA appreciates this concern and will retain **third party experts to undertake due diligence study to assess the suitability and risks associated with the use of series compensation for this application.** Staff of Hydro One Networks and the OPA have drafted a document that addresses the scope of technical issues and concerns to be covered by this study. The process to retain an appropriate consultant has commenced."*
- (d) Board staff consider the completion of the study outlined in Preamble (c) above and its submission to the Board prior to the Oral Hearing on January 14, 2008 to be essential and key to understanding the full picture of the project and its impact on consumers with respect to prices and the reliability and quality of electricity service.
- (e) The interim measures mentioned in Ref.(d) including installation of series compensation are considered critical elements for the period between 2009 and 2011 of integrating the additional generation resources in the Bruce area.

Requests:

- (i) Please provide the document drafted by Hydro One and the OPA for the noted study;
- (ii) Please provide the time-line for completing the study.
- (iii) As highlighted in Preamble (c) and (d) above, please provide the latest draft of the study.
- (iv) Please indicate when the completed study referred to in Preambles (c) and (d) above would be submitted to the Board?
- (v) Given that ABB has already complete its report and indicated that TCSC are feasible for the application in question why hasn't this been factored into the plans of the Applicant.

**Question No. 3.2**

Issue Number: 3.1

Issue: Are the proposed near term and interim measures as outlined in the application appropriate?

Ref. Exh. B/T 6/S 5/Appendix 2(letter dated December 22, 2006 from OPA)/pp. 2 to 5

Preamble:

The letter states that the proposed interim measures (generation rejection and series compensation) are not suitable long term solutions and they increase the risk to the security and reliability of the power system.

Questions:

- (i) If the Applicant and the OPA believe that measures such as this can negatively impact the security and reliability of the power system why are they being considered and proposed as interim measures?
- (ii) What does the Applicant, the IESO and the OPA believe are the specific technical and operational reasons that limit the use of these interim measures and what actions can be taken to limit their impact to system security and reliability?

**Question No. 3.3**

Issue Number: 3.2

Issue: Can the proposed near term and interim measures be utilized longer than the suggested two to three year time frame?

Ref.(a) Exh. B/T 6/S 2/Sec. 8.2 (pp. 10 and 11) & Sec.9.1.1 (p. 12)

Ref.(b) Hydro One's response to Board Staff interrogatory No. 84 [Exh J/T 1/S 84] - the "2007 and 2008 Electricity Transmission Revenue Requirements Hearing" (EB-2006-0501).

Preamble:

It is essential and informative to have the IESO perform additional analysis to show the effect of the scenario where the Series Compensation is assumed in-

service by 2009, on the system prior to and after the installation of the proposed new transmission lines.

Requests:

With the assumption that the Series Compensation installation is in service by 2009 with sizes and location per the IESO suggestion i.e., 30 % compensation level [see Ref. (b)], please carryout a repeat of **five** system simulations that will show the load flows under normal and contingency conditions as described in the above Ref.(a), and whose results were depicted in Diagrams 4, 5, 6, 7 and 13 of that Ref.(a).

**Question No. 3.4**

Issue Number: 3.2

Issue: Can the proposed near term and interim measures be utilized longer than the suggested two to three year time frame?

Ref.(a) Exh. B/T 6/S 5/Appendix 6/p. 39

Ref.(b) Exh. B/T 6/S 5/Appendix 2(letter dated December 22, 2006 from OPA)/pp. 2 to 5

Ref.(c) Hydro One's response to Board Staff interrogatory No. 84 [Exh J/T 1/S 84] - the "2007 and 2008 Electricity Transmission Revenue Requirements Hearing" (EB-2006-0501) – the interrogatory response included a copy of the Repor titled "Series Capacitor Application in Ontario:SSR Mitigation Final Report; Electric Systems Consulting, ABB Inc., Raleigh, NC, March 30, 2006".

Preamble:

- (a) Based on information, see Ref.(a), provided by the OPA on future generation supply, the capacity supply in the Bruce area may start to decline in 2012/13 and fall to a minimum value in 2017/18.
- (b) Assume that the interim measures including the 30% series compensation can be implemented with no risk to the system (subject to the findings of the study referred to in Ref. (b), last page) for two to three years.

