



Power to Ontario.  
On Demand.

**August 19, 2009 - revised**  
**Expedited System Impact Assessment**  
**Hydro One Networks Inc.**

**ASSESSMENT SUMMARY**

**1.0 GENERAL DESCRIPTION**

Hydro One proposes to replace or refurbish a number of disconnect switches that have reached the end of their useful life. In addition, two disconnect switches are being removed. Appendix 1 contains a table showing the location and operating designations of the disconnect switches, as well as the ratings of the original and the replacement or refurbished switches.

The replacements, refurbishments and removals will take place during 2008 and the outages will be communicated to the IESO via the normal outage management process.

**2.0 PROPOSED MODIFICATION**

Details of the existing and new or refurbished disconnect switches are shown at the end of this report in Appendix 1. Details for some of the switches are currently not available and will be provided prior to receiving final approval to connect from the IESO.

The replacement and refurbished disconnect switches will operate and remain in their original configuration and location.

**3.0 ASSESSMENT**

Maximum permissible voltage ranges for the 115 kV, 230 kV and 500 kV systems in Ontario, as specified by the Market Rules in Appendix 4.1, are shown below in Table 1. Appendix 1 identifies disconnect switches that do not meet these requirements.

<b>Maximum Permissible Voltage Ranges in Ontario</b>				
	<b>Southern Ontario</b>		<b>Northern Ontario (Rabbit Lake and Port Arthur)</b>	
	<b>Maximum continuous voltage range</b>	<b>Maximum voltage during reparation period (30 minutes without tripping)</b>	<b>Maximum continuous voltage range</b>	<b>Maximum voltage during reparation period (30 minutes without tripping)</b>
<b>115 kV system</b>	113 - 127 kV	133.4 kV	113 - 132 kV	138.6 kV
<b>230 kV system</b>	220 - 250 kV	262.5 kV	220 - 260 kV	273.0 kV
<b>500 kV system</b>	490 - 550 kV	577.5 kV	490 - 550 kV	577.5 kV

**Table 1: Voltage ranges in Ontario**

The Transmission System Code (TSC) indicates that the transmission system has to be designed to sustain short circuit currents of 50 kA for the 115 kV system, 63 kA for the 230 kV system and 80 kA (usually limited to 63 kA) for the 500 kV system. Appendix 1 identifies disconnect switches that do not meet these requirements or where the short circuit rating is not available.

**4.0 CONCLUSIONS**

The assessment indicates that the ratings of the new or refurbished disconnect switches are either the same as or higher than the existing disconnect switches. Switches that do not meet the required voltage or short circuit current ratings are identified in appendix 1.

The installation of disconnect switches whose short circuit capability is lower than the TSC requirements is a risk assumed completely by Hydro One. Hydro One must ensure that the short circuit current seen by these disconnect switches does not exceed the short time rating of the new equipment. Should future system changes result in fault currents greater than the installed switch ratings, Hydro One will be required to change these disconnect switches at their expense. The disconnect switches that do not meet these requirements are identified within Appendix 1 below.

It can be concluded that these replacements will have no material adverse effect on the IESO-controlled grid subject to the requirements in section 5.

## **5.0      *REQUIREMENTS***

The Market rules (Chapter 4 section 7.4) require that each transmitter connected to the IESO-controlled grid shall provide the IESO on a continual basis with on-line monitored status as specified in Appendix 4.16. For these proposed replacements or refurbishments, the IESO will continue to require the status associated with the new or refurbished disconnect switches.

As specified in Appendix 4.1 of the market rules, the IESO requires that connection equipment meets the voltage requirements outlined in Table 1 above. Some recognized contingencies (e.g. load shedding, open line end) can cause temporary voltage increases above these maximum continuous voltages. Connection equipment must remain in service and not automatically trip for voltages up to 5% above the maximum continuous voltages for up to 30 minutes to allow the system to be re-dispatched to return voltages to their normal range. This reparation period will be as short as possible, but it will not take longer than 30 minutes.

Hydro One must provide missing ratings for all disconnect switches prior to receiving approval to connect or remove the equipment from the IESO.

## **6.0      *NOTIFICATION OF CONDITIONAL APPROVAL***

This expedited System Impact Assessment concludes that the replacement or refurbishment of these disconnect switches is not expected to have a material adverse effect on the IESO-controlled grid, provided that the requirements listed in section 5 are met. It is therefore recommended that a Notification of Conditional Approval of the Connection Proposal be issued, subject to the requirements detailed above.

