

# **NEWFOUNDLAND AND LABRADOR HYDRO**

*Sequence of Events*

*Leading up to Sunnyside Transformer Fault on January 4, 2014*

February 2014



**Table 1: Events leading up to Sunnyside Transformer Fault - January 4, 2014**

<b>Date</b>	<b>Time</b>	<b>Event</b>
<b>Jun. 1, 2013</b>	<b>12:00</b>	The Stephenville Gas Turbine de-rated by 25 MW due to excessive heat build-up in the B turbine module during operation, resulting from the poor condition of the insulating blankets around the turbine and exhaust stack.
<b>Oct. 3, 2013</b>	<b>08:00</b>	Hardwoods Gas Turbine removed from service for alternator overhaul. Scheduled completion date was December 19, 2013.
<b>Dec. 11, 2013</b>		During testing at Hardwoods Gas Turbine on December 10, a jacking oil pump failed. The pump on the unit at Stephenville Gas Turbine was temporarily removed and installed at Hardwoods, causing the Stephenville unit to become unavailable while a replacement pump was obtained and installed.
<b>Dec. 14, 2013</b>		A new record system demand of 1,501 MW was supplied.
<b>Dec. 15, 2013</b>	<b>01:20</b>	Significant frazil ice accumulation affected the Exploits generation at Grand Falls. Plant production reduced from 63 MW to 38 MW (by 25 MW).
<b>Dec. 16, 2013</b>		Granite Canal Generating Station reduced to 32 MW due to axial vibration.
<b>Dec. 21, 2013</b>	<b>14:00</b>	Hardwoods Gas Turbine unavailable, suspected due to the failure of a three-way fuel valve associated with Engine A. The failure occurred during commissioning of the new alternator, following a refurbishment undertaken during the fall.
<b>Dec. 23, 2013</b>	<b>20:21</b>	Stephenville Gas Turbine restored to 25 MW with the installation of a new jacking pump to replace the old pump, which was removed on December 11 and sent to Hardwoods. The remaining 25 MW of capacity was pending the delivery of new insulating blankets, scheduled for early January 2014.
<b>Dec. 25, 2013</b>		Holyrood Unit 2 de-rated (by 25 MW) to 142 MW due to a broken control valve.
<b>Dec. 26, 2013</b>	<b>06:00</b>	Holyrood Unit 3 de-rated (by 100 MW) to 50 MW due to a failure of a forced draft (FD) fan motor.

Date	Time	Event
<b>Dec. 27, 2013</b>		Total unavailable generation at this time is approximately 233 MW.
		Implemented generation loading sequence generation shortages protocol up to step eight (with the exception of step seven). A copy of this protocol is at the end of this Sequence of Events. Communication continued with Newfoundland Power (NP) as to the status of generation assets, load forecasts, and protocols. Communications occurred internally to ensure awareness of the situation.
		Supply and demand at peak. Demand: 1385 MW Supply: 1426 MW
		Generation loading sequence generation shortages protocol was not required. Communication continued with NP as to the status of generation assets, load forecasts and protocols.
<b>Dec. 28, 2013</b>	<b>06:34</b>	Supply and Demand at Peak. Demand: 1331 MW Supply: 1456 MW
		Bay d’Espoir Unit 2 was removed from service due to air supply issue with circuit breaker B1T2. The unit was restored at 1138 hours.
<b>Dec. 28, 2013</b>		Generation loading sequence generation shortages protocol was not required. Forecast peak for December 29 of 1410 MW. This was communicated to NP. Preparations were made between both utilities to prepare, as per shortage protocol. A customer conservation message was discussed as a potential requirement for December 29. The decision was to be made early on December 29.
<b>Dec. 29, 2013</b>		Supply and demand at peak. Demand: 1354 MW Supply: 1456 MW
		The Stephenville Gas Turbine failed to start initially. The unit was successfully started at 2224 hours.
		Implemented generation loading sequence generation shortages protocol up to step 13; including asking Corner Brook Pulp and Paper (CBPP) to shed processing load. Continued to discuss the potential of issuing a public conservation message but determined it was not required. Forecast peak for December 30 of 1420 MW. Continued communication with NP regarding the continuing need to implement the Generation