Questions:

- (i) Given the facts and assumptions in the Preamble (a), and (b), please provide an assessment whether or not the applicant, OPA or the IESO would agree that these interim measures can meet the system requirements for a period of seven to eight years? And if the answer is negative, please provide cogent analysis to support the notions that such a scenario would be viewed as excessively severe.
- (ii) As an alternative to utilizing series compensation with fixed-value capacitors, as suggested in the ABB study referred to in Ref.(c), can the concept of series compensation be re-examined using thyrister- controlled

capacitors to vary the amount of compensation in order to deal with the possibility of sub-synchronous resonance with nearby nuclear or fossil generating units? If the answer is affirmative, please provide a full argument in terms of cost premiums, and advantages in the long term for such an approach.

**Question No. 3.5**

Ref. (a) Exh. B/T 3/S 1

Ref. (b) Exh. B/T 6/S 5

Issue Number: 3.2

Issue: Can the proposed near term and interim measures be utilized longer than the suggested two to three year time frame?

Preamble:

The second paragraph on page 1 of Ref.(a) outlines a number of short term and interim measures that the OPA has recommended. It is further stated that Hydro one intends to proceed with these measures, other than series compensation which is pending the results of a due diligence study to be undertaken by the OPA. Figure 1 on page 2 of Ref. (a) shows that the near term improvements will add approximately 300 MW to the transmission capability but there is no indication of the impact of the interim measures on transmission capacity. Figure 2.3.1 on page 52 of Ref. (b) shows that the proposed series compensation would add approximately 1300 MW to the transmission capability and the generation rejection scheme would add an additional approximately 700 MW for a total transmission capability of approximately 7300 MW. Board staff wishes to explore the impact of the proposed interim measures on transmission capacity and the timing of the proposed new transmission facilities.

Questions / Requests:

- (i) What is the current status and expected timing of the proposed generation rejection scheme?
- (ii) If Hydro One expects to proceed with the series compensation installation, what is the proposed completion date for that installation?
- (iii) Please advise what is the impact on the transmission capacity and timing of need for the proposed 500 kV circuits associated with:
  - a. the proposed generation rejection scheme; and
  - b. the proposed series compensation on existing 500 kV circuits in the area of the Bruce Complex.
- (iv) What is the maximum Bruce generation and wind generation that can be accommodated with all the short term and interim measures in place?
- (v) Are there any additional mitigating measures that can extend the adequacy of the transmission capability in the area of the Bruce Complex? If so, please provide a description of the measures, benefits provided and cost of implementation.

## **4.0 Reliability and Quality of Electricity Service**

(6 questions)

### **Question No. 4.1**

Issue Number: 4.1

Issue: For the preferred option, does the project meet all the requirements as identified in the System Impact Assessment and the Customer Impact Assessment?

Ref.(a) Exh. B/T 6/S 2 (IESO System Impact Assessment Report)/Sec. 3/p. 3

Ref.(b) Transmission Rate Hearing, EB-2005-0501/Exh. D2/T 2/Development Capital Projects

#### Preamble:

- (a) In Ref.(a), the SIA indicated that shunt capacitor banks were recommended in an earlier SIA report for installation at Detweiler TS, Orangville TS, Middleport TS, and Nanticoke TS;
- (b) In Ref.(b), Hydro One indicated that it intends to install Static-Var Compensators at Nanticoke [instead of shunt capacitors as stated in Ref.(a)] and shunt capacitors at Detweiler and Orangeville. There was no mention of installing shunt capacitors at Middleport.

#### Questions:

- (i) Please provide the explanation for deciding to install SVCs at Nanticoke instead of shunt capacitors given that the shunt capacitors' cost is in the order of \$ 5 million versus the SVCs which cost about \$ 50 million;
- (ii) Please indicate whether or not Hydro One intends to install shunt capacitors at Middleport. If not, please provide explanation why these shunt capacitors will not be needed.

