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Susan Frank
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BY COURIER

March 17, 2008

Mr. Basil Alexander
Klippensteins
Barristers & Solicitors
160 John St., Suite 300
Toronto ON
M5V 2E5

Dear Mr. Alexander:

EB-2007-0050 – Hydro One Networks' Section 92 Bruce - Milton Transmission Reinforcement Application – Hydro One Networks' Response to Interrogatory Questions from Pollution Probe

I am attaching an electronic copy and a paper copy of the responses to the interrogatory questions in your Second list (questions 14 to 21).

Intervenors and the OEB are being provided electronic copies by email today. CDs are available on request and these responses will be available for download from the Hydro One Networks regulatory website.

Sincerely,

ORIGINAL SIGNED BY ANDREW PORAY FOR SUSAN FRANK

Susan Frank

c. Kirsten Walli, Ontario Energy Board
EB-2007-0050 Intervenors (by email)
M. Heinz, Ontario Power Authority (by email)

Pollution Probe INTERROGATORY #14 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref Ontario Energy Board Act, 1998, section 92; Technical Conference Presentation by Hydro One, Panel 1, Existing Facilities and Grid Operation, Need, Alternatives and Evaluation, and Near-term & Interim Measures, "Bruce Area Generation Beyond 2014" October 15/16, 20071

a) Please provide all existing documents and analyses conducted to date that consider or are regarding the refurbishment of any Bruce B units.

b) Please provide all existing documents and analyses conducted to date on possible new Bruce area nuclear units, including current estimates of costs of construction and operation.

Response

Documents and analyses that consider or are regarding the refurbishment of any Bruce B units are the Supply Mix Advice (prepared in 2005, see: http://www.powerauthority.on.ca/Page.asp?PageID=1224&SiteNodeID=127) and the IPSP Discussion Papers (prepared in 2006/2007, see: IPSP Exhibit C at http://www.powerauthority.on.ca/Page.asp?PageID=924&SiteNodeID=320). Relevant references to the issue of nuclear refurbishment, including the potential refurbishment of Bruce B units as well as possible new Bruce area nuclear units, including estimates of costs are as follows:

i) References in the Supply Mix Advice:

- Section 2.5 pages 139 – 142 (re: outlook for existing nuclear)
- Section 2.7 pages 214 – 223 (re: nuclear cost, performance, environmental assumptions)
- Section 2.8 pages 249 – 318 (re: portfolios examined)
- Section 3.9 pages 319 – 366 (re: analysis of portfolios)

ii) References in the IPSP Discussion Papers ("DP"):

- DP#4 Section 2.2.2 pages 11 – 15 (Existing resources)
- DP #4 Section 4.1 pages 61 – 84 (New conventional resources)
- DP #5 Section 2.3.6 pages 39 – 61 (Bruce/Southwestern Ontario to the GTA)

- DP #7 Section 2.1 pages 17 – 21 (Existing resources)
- DP #7 Section 2.6 pages 38 – 39 (New resources)
- DP #7 Section 2.8.2 pages 65 – 67 (Transmission integration)
- DP #7 Section 3.1 pages 72 – 82 (Preliminary plan – feasibility and reliability)
- DP #7 Section 3.2 pages 82 – 97 (Preliminary plan – cost)
- DP #7 Section 3.3 pages 98 – 103 (Preliminary plan – environment)
- DP #7 Section 3.4 pages 104 – 106 (Preliminary plan – flexibility)
- DP #7 Section 3.5 pages 106 – 107 (Preliminary plan – societal acceptance)
- DP #7 Section 4 pages 108– 116 (Preliminary plan – implementation)

Pollution Probe INTERROGATORY #15 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref Ontario Energy Board Act, 1998, section 92; Technical Conference Presentation by Hydro One, Panel 1, Existing Facilities and Grid Operation, Need, Alternatives and Evaluation, and Near-term & Interim Measures, "Bruce Area Generation Beyond 2014" October 15/16, 20071

If there is no future refurbishment of the Bruce B reactors after they come to their current end of life, what is the need for transmission capacity out of the region as each of the four Bruce B reactors reach the end of their current lives and no longer deliver electricity to the grid?