## Appendix 1 - Equipment Rating

Location	Identifier	Voltage (kV)		Continuous Current Rating (A)		Short Circuit Current Rating	
		Replacement Equipment (maximum rating)	Existing Equipment	Replacement Equipment	Existing Equipment	Replacement Equipment	Existing Equipment
Beamsville	T3-A	145	138	600	600	44 kA <sup>C</sup>	Details not known
Beamsville	T3-AG	145	115	600	600	44 kA <sup>C</sup>	Details not known
Beamsville	T4-A	145	138	600	600	44 kA <sup>C</sup>	Details not known
Beamsville	T4-AG	145	115	600	600	44 kA <sup>C</sup>	Details not known
Bruce A	B24P <sup>A</sup>	230 <sup>B</sup>	230	3000	3000	Switches are being refurbished. Short circuit values to be provided prior to equipment being put in service.	Details not known
Bruce A	B24P-G <sup>A</sup>	230 <sup>B</sup>	230	N/A - grounding switch			Details not known
Cherrywood	DL26-26 <sup>A</sup>	230 <sup>B</sup>	230	3000	3000		Details not known
Dobbin	Q20-P20	145	115	2000	2000	44 kA <sup>C</sup>	Details not known
Hanover	T3-3	145	115	1200	1200	44 kA <sup>C</sup>	Details not known
Hanover	T4-4	145	115	1200	1200	44 kA <sup>C</sup>	Details not known
Lennox A	KX4-K	500 <sup>B</sup>	500	4000	4000	Switches are being refurbished. Short circuit values are to be provided prior to equipment being put in service.	Details not known
Lennox A	KX4-X4	500 <sup>B</sup>	500	4000	4000		Details not known
Martindale	T22-22	250	196	1200	1200		44 kA
Manby TS	DL11-D	145	138	1200	1200		Details not known
Manby TS	DL11-L	145	138	1200	1200		Details not known
Manby TS	EL12-E	145	138	1200	1200		Details not known

Location	Identifier	Voltage (kV)		Current Rating (A)		Short Circuit Rating	
		Replacement Equipment (maximum rating)	Existing Equipment	Replacement Equipment	Existing Equipment	Replacement Equipment	Existing Equipment
Manby TS	EL12-L	145	138	1200	1200	44 kA <sup>C</sup>	Details not known
Manby TS	T6-A2	250	230	1200	1200	63 kA	Details not known
Minden	HL80-L	250	230	1200	1200	63 kA	Details not known
Minden	L3L80-80	250	230	1200	1200	63 kA	Details not known
Minden	L4L81-81	250	230	1200	1200	63 kA	Details not known
Minden	HL81-L	250	230	1200	1200	63 kA	Details not known
Minden	87-M81B	250	230	1200	1200	63 kA	Details not known
Minden	M81B-G	250	230	not yet known <sup>E</sup>		63 kA	Details not known
Port Arthur #1	A6P-G	145	115	N/A - grounding switch		44 kA <sup>C</sup>	Details not known
Port Arthur #1	L3P-A	145	138	1200	1200	44 kA <sup>C</sup>	Details not known
Port Arthur #1	L3L80-80	145	138	1200	1200	44 kA <sup>C</sup>	Details not known
Port Arthur #1	HL80-L	145	115	1200	1200	44 kA <sup>C</sup>	Details not known
Port Arthur #1	L4P-A	145	115	1200	1200	44 kA <sup>C</sup>	Details not known
Port Arthur #1	L4P-L	145	115	600	600	44 kA <sup>C</sup>	Details not known
Rabbit Lake	L2L4-2	145	138	600	600	44 kA <sup>C</sup>	Details not known
Rabbit Lake	15-M1	145	138	600	600	44 kA <sup>C</sup>	Details not known
Strachan TS	H2JKCA1-38	145	115	800	600	44 kA <sup>C</sup>	Details not known
Strachan TS	H2JKCA1-G	145	115	not yet known <sup>E</sup>		44 kA <sup>C</sup>	Details not known
Vansickle TS	T5-AG <sup>D</sup>	Switches are being removed	230	Switches are being removed	Unknown	Switches are being removed	Details not known
Vansickle TS	T6-AG <sup>D</sup>		230		Unknown		Details not known
Vansickle TS	T5-D9HS <sup>A</sup>	Unknown <sup>E</sup>	230	Unknown <sup>E</sup>	2000	Unknown <sup>E</sup>	Details not known

**Notes:**

- A. Switch is being refurbished.
- B. Voltage does not meet the maximum continuous voltage requirement of 127 kV, 250 kV or 550 kV specified in Appendix 4.1.
- C. The switch's interrupting capability must meet TSC requirements of 50 kA for the 115 kV system.
- D. Both lines feeding Vansickle TS have remote trip to the terminal stations. Therefore, ground switches are no longer required for protection.
- E. Ratings are to be provided to the IESO prior to equipment being put in service.