### **Question No. 4.2**

Issue Number: 4.1

Issue: For the preferred option, does the project meet all the requirements as identified in the System Impact Assessment and the Customer Impact Assessment?

Ref.(a) Exh. B/T 6/S 2 (IESO System Impact Assessment Report)/Sec. 8.2 Contingency Conditions/scenario iv./p. 11

#### Preamble:

The SIA states *"It is therefore recommended that the proposed layout of the 500kV busbar at Milton TS be reviewed to avoid the simultaneous loss of the 500kV circuit M573T and either of the 500kV Milton-to-Claireville circuits due to a breaker-failure condition involving either of the 500kV breakers L70L73 or HL573."*

Question:

Did Hydro One review the layout of the 500 kV busbar at Milton to address the concern raised by the IESO in the Preamble. Please provide a status of that review along with Hydro One's conclusion and action plan to address this issue.

**Question No. 4.3**

Ref. Exh. A/T 2/S 1, System Impact Assessment

Issue Number: 4.1

Issue: For the preferred option, does the project meet all the requirements as identified in the System Impact Assessment and Customer Impact Assessment?

Preamble:

Page 17 of the System Impact Assessment indicates that the following facilities must be in service once the new 500 kV line is in service, but are expected to be in service prior to line to mitigate operational issues starting in 2009:

- Shunt capacitor banks at Detweiler TS and Orangeville TS;
- Buchanan TS A 3rd 170MVAR shunt capacitor bank;
- Middleport TS Two 400MVAR shunt capacitor banks;
- Nanticoke SS At least one 250MVAR shunt capacitor bank;
- Nanticoke SS Dynamic compensation with a capacity of at least +350/-120MVAR .

Questions / Requests:

- i. Please provide a brief description of the status of each of the above-noted recommended facilities including the expected completion dates.
- ii. If the expected completion dates are later than 2009, what plans does Hydro One have for dealing with the operational issues that will arise?

**Question No. 4.4**

Issue Number: 4.1

Issue: For the preferred option, does the project meet all the requirements as identified in the System Impact Assessment and the Customer Impact Assessment?

Ref. Exh. B/T 6/S 2 (IESO System Impact Assessment Report)/Sec. 9.1/p. 14 and Diagram 19 and 20

Preamble:

With regard to the IESO simulation projecting Bruce area generation of 8 Nuclear units, 725 MW of committed wind generation, a further 870 MW of additional generation capacity and a system load of 28,400 MW, the IESO states that "outages involving the transmission facilities that form the Milton-Claireville corridor would be especially challenging operationally and that this corridor would benefit from the implementation of measures that would limit the severity of the critical outage conditions."

Questions:

Does the Applicant agree with this assessment and if so what measures does the Applicant intend to implement?

**Question No. 4.5**

Issue Number: 4.2

Issue: Does the project meet applicable standards for reliability and quality of electricity service?

Ref. Exh. B/T 6/S 2(IESO System Impact Assessment Report)/ p. 1 and Diagram 2

Preamble:

The IESO has recommended an additional circuit breaker at the Bruce A TS at the termination location of the proposed transmission line.

Questions:

- (i) Does the Applicant intend to install the additional breaker recommended by the IESO to avoid having the T27 autotransformer directly connected to the E-bus?
- (ii) Would adding yet another breaker (to avoid having the T25 autotransformer directly connected to the A-bus) make sense in order to add more security to the system for events such as double contingencies?

**Question No. 4.6**

Issue Number: 4.2

Issue: Does the project meet applicable standards for reliability and quality of electricity service?

Ref. Exh. B/T 6/S 2 (IESO System Impact Assessment Report)/Sec. 8.2/p. 11 and Diagram 10

Preamble:

In the IESO's review of a breaker failure contingency and the simultaneous loss of a 500 kV Milton to Claireville circuit and a 500 kV Milton to Trafalgar circuit, the IESO states that under some operating scenarios the 10 day LTR rating of autotransformer T14 at Trafalgar could be exceeded.

Questions:

Is it the intention of Hydro One to re-configure the layout of the 500 kV switching facilities at Milton SS to avoid the possibility of a simultaneous loss of the M573T circuit and either of the Milton to Claireville circuits in the event of a failure involving either circuit breaker L70L73 or circuit breakers HL73 at Milton SS? and if not, why not?



