

1 Q. Reference: Hydro's November 30, 2016 *Energy Supply Risk Assessment*,
2 Appendix A, Page 2 of 5, Table 3.

3 Please complete the following table taking into account the full impact of the forced
4 outages that resulted from the boiler tube issues in 2016:
5

Holyrood DAFOR					
Holyrood	2012	2013	2014	2015	2016
Unit 1					
Unit 2					
Unit 3					
Total Plant					

6

7

8 A. The following table presents the Holyrood DAFOR¹ including the full impact of the
9 forced outages resulting from the 2016 boiler tube issues.

Holyrood DAFOR					
Holyrood	2012	2013	2014	2015	2016
Unit 1	4.73%	75.83%	19.76%	4.94%	24.55%
Unit 2	0.77%	6.44%	12.16%	1.89%	26.69%
Unit 3	17.86%	13.36%	9.51%	9.37%	2.41%
Total Plant²	6.05%	38.98%	13.79%	5.04%	19.42%

¹ DAFOR is the Derated Adjusted Forced Outage Rate. It is the ratio of equivalent forced outage time to equivalent forced outage time plus the total equivalent operating time.

² the "Total Plant" DAFOR is not a straight average of the annual DAFOR of the individual units. The "Total Plant" is a weighted average which considers the unit output and generating hours.

1 It is estimated that the de-rating of Units 1 and 2 through the first half of 2016 due
2 to boiler tube issues contributed to approximately 10% (half of the 19.42%) of the
3 2016 actual Total Plant DAFOR of 19.42%.

4

5 The reliability metrics used by Hydro in the Energy Supply Risk Assessment report,
6 specifically DAFOR and UFOP³, utilize nationally adopted definitions for the factors
7 in the calculations of these metrics. Examples of factors for which national
8 definitions exist include the various operating states of a unit, such as “forced
9 outages”, “forced de-rating”, and “maintenance outages”. Within DAFOR, forced
10 outages are considered, but not maintenance outages. Maintenance outages are
11 those outages required to address an identified issue but that can be postponed
12 until system conditions allow a unit to be taken offline in a controlled fashion to
13 complete the maintenance. The DAFORs for Holyrood Units 1 and 2 were materially
14 affected in 2016 by the *de-ratings* due to boiler tubes issues. The DAFOR calculation
15 was not impacted by maintenance outages. In 2016 the outages to replace tubes
16 that occurred for Unit 1 and Unit 2 are not part of the DAFOR calculation. This is
17 consistent with how utilities nationally would calculator DAFOR for their generating
18 units.

³ UFOP is the Utilization Forced Outage Probability. It is the probability that a generation unit will not be available when required