

1 Q. **Newfoundland and Labrador Hydro – Near-Term Reliability Report, May 15, 2020**

2 ***Generation***

3 With respect to the root cause of the rotor rim key cracking for the Upper Salmon Plant/Unit,
4 please:

- 5 a. Describe the status of efforts to determine the root cause(s).
- 6 b. Identify the root cause(s) if known.
- 7 c. Describe corrective actions planned or in place, other than frequent monitoring.

8

9

10 A. a. The presence of fretting corrosion and subsequent rotor rim key cracking on the Upper
11 Salmon unit was first noted to be a risk to the near term reliability of this unit in the May
12 2017 Near-Term Generation Adequacy Report. As per Original Equipment Manufacturer
13 guidance, the rim keys were replaced in 2018 during the annual maintenance outage and
14 continued monitoring has occurred since that time. Inspections that followed discovered
15 cracked keys which have been repaired. However, the five inspections, completed since
16 November 2019, have revealed no new cracked keys; as a result, the frequency of
17 inspection was changed from four to six weeks.

18 Work has been ongoing to determine the root cause(s) and long-term solution to the
19 fretting corrosion and rotor rim key cracking. In 2019, Newfoundland and Labrador Hydro
20 (“Hydro”) engaged an external consultant to complete an independent review of the issue.
21 This consultant confirmed that the continuing maintenance requirements associated with
22 the rotor rim keys are excessive when compared to what has been experienced on similar
23 machines of this vintage. It was also confirmed that the largest likely contributing factor to
24 the excessive wear and cracking of rotor rim keys is the misalignment of the generator rotor
25 to stator airgap. When a generator stator and rotor do not exhibit concentricity, the rotor

1 rim is subjected to an alternating magnetic force. These alternating forces can result in
2 fatigue cracking and wear to welds as has been experienced on the Upper Salmon unit.

3 b. Please refer to Hydro's response to part a.

4 c. Intervention in addition to the normally scheduled asset management activities is required
5 to address the cause of this issue. To gather the appropriate information to ensure a
6 suitable path forward is determined, Hydro has planned to complete detailed airgap
7 measurements to determine the current shape of both the rotor and stator as per the
8 recommendations of the external consultant. This work is planned as part of the next major
9 maintenance interval, referred to as a PM9, which is currently scheduled for 2024. This
10 detailed air gap measurement will provide the data required to complete analysis to
11 determine if the rotor rim shape, the stator core shape, or both may require adjustment.
12 This analysis will help to establish an appropriate plan for the required work to properly
13 remedy the issue.

14 Although the current philosophy of continued frequent monitoring and repair of broken
15 rotor rim keys on an as required basis does not address the root cause, it does ensure
16 continued reliable operation. Monitoring and repair activities are completed during
17 regularly scheduled maintenance outages which are short in duration, typically less than
18 eight hours. These inspections and repairs, if required, require no external resources and
19 minimal additional incurred cost. If at a later date, a lengthy planned outage and
20 intervention is completed to remedy the issue, these regularly scheduled inspections would
21 be expected to continue for a period of time to monitor the unit and ensure the longevity of
22 the fix.