## **5.0. Land Matters**

### **(2 Questions)**

#### **Question No. 5.1**

Issue Number: 5.1

Issue: Are the forms of land agreements to be offered to affected landowners reasonable?

Ref. Exh. B/T 6/S 10 Appendices 1-8

#### **Preamble:**

Hydro One included the following forms of agreements in its pre-filed evidence in support of s. 92 application:

- Easement Agreement
- Agreement of Purchase and Sale
- Offer to Grant an Easement
- Option to Purchase
- Damage Claim Form
- Damage Release Form
- Testing and Associated Access Routes
- Off-Corridor Temporary Access Roads

#### **Question:**

- a. Is Hydro One seeking approval of the Board for each agreement listed in the preamble? Please explain the rationale for your response.
- b. What is Hydro One's strategy to offering each agreement listed in the preamble to the affected landowners?
- c. What is the status of Hydro One's acquisition of each agreement listed in the preamble from the affected landowners?
- d. What are the types and amounts of costs that Hydro One expects to incur upon executing each agreement listed in the preamble?
- e. Approximately, how many properties will be affected by each agreement listed in the preamble?

#### **Question No. 5.2**

Issue Number: 5.2

Issue: What is the status and process for Hydro One's acquisition of permanent and temporary land rights required for the project?

Ref. Exh. B/T 6/S 9 pp 4-6

#### **Question:**

Referring to current project construction and in-service schedule, please discuss Hydro One's schedule and prospects to acquire necessary permanent and temporary land rights.

## **6.0 Aboriginal Peoples Consultations**

### **(1 Question)**

#### **Question No. 6.1**

Issue Number: 6.1

Issue: Have all Aboriginal Peoples whose existing or asserted Aboriginal or treaty rights are affected by this project been identified, have appropriate consultations been conducted with these groups and if necessary, have appropriate accommodations been made with these groups?

Ref. Exh. B/T 6/S 7

#### **Preamble:**

According to its pre-filed evidence Hydro One identified potentially affected Aboriginal Groups (defined by Hydro One as First Nations and the Métis) and that initial consultations with these Aboriginal Groups have commenced or are planned to commence and continue.

#### **Questions:**

Please provide a status update on consultations with Aboriginal Groups communities with regard to the following points:

- a) Identify all of the Aboriginal Groups that have been contacted in respect of this application.
- b) Indicate:
  - i) how the Aboriginal Groups were identified;
  - ii) when contact was first initiated;
  - iii) the individuals within the Aboriginal Group who were contacted, and their position in or representative role for the group;
  - iv) a listing, including the dates, of any phone calls, meetings and other means that may have been used to provide information about the project and hear any interests or concerns of Aboriginal Groups with respect to the project.
- c) Provide relevant information gathered from or about the Aboriginal Groups as to their treaty rights, or any filed and outstanding claims or litigation concerning their treaty rights or treaty land entitlement or aboriginal title or rights, which may potentially be impacted by the project.

- d) Provide any relevant written documentation regarding consultations, such as notes or minutes that may have been taken at meetings or from phone calls, or letters received from, or sent to, Aboriginal Groups.
- e) Identify any specific issues or concerns that have been raised by Aboriginal Groups in respect of the project and, where applicable, how those issues or concerns will be mitigated or accommodated.
- f) Explain whether any of the concerns raised by Aboriginal Groups with respect to the applied-for project have been discussed with any government department or agencies, and if so, identify when contacts were made and who was contacted.
- g) If any of the Aboriginal Groups who were contacted either support the application or have no objection to the project proceeding, identify those groups and provide any available written documentation of their position. Also, indicate if their positions are final or preliminary or conditional in nature.
- h) If any of the Aboriginal Groups who were contacted are opposed to the application, identify those groups and provide any available written documentation of their position. Also, indicate if their positions are final or preliminary or conditional in nature.
- i) Provide details of any know Crown involvement in consultations with Aboriginal Groups in respect of the applied-for project.