Q. Reference PUB-NLH-513: In this response Hydro predicts the frequency of a pole outage, followed by a second pole outage during the winter months at once every 3 years. Please confirm that this would be in addition to the bipole outage rate as stated in PUB-NLH-212 Attachment 2. If yes, please explain why this has not been reflected in the table provided in GRK-NLH-060. If the scenario described is not in addition to the bipole outage rate as stated in PUB-NLH-212 Attachment 2, please explain where this scenario is reflected in the tables provided in PUB-NLH-212 Attachment 2 and in the tables provided in GRK-NLH-060.

A. Caution is required not to take values out of context when comparing the responses to various requests for information. In this regard Hydro advises that PUB-NLH-513 questions the perceived difference between the Cigre and NLH definitions of bipole failure as it related to responses PUB-NLH-482 and PUB-NLH-487. Hydro indicated in PUB-NLH-513 that its definition of a bipole outage was consistent with the Cigre definition of simultaneous loss of both poles of the bipole system.

The responses to both PUB-NLH-482 and PUB-NLH-487 were written given the underlying assumption of the question that one pole of the Labrador – Island Link (LIL) was out of service. Recall PUB-NLH-482 asked:

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

PUB-NLH-487 considered the implications of under frequency load shedding for loss of a LIL pole.

Hydro explained in PUB-NLH-513 that it was not the company's intention to operate for long periods of time at heavy loads on one pole with the second pole out of service. To this end, long duration maintenance outages would be scheduled at times of low loading requirements on the LIL. With respect to a the loss of a second pole following the forced outage of the first pole, Hydro maintained in PUB-NLH-513 that in order for there to be an impact on load shedding during peak load conditions (in the context of the questions PUB-NLH-482, PUB-NLH-487 and PUB-NLH-513):

> *…the LIL must transition from normal bipole mode of operation to monopolar mode of operation to loss of the healthy pole in a relatively short period of time.*
>
> *Statistically, the sudden loss of one pole of a bipole system followed by the sudden loss of the second pole of the bipole system in a short period of time approaches the probability of the bipole outage. As a consequence, Hydro's response to PUB-NLH-482 placed the frequency of a pole outage, followed by a second pole outage during the winter months at once in three years, as per the calculated bipole outage rate.*

This bipole outage rate of once in three years is sourced to response PUB-NLH-124. PUB-NLH-124 considers the response to PUB-NLH-212 and its Attachment 2 "*Reliability & Availability Assessment of the HVdc Island Link*" dated April 10, 2012 completed by SNC-Lavalin. The failure rates in PUB-NLH-212 Attachment 2 were updated in PUB-NLH-124 to reflect the manufacturer's performance guarantees for the proposed converter equipment at Muskrat Falls and Soldier's Pond. The end

result is an adjusted total bipole failure rate of 0.3278 per year, or one bipole failure every three years.

As a result, the bipole outage rate of one in three years is not in addition to the outage rate as stated in PUB-NLH-212 Attachment 2, but rather an adjustment for manufacturer's performance guarantees.

Consequently Table 3-2 Composite Island Link Bipole Reliability given in response to GRK-NLH-060 provides the same once in three years outage rate as shown below. The requested outage rate is highlighted here for identification.

Table 3-2: Composite Island Link Bipole Reliability

Modification to PUB-NLH-212 Attachment 2 Table 3-2: For Labrador - Island HVdc Link Converter Bipole Failure Rates			
Element	**Failure Rate (f/yr)**	**Repair Time (hrs)**	**Downtime (hrs/yr)**
Bipole – Muskrat Falls	0.05	0.13	0.007
Converter Pole + Converter Pole – Muskrat Falls	0.0084	6.86	0.057
Bipole HVdc L1 (Labrador) – 388 km	0.074	24	1.776
Pole 1 + Pole 2 (submarine cables)	0.007	621.7	4.479
Bipole HVdc L2 (Island) – 680 km	0.13	24	3.12
Converter Pole + Converter Pole – Soldiers Pond	0.0084	6.86	0.057
Bipole - Soldiers Pond	0.05	0.13	0.007
Total	0.3278	683.4	9.503