

September 24, 2014

The Board of Commissioners of Public Utilities  
Prince Charles Building  
120 Torbay Road, P.O. Box 21040  
St. John's, Newfoundland & Labrador  
A1A 5B2

**Attention: Ms. Cheryl Blundon**  
**Director Corporate Services & Board Secretary**

Dear Ms. Blundon:

**Re: Newfoundland and Labrador Hydro - the Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System – Sunnyside Equipment Replacement Project**

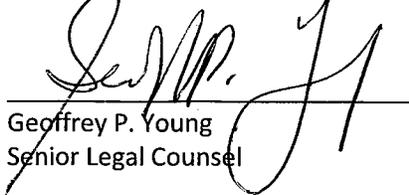
This is further to the Board's letter of September 15, 2014 requesting a copy of the factory acceptance testing report referred to in Hydro's latest bi-weekly update relating to the above referenced project. As indicated by Hydro in its status update of September 12, 2014, there was an issue identified during the Factory Acceptance Testing for the new transformer that required material change and retesting.

Please find enclosed an assessment letter received from the transformer manufacturer, ABB, on September 19, 2014. The letter contains a summary report related to the transformer testing and failure and includes a description of the process used to determine the issue. A decision was taken to rewind the unit because of carbon infiltration into the windings as a result of partial discharge activity. The unit has been de-tanked, the tank is being cleaned, and the phase cores are in the process of being rewound before new tests are undertaken. As of September 19, the re-tanking has been scheduled for October 6 and factory retesting, including witness testing, is scheduled for October 10. The unit is scheduled to be on site for October 30, 2014 and, as per its last bi-weekly submission, Hydro now anticipates a return to service by December 1, 2014.

If you have any questions or comments, please contact the undersigned.

Yours truly,

**NEWFOUNDLAND AND LABRADOR HYDRO**

  
Geoffrey P. Young  
Senior Legal Counsel

GPY/jc

cc: Gerard Hayes – Newfoundland Power  
Paul Coxworthy – Stewart McKelvey Stirling Scales  
ecc: Roberta Frampton Benefiel – Grand Riverkeeper Labrador

Thomas Johnson – Consumer Advocate  
Danny Dumaresque



September 19, 2014

Mr. Blair Seckington  
Program Manager, Incremental Work Program

Subject: Sunnyside Partial Discharge Failure Assessment

Dear Mr. Seckington,

During witness testing the week of August 17, 2014, the Sunnyside transformer successfully passed all tests with exception of the partial discharge test on August 22, 2014. During this testing high partial discharge was observed on all three phases. After additional troubleshooting, it appeared that the on-load tap changer was the source of the partial discharge. ABB contacted the supplier of the on-load tap changer, and on August 25, 2014 a technical expert from ABB Canada came to ABB South Boston to assist in troubleshooting.

The transformer was drained of oil to allow the technical expert access to the inside of the tank to inspect the switches, and the diverters were removed from the switches to allow inspection. During the inspection no sources of partial discharge were found. The tank was refilled and partial discharge testing was conducted again with the diverter switch removed. High levels of partial discharge were observed again, which eliminated the on-load tap changer as the source of the partial discharge.

On August 29, 2014, ABB's technical expert on high voltage testing was brought in from ABB Canada to assist in the troubleshooting. During this additional troubleshooting we were able to isolate, based on the signature of the partial discharge, the source of the partial discharge to the HV side of "A" and "B" phases. To further isolate the source of the partial discharge, and facilitate a more efficient inspection, ABB brought a team from Kinectrics North America in on September 1 – 3, 2014, with their highly specialized partial discharge test equipment (Omicron PDL 650 & Omicron MPD 600). The Omicron PDL 650 allows isolation of partial discharge via acoustic measurements, and the Omicron MPD 600 allows isolation of partial discharge via electrical measurements.

The testing conducted by Kinectrics North America further isolated the primary source of partial discharge to be located between and at the bottom of the HV "A" phase and HV "B" phase windings. At this point, ABB made the decision to cut the cover on the transformer and remove the active part for inspection.

On September 8, 2014, ABB found insulation damage on the stress shield and surrounding insulation structure at the lower end of the "A" phase HV and RV coils. The area of damage was in the phase-to-phase region between "A" and "B" phases. At this point, samples of the damaged insulation were sent to Doble for analysis and identification of any contamination. In parallel,



Canduct, insulation supplier, was contacted and asked to travel to ABB South Boston to participate in the failure investigation.

On September 9, 2014, Canduct arrived to assist in the failure investigation, and together with ABB, started removing the insulating wrap on the static ring in the area of the partial discharge. A small indentation was found under the insulating wrap. It is suspected that some form of contamination, occurring during the manufacturing of the static ring at Canduct, caused this indentation.

ABB has analyzed the design for dielectric stress floating in the area of the partial discharge, and we have confirmed that we have enough electrical design strength to withstand the voltage. In addition, during the inspection of the active part, ABB did not find any additional sources of partial discharge. Therefore, ABB feels strongly that whatever contamination caused the indentation in the insulating wrap of the static ring was the source of the partial discharge.

At the time of this report, ABB is awaiting the metal analysis results from Doble, and the root cause analysis from Canduct. Once this information is available an update to this report will be released.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lance Workman', is written over a horizontal line.

Lance Workman, PMP  
ABB Project Manager  
Office: 434-517-6225  
Email: lance.workman@us.abb.com