

1 Q. It is understood that Hydro plans its transmission system to an N-1 criterion (PUB-
2 NLH-186). Please identify the critical elements that are assumed to be forced out of
3 service when Hydro plans its transmission system.

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6 A. Hydro plans its bulk transmission system under an N-1 criterion as summarized in
7 the first four bullets of Hydro's response to PUB-NLH-186 Attachment 1. In
8 particular, meeting this criterion will result in no customer load loss under any
9 forecast load condition, considering an outage to each of the following individual
10 elements¹:

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- 12 • A 230 kV or 138 kV transmission line except radial transmission lines;
- 13 • A single shunt capacitor. In particular, on the Island Interconnected System,
14 these are:
 - 15 ○ One 26.4 MVAR, 66 kV capacitor bank at Oxen Pond,
 - 16 ○ One 26.4 MVAR, 66 kV capacitor bank at Hardwoods, or
 - 17 ○ One 38.5 MVAR, 230 kV capacitor bank at Come By Chance²; and
- 18 • A single synchronous condenser when in operation for voltage control:
 - 19 ○ Stephenville combustion turbine in synchronous condenser mode,
 - 20 ○ Hardwoods combustion turbine in synchronous condenser mode,
 - 21 ○ Cat Arm in synchronous condenser mode,
 - 22 ○ Bay d'Espoir Unit 7 in synchronous condenser mode, or
 - 23 ○ Holyrood Unit 3 in synchronous condenser mode.

¹ Each element is considered on an individual basis with no combination of elements unless the system configuration is such that loss of a single element results in multiple element outages.

² The 230 kV bus configuration at Come By Chance Terminal Station requires consideration of loss of two 230 kV capacitor banks with a 230 kV transmission line fault in stability simulations.

For transformer contingencies, Hydro plans to have sufficient transformer capacity installed in its multiple transformer terminal stations such that there is adequate transformer capacity to supply the forecast firm load with the largest transformer out of service. Hydro accepts short-term customer load loss for a customer contingency while the failed transformer is isolated and the ECC coordinates the restoration of service. These transformers are:

- The largest 230/66 kV transformer in the Hardwoods – Oxen Pond Loop;
- The largest 230/66 kV transformer in Massey Drive assuming closure of the normally open 66 kV bus tie switch between Newfoundland Power and Corner Brook Pulp and Paper supply buses;
- Loss of one 230/66 kV transformer at Holyrood;
- Loss of one 230/69 kV transformer at Bay d’Espoir;
- Loss of one 230/66 kV transformer at Western Avalon;
- Loss of one 230/138 kV transformer at Bottom Brook assuming closure of the normally open 138 kV bus tie disconnect switch between T1 and T3;
- The largest 230/138 kV transformer in the Stony Brook – Sunnyside 138 kV Loop; and
- The largest 230/138 kV transformer in the Western Avalon – Holyrood 138 kV Loop.