

# Final Draft Report

## Replacement of Bramalea T1

CAA ID Number: 2007-EX330

### ASSESSMENT SUMMARY

#### Hydro One Networks Inc.

#### 1.0 GENERAL DESCRIPTION

The three phase step-down transformer T1 at Bramalea TS failed and will be replaced with a system spare. The scheduled in-service date for the replacement transformer is April 15, 2006.

#### 2.0 PROPOSED MODIFICATION

A comparison of the technical specifications between the failed and the replacement transformer is given below. Existing transformer T2 is also shown for comparison purposes. Original T1 & T2 data was taken from the Secure Web for HydroOne Operational Information for use in this assessment.

| Bramalea TS  | Failed T1                                   | Replacement T1<br>(NA74T1)                    | Existing T2                                 |
|--|---|---|---|
| <b>Configuration</b>                               | three phase                                 | three phase                                   | three phase                                 |
| <b>Transformation (kV)</b>                         | 215.5 / 28 / 28                             | 215.5 / 28 / 28                               | 215.5 / 28 / 28                             |
| <b>Winding Configuration</b>                       | wye / zig-zag / zig-zag                     | wye / zig-zag / zig-zag                       | wye / zig-zag / zig-zag                     |
| <b>Thermal Rating</b>                              | 75 MVA ONAN<br>100 MVA ONAF<br>125 MVA OFAF | 75 MVA ONAN<br>100 MVA ONAF<br>125 MVA ODAF   | 75 MVA ONAN<br>100 MVA ONAF<br>125 MVA OFAF |
| <b>Continuous Thermal Rating<br/>(summer 30°C)</b> | 125 MVA                                     | 125 MVA                                       | 125 MVA                                     |
| <b>15 Minute Thermal Rating<br/>(summer 30°C)</b>  | 212.4 MVA                                   | 254.6 MVA                                     | 214 MVA                                     |
| <b>10 Day Thermal Rating<br/>(summer 30°C)</b>     | 190.8 MVA                                   | 205.7 MVA                                     | 172.6 MVA                                   |
| <b>Positive Sequence<br/>Impedance<br/>(H-X)</b>   | R = 0.29%<br>X = 11.55%<br>on 37.5 MVA base | R = 0.282%<br>X = 10.598%<br>on 37.5 MVA base | R = 0.33%<br>X = 12.23%<br>on 37.5 MVA base |
| <b>Impedance to Ground</b>                         | solidly grounded                            | solidly grounded                              | solidly grounded                            |
| <b>Under-load tap-changer</b>                      | 220 ± 40 kV<br>32 steps                     | 220 ± 40 kV<br>32 steps                       | 220 ± 40 kV<br>32 steps                     |
| <b>Off-load tap-changer</b>                        | N/A   | N/A   | N/A   |
| <b>In service off-load tap<br/>position</b>        | Not applicable                              | Not applicable                                | Not applicable                              |
| <b>Manufacturer</b>                                | CGE   | Hyundai                                       | CGE   |
| <b>Serial #</b>                                    | 288966                                      | 41144TL0007-001                               | 288562                                      |

### **3.0 ASSESSMENT**

The information provided by Hydro One shows that the technical characteristics of the replacement transformer T1 are similar to those of the failed transformer. The replacement unit has the same configuration and transformation, similar positive sequence impedances and slightly better LTR ratings.

The replacement T1 has a slightly different ULTC range than the failed transformer but the difference is not material.

This replacement represents a like-for-like exchange of existing equipment and will have no material adverse effect on the IESO-controlled grid.

### **4.0 CONCLUSIONS**

It can be concluded that the replacement transformer T1 will not result in a material adverse effect on the reliability of the IESO-controlled grid because:

- § The impedance of the replacement transformer T1 is similar to the failed transformer;
- § The replacement transformer T1 is equipped with a ULTC that has a slightly lower range than the failed transformer and the existing transformer T2; and
- § The LTR ratings of the replacement transformer T1 are higher than the failed transformer.

### **5.0 REQUIREMENTS**

The Market Rules require that all equipment with a nominal voltage of 230 kV must be able to operate in the range between 220 kV – 250 kV.

The proponent 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 is required to meet the transmitters' requirements with respect to protection systems for the new transformer 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 operating quantities associated with the new transformer.

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

This expedited System Impact Assessment concludes that the installation of the replacement transformer T1 for the existing transformer T1 is not expected to have a material adverse effect on the IESO-controlled grid. It is therefore recommended that a Notification of Conditional Approval of the Connection Proposal be issued, subject to the requirements detailed above.