

1 Q. Further to the response to PUB-NLH-264, state how frequently load shedding might  
2 happen as a consequence of trips occurring when in monopolar operation.

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5 A. Under normal operation, the Labrador - Island HVdc Link (LIL) will operate in bipole  
6 mode. That is both poles of the LIL will be in service. Monopolar operation, that is  
7 one pole of the LIL out of service, will occur either during scheduled maintenance of  
8 the LIL, or during a forced outage of LIL equipment.

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10 It is expected that LIL maintenance on a pole-by-pole basis will be performed during  
11 the Island Interconnected System light load periods (i.e., late spring, summer  
12 and/or early fall). At these times, there is sufficient on-island generation capacity to  
13 meet the Island load. Operation of the LIL during the maintenance period with  
14 contracted deliveries on the Maritime Link (i.e., the Nova Scotia Block) and minimal  
15 LIL load for delivery to the Island has two positive benefits for the Island  
16 Interconnected System. First, there will sufficient margin on the LIL in monopolar  
17 mode to carry sufficient spinning reserves on the LIL to ensure no under frequency  
18 load shedding for the loss of an on-island generator. Second, with only the Nova  
19 Scotia Block and limited deliveries to the island on the LIL during scheduled  
20 monopolar operation for maintenance, sudden loss of the LIL will result in loss of  
21 the Nova Scotia Block and a sufficiently low enough delivery to the Island such that  
22 on-island generator response will eliminate under frequency load shedding for the  
23 event. Operating experience with the existing isolated system shows that loss of up  
24 to 25 MW of on-island generating capacity during these load conditions does not  
25 result in under frequency load shedding. At this point, it is expected that a LIL  
26 delivery at Soldiers Pond in the range of 183 MW in monopolar mode during LIL  
27 maintenance will not result in under frequency load shedding on the island for loss

1 of the LIL. The addition of the high inertia synchronous condensers will improve the  
2 frequency response of the system with the expectation that the 25 MW limit may  
3 be increased. Detailed operating studies to be completed in the 2015/2016  
4 timeframe will determine the extent to which the LIL may be loaded on monopolar  
5 mode with no under frequency load shedding on the island following a trip of LIL  
6 from the monopolar starting point.

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8 The greatest risk to under frequency load shedding on the Island Interconnected  
9 System due to loss of the LIL while operating in monopolar mode will occur during  
10 peak load periods when one pole of the LIL has been forced out of service. During  
11 late fall, winter, and early spring when there will be insufficient generation on the  
12 island to supply all island load, deliveries to the island via the LIL will be at their  
13 greatest. Under these conditions, the LIL has sufficient overload capacity to ensure  
14 no under frequency load shedding for the loss of one pole over peak. Following the  
15 loss of one pole the LIL will have a continuous monopolar rating of 552 MW  
16 delivered. Maximization of on-island generation can be used to reduce the LIL  
17 transfer as much as possible. However, given the load requirements of the Island  
18 Interconnected System during peak load conditions, high deliveries via LIL would be  
19 required. Consequently, it would be impossible to reduce the LIL delivery during  
20 peak load conditions to eliminate under frequency load shedding for sudden loss of  
21 the LIL when operating in monopolar mode. Recall that the system is being planned  
22 for the loss of a pole of the LIL without loss of load. The loss of the bipole is  
23 considered a NERC transmission planning standard category C event<sup>1</sup>, and as such,  
24 scheduled loss of load is deemed acceptable.

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<sup>1</sup> See NERC Reliability standard TPL-003-0b Table I.

1 In determining the potential frequency of under frequency load shedding on the  
2 Island Interconnected System for loss of the LIL while in monopolar mode, one must  
3 first consider the frequency with which the LIL has gone from its normal bipole  
4 operating state to a monopolar mode of operation. Next, one considers the  
5 frequency of moving from the monopolar operating state to the LIL outage state.  
6 The combined frequencies of these two mode changes is, in essence, the frequency  
7 of the LIL bipole outage frequency. Hydro's response to PUB-NLH-124 provides the  
8 bipole failure rate as one bipole failure every three years. Given that the bipole  
9 failure may occur at anytime during the three year period and Hydro's ability to  
10 minimize the impact of load shedding through reduced power deliveries on the LIL  
11 in monopolar mode except in peak load periods, it is expected that the frequency of  
12 load shedding following loss of the LIL in monopolar mode will be less than once in  
13 three years.