Response

If the decision is made not to refurbish the Bruce B units, the OPA assumes that these units would continue to be operated until the end of their useful lives, or about 2020. In Hydro One's response to Board Staff Interrogatory 3.4 (i), OPA presented the results of an economic assessment of the net present values between the alternative with the proposed Bruce to Milton line and the alternative without that line but with series compensation. In the first five years following the line's end of 2011 in-service date, and as the full complement of generation in the Bruce area comes into service, the NPV cost differential between these alternatives falls quickly as the costs of undelivered energy and higher losses associated with the series capacitors option begin to be incurred. A cross-over of the NPV then occurs in 2019. This indicates that thereafter the economics favor the Bruce to Milton alternative. As the economic analysis has assumed the Bruce B units' forecast refurbishment to occur in 2018, which is near the cross-over date, refurbishment and/or retirement has only a minor impact on the NPV results. Overall the Bruce to Milton line will therefore provide significant economic benefits in the long term.

From the technical perspective, if there is no future refurbishment of the Bruce B reactors after they come to their end-of-life, the existing, committed and the planned resources in the Bruce area would total 4700 MW (3000 MW of nuclear capacity and 1700 MW of wind capacity). While the existing Bruce transmission system is capable of transmitting this power to the southern Ontario power grid when all transmission facilities are available, curtailment of Bruce area generation may still be required under conditions where there is equipment outage on the Bruce transmission system, a higher level of power transfer from the London area to the GTA or unavailability of critical reactive power resources in southwestern Ontario. The proposed Bruce to Milton 500 kV line

would provide a much greater level of transfer capability and thus, more margin to cover the variations and uncertainties in the day-to-day operation of the Bruce transmission system and minimize the need for generation curtailment under adverse operating conditions.

As well, losses would be reduced by about 30 MW when the 4700 MW is being transferred (this is equivalent to half of the 2007 peak demand of the Hanover transformer station). This reduction in losses would continue for the life of the generating facilities.

With the Bruce to Milton line in-service and the Bruce B units not refurbished, sufficient transfer capability would exist allowing development of a further 3400 MW of new nuclear or renewable generation in the Bruce area.

Pollution Probe INTERROGATORY #16 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref Ontario Energy Board Act, 1998, section 92; Technical Conference Presentation by Hydro One, Panel 1, Existing Facilities and Grid Operation, Need, Alternatives and Evaluation, and Near-term & Interim Measures, October 15/16, 2007 Section 6. "Near Term and Interim Measure Improvements"

Please provide the following information:

a) What are the total costs associated with the implementation of each of the transmission system improvements below?
b) In what year or years are those costs incurred?
c) What is the increased transmission system capability away from the Bruce area for each transmission system improvement?
d) What is the cumulative total transmission transfer capability away from the Bruce area after each transmission system improvement is completed? And
e) In what year does each incremental transmission capability increase occur?

The transmission system improvements referenced above include:

a) Near term improvements including the Hanover to Orangeville line and dynamic and static reactive resources at various southwestern Ontario substations;
b) Medium-term improvement or "interim" measure of expansion of Bruce special protection system and employment of generation rejection system;
c) Medium-term improvement of implementation and employment of series compensation on the southwestern Ontario 500 kV system;
d) Any other transmission system improvements not covered by these stated near-term and medium term measures; and
e) The proposed double-circuit 500 kV lines from Bruce to Milton.

Response

Parts a through e) of this Interrogatory are addressed in the table shown on the following page. A discussion of the table's contents and their calculation is then provided.

Table 1 – Summary of Costs, Capabilities and Suitability of the Bruce Transmission System Improvements

	A	B	C	D	E	F	G	H	I
Scenario	**Incremental Cost of Upgrade ($M)**	**Total Cost of Upgrade ($M)**	**Incremental Cost Incurred in (year)**	**Increase in Transfer Capability (MW)**	**Total Transfer Capability (MW)**	**Shortfall from Identified Need (MW)**	**Increased Capability Available in (year)**	**Suitable for Long-Term Use?**	**Meets the Need?**
Existing System	-	-	-	-	5000	**(3100)**	-	Yes	No
a) Near Term Measures (NTM) (includes upgrade of Hanover to Orangeville 230 kV line; and shunt capacitors and static var compensators to accommodate additional flow out of the Bruce Area and to replace the reactive power lost due to the phase out of the Nanticoke units)	+216	216	2007-2010	+385	5385	**(2715)**	2009 - 2010	Yes	No
b) NTM + Expansion of Bruce Special Protection System (BSPS) for use under normal system conditions	+7	223	2008-2010	+941	6326	**(1774)**	2010	No	No
c) NTM + Series Capacitors + BSPS for use during outage conditions	+97	320	2008-2011	+941 [above a]	6326	**(1774)**	2012	Yes	No
d) NTM + Series Capacitors + BSPS for use under normal system conditions	+0	320	2008-2011	+750	7076	**(1024)**	2012	No	No
e) NTM + Proposed Bruce x Milton Line + BSPS for use during outage conditions	+645 [above (b)]	868 [216+7+645]	2007-2011	+1084 [above (d)]	8160	**+60**	2012	Yes	Yes

