

Requests for Information

Q. Further to the response to PUB-NP-032, provide further information in relation to the 138kV-66kV transformer and transmission line 41L taken out of service, setting out reasons, impacts and timing.

A. General

On January 8th at 5:45 pm Newfoundland Power's 2 transmission lines between Newfoundland and Labrador Hydro's ("Hydro") Western Avalon terminal station and Newfoundland Power's Blaketown substation tripped out of service. This caused widespread outages on the Avalon Peninsula west of Holyrood affecting approximately 29,000 customers in the Placentia Bay, St. Mary's Bay, Conception Bay North and Trinity Bay areas.

Newfoundland Power's 138 kV transmission line (64L) tripped as the result of the operation of Hydro's transformer overload protection.¹ This caused an immediate overload trip on a second Newfoundland Power 66kV transmission line (86L). Following this incident, Newfoundland Power learned that Hydro's WAV-T5 transformer was out of service.²

Within 30 minutes of this incident, Newfoundland Power undertook the necessary switching actions to restore stability to the electricity system and service to its customers. These actions included isolating Blaketown substation transformer BLK-T3 and removing transmission line 41L from service.³

The reasons for these switching actions are outlined below.

Normal Operations

Under normal operations, the electricity system in the affected area is supplied from Hydro's Western Avalon terminal station and Holyrood Thermal Generating Station ("Holyrood"). Electricity is supplied using 2 Newfoundland Power transmission lines (64L and 86L) between Western Avalon terminal station and Newfoundland Power's Blaketown substation and a third 138 kV Newfoundland Power transmission line, (39L) from Holyrood to Newfoundland Power's Bay Roberts substation.⁴

¹ Newfoundland Power's 39L-B breaker at Bay Roberts substation was also out of service at this time (see response to Request for Information PUB-NP-032). So, transmission line 39L was not available to reduce the load on transmission line 64L.

² This information was conveyed through discussion between Newfoundland Power's System Control Center and Hydro's Energy Management Center. WAV-T5 is a 230/138kV 125MVA power transformer and is one of three transformers that normally supplies 64L. The three transformers have combined capacity of 208MVA. However with T5 out of service there is only 83MVA transformer capacity remaining in service to supply 64L. Newfoundland Power learned at this time that WAV-T5 had been out of service since January 4th. This transformer remains out of service with reported damage to the tap changer components.

³ These 138kV and 66kV transmission lines are inter-connected at Blaketown substation through Newfoundland Power's BLK-T3 transformer. Newfoundland Power's transmission line 41L is a 66kV transmission line from Heart's Content substation to Carbonear substation.

⁴ Transmission lines 64L and 39L operate at 138kV and transmission line 86L operates at 66kV.

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1 Under normal operations, transformer loadings on the 138kV and 66kV systems in the
2 affected areas are shared automatically.

3
4 ***Operations Since January 8th, 2014***

5 In response to this incident, Newfoundland Power separated the 138kV and 66kV
6 systems at its Blaketown substation by removing transformer BLK-T3 from service and
7 opening transmission line 41L between Newfoundland Power's Heart's Content and
8 Carbonear substations.⁵ This effectively balanced the loads on Newfoundland Power's
9 138kV and 66kV transmission lines and Hydro's 138kV and 66kV transformers at
10 Western Avalon terminal station. This relieved the risk of over load for Hydro's
11 transformers.⁶

12
13 Newfoundland Power continues to operate with the 138kV and 66kV system split at
14 Blaketown substation while WAV-T5 remains out of service. The 138kV and 66kV
15 system is expected to be returned to normal configuration following return to service of
16 Hydro's WAV-T5 transformer.

⁵ Through the use of engineering load flow analysis, transmission line 41L was determined to be the point on Newfoundland Power's Avalon Peninsula transmission system that created the necessary load transfer from the Western Avalon 138kV transformers to the 66kV transformers.

⁶ This effectively meant Newfoundland Power had to reduce load on the 138kV transformers and increase load on the 66kV transformers. This was necessary due to the reduction in capacity by 125MVA resulting from the loss of WAV-T5.