Date	Time	Event
		Loading Sequence Generation Shortages protocol.
	<b>16:35</b>	Implemented the Generation Loading Sequence Generation Shortage Protocol steps to start NP standby generation, implement NP voltage reductions and call on curtailable customer.
	<b>17:08</b>	Received first assistance from CBPP (28 MW)
		Supply and Demand at Peak. Demand: 1425 MW Supply: 1470 MW
		Determined that immediate resolution of Holyrood and Hardwoods generation issues were not possible.
<b>Dec. 30, 2013</b>		<p>Implemented Generation Loading Sequence Generation Shortage protocol up to step 13; This included asking CBPP to shed approximately 30 MW of load in the morning and 52 MW in the evening.</p> <p>There was an internal meeting held to discuss progress on generation and preparations going forward.</p> <p>Discussions were initiated with CBPP regarding a more formal capacity assistance agreement.</p> <p>Forecast peak for December 31 of 1400 MW. Continued communication with NP regarding the continuing need to implement the Generation Loading Sequence Generation Shortage protocol.</p> <p>Supply and Demand at Peak. Demand: 1417 MW (morning) Demand: 1417 MW (evening) Supply: 1458 MW</p> <p>A review of the weather forecasts highlighted that January 2-3 demand levels are were expected to be high. Generation Loading Sequence Generation Shortage protocol not required.</p>
<b>Dec. 31, 2013</b>		<p>A short- term capacity assistance agreement was reached with CBPP for 20, 40 or 60 MW blocks of power.</p> <p>Forecast peak for January 1 of 1450 MW. Continued communication with NP regarding the continuing need to implement the Generation Loading Sequence Generation Shortage protocol.</p>

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## NP – Feeder Interruptions

Date	Time	Feeder Rotations	Average Duration (minutes)
Thursday January 2, 2014	4:13 pm to 10:45 pm	77	88
Friday January 3, 2014	6:57 am to 7:36 pm	141	44
Sunday January 5, 2014	7:23 am to 8:29 pm	158	54
Monday January 6, 2014	5:17 am to 10:48 am	39	47
Wednesday January 8, 2014	3:23 pm to 5:42 pm	32	25

## NLH – Feeder Interruptions

Date	Time	Feeder Rotations	Average Duration (minutes)
Thursday January 2, 2014	4:56 pm to 10:50 pm	6	30
Friday January 3, 2014	7:00 am to 7:30 pm	25	30
Sunday January 5, 2014	5:04 pm to 7:03 pm	5	60
Wednesday January 8, 2014	3:32 pm to 4:30 pm	3	30



### SYSTEM OPERATING INSTRUCTION

<b>STATION:</b>	GENERAL	<b>Inst. No.</b>	T-001
<b>TITLE:</b>	GENERATION LOADING SEQUENCE AND GENERATION SHORTAGES*, **	<b>Rev. No.</b>	07
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#### INTRODUCTION

In the event of a system generation shortage, the following guidelines shall be followed in the sequence outlined in order to minimize outages to customers:

#### PROCEDURE

##### A. Normal Generation Loading Sequence

1. Bring on line all available Hydro hydroelectric generators and load them to near their full capacity.
2. Request Newfoundland Power to maximize their hydro production.
3. Make a Capacity Request of Deer Lake Power to maximize their hydroelectric generation.
4. Request Non-Utility Generators to maximize their hydro production.
5. Increase Holyrood production to near full capacity.
6. Notify customers taking non-firm power and energy that if they continue to take non-firm power, the energy will be charged at higher standby generation rates.
7. Ask Newfoundland Power to curtail any interruptible loads available.
8. Start and load standby generators, both Hydro and Newfoundland Power units, in order of increasing average energy production cost with due consideration for unit start-up time.

<b>PREPARED BY:</b>	<b>APPROVED/CHECKED BY:</b>	<b>ISSUED DATE:</b> 1992-07-16
Robert Butler		<b>REV. DATE:</b> 2009-04-29



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#### PROCEDURE (cont'd.)

9. Cancel all non-firm power delivery to customers and ensure all industrial customers are within contract limits.

If load is still increasing and it is apparent that a generation shortage may occur, proceed as follows:

10. Ensure that steps A1 to A9 above have been followed and implemented.
11. Inform Newfoundland Power of Hydro's need to reduce supply voltage at Hardwoods and Oxen Pond and other delivery points to minimum levels to facilitate load reduction. Begin voltage reduction.
12. Request industrial customers to shed non-essential loads and inform them of system conditions.
13. Request industrial customers to shed additional load.
14. Request Newfoundland Power to shed load by rotating feeders. At the same time, shed load by rotating feeders in Hydro's Rural areas where feeder control exists.

#### Note:

Generation from Wind Farms may shutdown with little notice.

\* Part of the Environmental Plan

\*\* Part of the Emergency Response Plan

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