Discussion of Table Results

This interrogatory requested analysis of the incremental transfer capability of five scenarios involving different levels of system improvements. Table 1 summarizes the information requested. The following notes provide explanations of the table's contents:

- Two of these scenarios contemplate the use of Generation Rejection under normal system conditions (as compared with the use of GR under outage conditions) and therefore are not suitable for long-term use: see the response to OEB Staff Interrogatory 3.2. Column H of Table 1 above indicates whether a particular scenario is suitable for long-term use.

- The costs associated with each scenario are shown in Table 1 columns A and B. The total and incremental costs have been included. Please note that the Near Term Measures are common to all scenarios as they are required to implement any of the long term solutions (i.e., Series Capacitors or the proposed Bruce to Milton Line).

- The years in which the incremental system upgrade cost is incurred is shown in Table 1 column C. The costs of each scenario have been calculated incremental to the scenario found above it, unless noted otherwise.

- The incremental transfer capability away from the Bruce Area is shown in Table 1 column D. Each system's capability has been calculated incremental to the one above it in the table, unless noted otherwise.

- The total transfer capability is shown in Table 1 column E and the shortfall in transfer capability relative to the need is shown in column F.

- The year in which the transmission capability of each scenario becomes available is shown in Table 1 column G.

The information in Table 1 demonstrates that the only case that can meet the identified transfer capability need of at least 8100 MW is the proposed Bruce to Milton line with the near-term measures and use of GR during outage conditions (shown by the only "Yes" in column I of the Table 1). The near-term measures add about 385 MW in capability and the Bruce to Milton line adds a further 2775 MW, in combination with the use of GR during outage conditions.

Series compensation can increase the transfer capability by about 941 MW. The resulting transfer capability of 6326 MW is far short, by about 1800 MW, of the level required to meet the need identified. Furthermore, even when used over the long-term under normal system conditions, a use which is not consistent with the NPCC and IESO reliability standards, further augmentation of the series compensated system with generation rejection under normal conditions provides a capability of only about 7076 MW, or about 1000 MW short of the capability required.

Options such as employing series capacitors to stretch the existing system to its fullest, which are appropriate when smaller increases are required, or those such as generation rejection, which are intended to provide relief for the transmission under adverse conditions, are not substitutes to a robust, appropriately designed, long-term reinforcement option such as the Bruce to Milton line when significant increase in transmission capability is required, as is the case in this application. Partial or inappropriate G/R solutions will not address the need identified and will expose the system to undesirable levels of increasing risk and complexity.

Pollution Probe INTERROGATORY #17 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref B/Tab 1/Sch 1 page 3, "Other alternatives considered"

a) Has Hydro One or the OPA conducted any analyses of the total costs of transmission alternatives that exclude the proposed Bruce to Milton 500 kV double circuit or other new double circuit 500 kV lines or HVDC lines, and instead include generation rejection schemes (including expected "operating" costs or costs of invoking generation rejection schemes)?

b) If so, please provide those studies.

c) In particular, has Hydro One or the OPA assessed the expected level of operation or likelihood of use of any Bruce-area generation rejection schemes during the period 2011-2020 due to forced outages of the 500 kV or lower voltage transmission system in the region?

d) If so, please provide those analyses and their results.

