

October 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 and Western Avalon Terminal Station T5 Tap Changer Replacement**

Further to your letter of October 16, 2014 in relation to the above, this is Hydro's response to the Board's request for an explanation as to how the relocation of Transformer T8 from the Holyrood Terminal Station will affect the Island Interconnected System and Hydro's ability to supply load to customers at the forecast 2014/2015 winter peak.

The impact of the relocation of Holyrood T8 (230/138 kV, 75/100/125 MVA) to Sunnyside must be viewed from two perspectives: the impact on the Stony Brook to Sunnyside 138 kV Loop (STB-SSD); and the impact on the Western Avalon to Holyrood 138 kV Loop (WAV-HRD). The sections below address both aspects in some detail. In summary, however, the relocation of T8 will ensure that the STB-SSD loop has the same level of transformer capacity as with a new transformer leading into the 2014/15 winter season, while at the same time ensuring sufficient capacity in the WAV-HRD Loop to meet expected winter peaks demands.

#### Stony Brook to Sunnyside 138 kV Loop Impacts

Prior to the failure of 230/138 kV transformer T1 at Sunnyside in January 2014, the STB – SSD 138 kV Loop was supplied by four 230/138 kV, 75/100/125 MVA transformers, including two at STB (T1 and T2) and two at SSD (T1 and T4). The transformer capacity within the Loop was sufficient to supply all customer load with one unit out of service.

The failure of SSD T1 reduced the total installed transformer capacity in the STB – SSD 138 kV Loop to 375 MVA. The forecast peak for the 2014/2015 winter is approximately 320 MVA, thus the Loop has sufficient transformer capacity to supply the peak load for this coming winter season. However, the Loop is at risk of not being able to supply all load should one of the remaining three transformers fail prior to the replacement of SDD T1. The loss of a second transformer within the STB - SSD 138 kV

Loop would result in an available transformer capacity of 250 MVA. Load flow analysis indicates that if SSD T4 were to fail, the maximum load that could be supplied would be approximately 199 MVA due to low voltages on the Burin Peninsula. Should one of the STB units fail, analysis indicates that there would be overloading of the remaining two transformers over peak. Consequently, load reduction over peak could be expected should a second 230/138 kV transformer fail in the STB – SSD 138 kV Loop.

To reduce the risk to the STB – SSD 138 kV Loop for the 2014/2015 winter peak, and to ensure that available transmission capacity is within Hydro's N-1 transmission planning criteria (i.e., able to meet load in the event of a loss of the largest transformer), Hydro initiated a transformer purchase for the replacement of SSD T1 with an in-service date of Fall 2014.

Unfortunately, the delivery of the new SSD unit has been delayed, and Hydro has therefore initiated its contingency plan of relocating the Holyrood T8 (230/138 kV, 75/100/125 MVA) transformer to SSD to return the STB – SSD 138 kV Loop to full capacity.

#### Western Avalon to Holyrood 138 kV Loop Impacts

The WAV - HRD 138 kV Loop is supplied by a total of six 230/138 kV transformers with an installed transformer capacity of 416.8 MVA as indicated below:

##### Western Avalon

T3: 25/33.3/41.7 MVA

T4: 25/33.3/41.7 MVA

T5: 75/100/125 MVA

##### Holyrood

T6: 25/33.3/41.7 MVA

T7: 25/33.3/41.7 MVA

T8: 75/100/125 MVA

The WAV – HRD 138 kV Loop has a firm transformer capacity of 291.8 MVA (i.e., assuming a loss of one 125 MVA). The forecast peak load on this loop for the 2014/2015 winter season is approximately 155 MVA. It should be noted that the firm transformer capacity exceeds the forecast peak by 136.8 MVA.

In order to minimize the risk of load shed in the STB – SSD 138 kV Loop, Hydro's contingency plan in the event of any delay in the installation of the new replacement for SSD T1 in time for the 2014/15 winter season was to relocate a 125 MVA transformer from the WAV – HRD 138 kV Loop to SSD. As noted above, this contingency plan has been activated. This move will reduce the installed transformer capacity in the WAV – HRD 138 kV Loop to 291.8 MVA. Hydro has reviewed the risk to the WAV – HRD 138 kV Loop of a transformer failure following the relocation of HRD T8.

The loss of WAV T5 (125 MVA unit) would reduce the total transformer capacity in the WAV – HRD 138 kV Loop to 166.8 MVA (4 x 41.7 MVA). Load flow analysis of this contingency reveals that the WAV and HRD 41.7 MVA transformers would be loaded to 82% and 71% of nameplate ratings respectively.

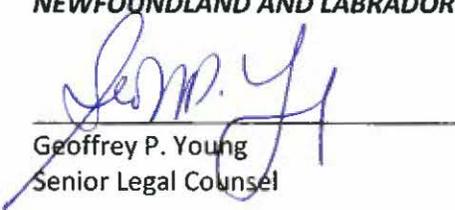
The loss of a 41.7 MVA transformer at HRD with HRD T8 relocated would leave a single 41.7 MVA transformer in service at HRD. Analysis of this contingency indicates that, while there would be sufficient transformer capacity within the Loop to supply all load, the load distribution along the Loop would be expected to result in the single HRD transformer being loaded to 139% of nameplate rating for the contingency. However, by opening the Loop between Springfield and Bay Roberts at peak load, the lone HRD unit would be reduced to 77% of nameplate rating for the contingency.

Consequently, the relocation of HRD T8 to the STB – SSD 138 kV Loop is not expected to have any significant adverse impact on the ability to supply all customer load in the WAV – HRD 138 kV Loop for the 2014/015 winter peak. The delivery and installation of the new 230/138 kV, 75/100/125 MVA transformer from the manufacturer will return both 138 kV loops to their previous installed transformer capacities.

We trust the foregoing is satisfactory. 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