

1 Q. Please describe the nature of the 2012-13 forced outage at the Stephenville CT,  
2 including the major work completed and the reason for the 20-month duration.

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5 A. The Stephenville Gas Turbine is used as both a peaking plant during system  
6 contingencies and for voltage control (in synchronous condenser mode) on the west  
7 coast of the Island. The 2012/2013 forced outage at the Stephenville Gas Turbine  
8 began on December 29, 2011 and the unit was returned to service on June 1, 2013,  
9 for a total outage time of 17 months. The cause of the outage was an alternator  
10 stator winding failure. This rendered the unit inoperable for both of its primary  
11 purposes until the alternator could be repaired. The repair options available were  
12 limited to an in-situ repair, a partial rewind or complete rewind of the alternator  
13 stator. The repair option chosen was a complete rewind of the stator. This option  
14 was chosen due to the age and condition of the alternator stator winding and the  
15 cost associated with the disassembly of the gas turbine to facilitate either a partial  
16 or complete rewind. Thus, Hydro proposed to the Board a complete rewind of the  
17 alternator stator and an upgrade of other components to ensure the reliability of  
18 the asset into the future.

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20 From 2008 to 2013, the unit was used primarily as a synchronous condenser and  
21 rarely as a peaking unit. This is because system demand was significantly reduced  
22 with the shutdown of the paper mills in Stephenville and Grand Falls-Windsor and  
23 the decline in paper machine operations at the Corner Brook paper mill. Hydro's  
24 response to PUB-NLH-148 provides the unit operating hours in synchronous  
25 condenser mode and in generation mode (primarily testing or for system  
26 contingencies) from 2008 to 2013 which demonstrates the typical operating  
27 requirements for this unit during that period.

The more critical time for synchronous condenser operation for this unit is during the late spring, summer and early fall period (from May to September). At this time, customer demand is reduced. The west coast of the Island Interconnected System is serviced by long, lightly loaded transmission lines, which results in high voltages. The Stephenville unit (in synchronous condenser mode) is used to reduce supply point voltages to acceptable levels. While the unit was out of service, alternate methods<sup>1</sup> of reducing voltage on the system were relied upon to ensure minimum impact to system reliability and customer service. Due to the length of time to repair, there was no opportunity in 2012 to return the unit to service in advance of the lower demand period of the summer of 2012. As a result, the critical path was established with the primary focus to have the unit returned to service for the reduced demand period of 2013.

The major work completed during the outage included:

- Asbestos abatement of the work area prior to dismantling;
- Partial dismantling of the facility to allow removal of the alternator;
- Rotor and exciter removal from the alternator stator;
- Rotor and exciter packaging and shipping to the Brush facility in Pennsylvania for refurbishment;
- Erection of a climate-controlled enclosure on site to house the stator during the rewind;
- Placing the stator in the climate-controlled enclosure;
- Removal of stator coils and installation of new coils;
- Reinstallation of the refurbished rotor and exciter into the stator;

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<sup>1</sup> Such as reducing generator voltages, dispatching additional generation in a manner to increase the overall MVAR absorption capability on the system or removing a 230 KV line from service when loading and weather conditions permitted.

- Reinstallation of the alternator;
- Reassembly of the facility;
- Completion of final electrical, mechanical and piping connections; and
- Commissioning of the unit and release for service.

In addition to the work listed above, further inspection and work was undertaken to take advantage of the extended outage and the access afforded by the partial disassembly of the unit. The components inspected and/or repaired included the alternator rotor and retaining rings, bearings, shaft grounding system, and heat exchanger. A protection upgrade was also completed.

The project activity timeline for the forced outage of the Stephenville Gas Turbine is provided in PUB-NLH-152 Attachment 1.

| <b>Date</b>                      | <b>Activity</b>  | <b>Comments</b>   |
|----------------------------------|--|---|
| December 29, 2011                | Alternator failed in service   |   |
| January 2012                     | Failure Investigation completed by Brush.  | This investigation required extensive partial disassembly of the stator and engineering evaluation work in order to determine the mode of failure and the potential refurbishment options.  |
| January 2012                     | Site visit by Hydro's insurer, FM Global, to visually inspect the failed unit.               |   |
| February 2012                    | Site visit by Brush to establish logistics of alternator removal for refurbishment.          |   |
| March – July, 2012               | Preparation of Supplemental application and determining scope, cost and schedule for repair. | During this time, the work required to complete the refurbishment was being determined to allow estimate of cost and schedule. This required the complex logistics of alternator removal to be worked out, including the extent of disassembly of the building itself which would be required. Also, an investigation of opportunistic work which was reasonable to do given the extent of dismantling which would be required to facilitate alternator repair and the access afforded by this major disassembly was completed. |
| July 24, 2012                    | Application filed for project approval.  |   |
| August 16, 2012                  | Project approval received.   |   |
| August 16, 2012                  | Tender posted for rewind work – two weeks.   | Public tender closed August 30, 2012.   |
| October 10, 2012                 | Contract award.  |   |
| October 29, 2012                 | Project construction start.  |   |
| October 29 – November 20, 2012   | Asbestos abatement work completed.   |   |
| November 24 – December 1, 2012   | Erection of climate-controlled enclosure.  | Required to keep the stator dry and clean during rewind.  |
| December 8, 2012 – March 1, 2013 | Stator rewind completed.   | Stator rewind is a major engineering undertaking and was achieved within the expected timeframe.  |
| April 9 – May 25, 2013           | Unit reassembly.   |   |
| May 27 – June 1, 2013            | Unit start up and commissioning.   |   |
| June 1, 2013                     | Unit released for service.   |   |