Response

a) Neither Hydro One nor the OPA has conducted these analyses. Use of generation rejection under normal operation to increase transfer capability of the Bruce transmission system is not an acceptable option in consideration of the applicable planning standards of the NPCC and the IESO (see: the response in Exhibit C Tab 1 Schedule 3.2).

b) Not applicable.

c) The expected level of GR operation in the period 2011-2020 was not assessed.

d) Not applicable

Pollution Probe INTERROGATORY #18 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref B/Tab 1/Sch 1, page 3, "Other alternatives considered" Please provide the following information:

For the potential use of Bruce area generation rejection schemes, please provide the following requested information or answers:

a) Any and all documents or analyses developed by Hydro One or the OPA concerning the historical and forecasted future use of generation rejection schemes at the Bruce site.

b) What are the historical levels of forced outages on the 500 kV transmission system in the Ontario Southwest Area? Please provide all documentation or studies that address the actual level of forced outages that have been experienced with the transmission system in this region. Please also include both the number and duration of outages by year.

Response

a. Please refer to the response to OEB Staff Interrogatory 1.4 for information regarding the Bruce generation rejection scheme and its historical usage. With respect to forecast future use of the scheme, a forecast is not prepared. However, it is reasonable to assume that usage (i.e., arming of the scheme) will increase over time as generation in the Bruce area increases, in the event the proposed Bruce to Milton line is not built.

b. The requested information is being prepared and will be filed shortly.

Pollution Probe INTERROGATORY #19 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref B/Tab 6/Sch 5, Appendix 6, IPSP Discussion Paper #7, Integrating the Elements, page 162, Table 10.1

a) Please provide detailed, year-by year breakdowns of the specific resources that comprise the "Existing Nuclear", "Refurbished Nuclear" and "New Nuclear" resources listed in Table 10.1.

b) Please provide detailed, year-by year breakdowns of the specific resources that comprise each of the remaining categories of resources listed in Table 10.1.

c) Please confirm that Hydro One uses the resources projection values in Tables 10.1 and 10.2 in determining need for the proposed transmission circuits.

a) For both of responses to a) and b), please provide a copy of the data electronically in an MS Excel spreadsheet or other spreadsheet readable format.

Response

a) Please refer to separate correspondence from Hydro One and the OPA to the Board each dated March 6, 2008. Information used in preparing Table 10.1 figures for the years post 2008 include commercially sensitive and confidential information provided to the OPA by Bruce Power and OPG. The OPA is not entitled to disclose this commercially sensitive confidential information unless it is legally compelled to do so by a Governmental Authority. Aggregated data expressed on a year-by-year basis for "New Nuclear" resources is provided in attachment A, Table 1.

b) A year-by-year summary of resources comprising each of the remaining categories listed in Table 10.1 is provided in attachment A, Table 2.

c) The results of OPA studies that have considered the need for the Bruce to Milton Project are consistent with the system wide resource projections provided in Tables 10.1 and 10.2. For the Bruce area generation forecasts filed in support of this Hydro One application, the OPA used more specific and updated information. This includes: a) increases in the capacity of the Bruce B units by 2013, general timing concerning the refurbishment of the Bruce A units; committed wind capacity including standard offer resources and information on the retirement timing of the Bruce B units (see:

Day 1 Technical Conference Presentation Exhibit KT.1 slides 14 to 21; Hydro One responses to Board Staff Interrogatory 1.1, Fallis Interrogatory 14 and 26, Energy Probe Interrogatory 6).

d) Please see Attachment A, referred to in parts (a) and (b) above.

Table 1

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
New Nuclear	-	-	-	-	-	-	-	-	-	-	-	700	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
Total New Nuclear	-	-	-	-	-	-	-	-	-	-	-	700	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400

