

Final Draft Report

September 17, 2007

ASSESSMENT SUMMARY

Hydro One Networks Inc.

Hanmer TS - R9 Replacement

CAA ID Number: 2006-EX271

1.0 GENERAL DESCRIPTION

Hanmer TS shunt reactor R9 and breaker R9N are being replaced. The proposed work is scheduled for an in-service date of September 30, 2007. The existing configuration is shown in Figure 1.

2.0 PROPOSED MODIFICATION

A comparison between the technical specifications of the existing and new replacement reactor R9 is given below.

Reactor Comparison		
Hanmer TS	Original R9	Replacement R9
Identifier	FK33R9	FK33R9
Configuration	three phase	three phase
Rated Voltage	28 kV	27.6 kV
Maximum Voltage	not known	30.36 kV continuous; 33 kV for 5 minutes
Winding Configuration	wye	wye
Rating	150 MX (3 x 50 MX)	150 MX (3 x 50 MX)
Manufacturer	CGE	TRENCH
Serial #	288425	TBD

A comparison between the technical specifications of the existing and new replacement breaker R9N is given below.

Breaker Comparison		
Hanmer TS	Original R9N	Replacement R9N
Identifier	FK33R9N	FK33R9N
Configuration	three phase	three phase
Rated Voltage	38 kV	27.6 kV
Maximum Continuous Voltage	not known	145 kV
Interrupting time (ms)	22 ms	50 ms
Interrupting media	SF6	SF6
Rated continuous current (A)	4,000	4,000
Rated symmetrical short circuit capability (A)	not known	40 kA
Description of Protection	The new breaker R9N must operate as required by Hydro One's Facility Description Document (FDD) #SPS-H1 titled "Reactor/Capacitor Switching Scheme at Hanmer TS"	
Description of automatic switching		
Manufacturer	ABB	TBD
Serial #	7346-293	TBD

Original data was taken from the Secure Web for HydroOne Operational Information for use in this assessment.

Note: FDD #SPS-H1, "Reactor/Capacitor Switching Scheme at Hanmer TS" states that the purpose of the automatic reactor switching scheme at Hanmer TS is to minimize sustained voltage variations that could occur when certain circuits in the Hanmer area are switched.

3.0 ASSESSMENT

Our records indicate that the voltages on nearby 500 kV lines can exceed 550 kV. Several of the highest voltages on X503E are listed in the table below. Transformer T9 is rated at 500/240/28 kV with a 20 step ULTC covering +/- 50 kV and therefore the corresponding LV bus voltage could rise above the replacement R9's nominal voltage rating of 27.6 kV. However, Hydro One has confirmed that the replacement reactor's maximum voltage rating is 30.36 kV continuous and 33.0 kV for 5 minutes.

Date	Time	HANMER - X503E	Low Voltage Bus
03/11/2006	20:00:00	585.00 kV	29.78 kV
07/25/2006	11:00:00	579.79 kV	29.52 kV
08/12/2006	14:00:00	577.03 kV	29.38 kV
12/03/2006	18:00:00	566.66 kV	28.85 kV

The replacement breaker R9N also has a lower nominal voltage rating (27.6 kV vs. 38 kV) than the original breaker. Hydro One has confirmed that the maximum continuous voltage rating is 145 kV.

In addition, R9N's interrupting time is longer (50 ms vs. 22 ms). Hydro One Networks Inc. has confirmed that the breaker switching time is not critical in the operation of the reactor/capacitor switching scheme at Hanmer TS.

4.0 CONCLUSIONS

The maximum voltage rating for both the replacement breaker and the replacement reactor is sufficiently high.

The replacement breaker's slower interrupting time of 50 ms is acceptable since Hydro One has confirmed that the breaker switching time is not critical in the operation of the reactor/capacitor switching scheme at Hanmer TS.

Therefore, it can be concluded that the replacement reactor and replacement breaker will have no material adverse effect on the reliability of the IESO-controlled grid.

5.0 REQUIREMENTS

Hydro One Networks Inc. must notify the IESO as soon as it becomes aware of any changes to the assumptions made in the connection assessment. The IESO will determine whether these changes require a re-assessment.

Hydro One Networks Inc. must update FDD #SPS-H1, "Reactor/Capacitor Switching Scheme at Hanmer TS" before final approval to connect is given by the IESO.

Hydro One Networks Inc. is required to meet the transmitters' requirements with respect to protection systems for the new reactor and coordination with the existing protection systems, as outlined in the Transmission System Code.

The Market rules (Chapter 4 section 7.4) require that transmitter shall provide the IESO on a continual basis with on-line monitored quantities as specified in Appendix 4.16. For this proposed project, the IESO will require the status of the breaker and operating quantities associated with the new reactor.

6.0 NOTIFICATION OF APPROVAL

This expedited System Impact Assessment concludes that the installation of a replacement reactor for the existing reactor R9 and a replacement breaker R9N for the existing breaker is not expected to have a material adverse effect on the IESO-controlled grid. It is therefore recommended that a Notification of Approval of the Connection Proposal be issued, subject to the requirements detailed above.