Table 2

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Existing	Existing Nuclear	11,514	11,514	11,514	10,764	10,764	11,514	10,998	9,966	9,116	7,750	7,750	5,270	3,540	2,660	1,265	1,265	1,265	1,265	1,265	1,265	750
	Existing Water	5,958	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959	5,959
	Existing Wind	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
	Existing Biomass	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
	Existing Gas/Oil	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539	4,539
	Existing Coal	6,434	6,434	6,434	6,434	4,969	2,987	2,987	2,987	-	-	-	-	-	-	-	-	-	-	-	-	-
New / Refurbished	New Water	37	139	233	331	416	596	619	753	916	928	939	945	1,468	1,480	1,481	1,482	1,483	1,552	1,553	1,652	1,653
	New Wind	15	45	162	267	267	285	298	298	367	439	511	609	714	802	802	802	802	802	802	802	802
	New Biomass	5	5	5	235	235	235	235	235	637	637	637	637	637	706	786	786	786	786	786	786	786
	New Solar	-	-	-	-	2	5	15	25	40	40	40	40	40	40	40	40	40	40	40	40	40
	Conservation	322	785	1,315	1,545	1,811	2,038	2,236	2,407	2,611	2,831	3,074	3,281	3,510	3,756	4,026	4,318	4,633	4,973	5,310	5,706	6,134
	New Gas	485	766	3,443	4,279	5,929	5,929	6,515	6,520	6,525	6,535	6,545	6,555	6,595	6,665	6,715	6,765	6,815	6,915	7,015	7,015	7,015
	New Storage	-	-	-	-	-	-	-	-	-	-	-	500	500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	New Gasification	-	-	-	-	-	-	-	-	-	-	-	250	250	250	250	250	250	250	250	250	250
	Refurbished Nuclear	-	-	-	1,500	1,500	1,500	1,500	1,500	2,016	2,016	2,532	3,898	4,748	6,144	7,874	9,604	10,484	10,484	10,484	10,484	10,484
	New Nuclear	-	-	-	-	-	-	-	-	-	-	-	700	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
	Interconnection	800	950	500	500	500	500	500	500	500	500	500	500	500	550	500	500	500	500	500	500	500
	Total Effective	30,229	31,255	34,223	36,473	37,010	36,207	36,520	35,808	33,345	32,293	33,145	33,802	34,519	36,072	36,758	38,830	40,076	40,585	41,023	41,518	41,433

Pollution Probe INTERROGATORY #20 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref B/Tab 6/Sch 5, Appendix 6, IPSP Discussion Paper #7, Integrating the Elements, page 130, Table 10.1 Preliminary Plan price for new and refurbished nuclear plant.

a) What is the "refurbished contract price" or yearly price stream associated with any Bruce B refurbishment power and over what years is this price assumed?

b) Please provide all analyses in support of the use of the refurbished price reported in a) above.

c) What is the assumed contract price or yearly price stream associated with any new nuclear units at the Bruce B site and over what years is this price assumed?

d) Please provide all analyses in support of the use of the "new nuclear" price reported in c) above.

Response

a) Specific information relating to the refurbished contract price or yearly price stream associated with any Bruce B refurbishment power does not exist and is not available. However estimates and assumptions used for planning purposes are described on pages 82 to 86 of IPSP Discussion Paper #7. The OPA's cost-to-customer analysis utilized an upper and lower band of the cost components intended to demonstrate a range of possible future outcomes.

b) Please refer to page 130 of IPSP Discussion Paper #7 where it states "for new generation and refurbishments of existing facilities, it is assumed that these facilities will obtain a price similar to the existing contract prices for similar type of facilities". The contract price for the refurbishment of Bruce A units is described on page 73 of IPSP Discussion Paper #4. The refurbished nuclear price reported in a) above reflects the contract price described in Discussion Paper #4.

c) Estimates and assumptions used for planning purposes relating to the contract price or yearly price stream associated with any new nuclear units are identified on pages 82 to 86 of IPSP Discussion Paper #7.

d) Analyses in support of the use of the "new nuclear" price reported in c) above are pages 61 – 84 of IPSP Discussion Paper #4 and pages 214 – 219 of Part 2-7 of the Supply Mix Advice.

Pollution Probe INTERROGATORY #21 List 2

Interrogatory

Issue Number: 1.0
Issue: Project Need and Justification

Ref B/Tab 6/Sch 5, Appendix 6, IPSP Discussion Paper #7, Integrating the Elements, page 133-134, Congestion Management Settlement Uplift

a) How does the congestion management settlement uplift (CMSU) amounts used by OPA affect the value of Bruce area generation relative to GTA generation?

b) For each year of the IPSP planning period and out to 2037, please provide the OPA's or Hydro One's estimate of the effect of the CMSU, in total dollars per year and in dollars per MWh of Bruce area generation.

Response

a) "CMSU" amounts were estimated on an Ontario-wide basis rather than on a zone-specific basis. As such, the OPA is unable to infer from these estimates the value of Bruce area generation relative to GTA generation.

b) For the reason stated above, the OPA is unable to infer the effect of the CMSU, in total dollars per year and in dollars per MWh of Bruce area generation.