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April 22, 2015

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, Newfoundland & Labrador
A1A 5B2

Attention: Ms. Cheryl Blundon
Director Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro - The Board's Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System – Rolling 12 month performance of Hydro's generating units

In accordance with item 2.8 of the Liberty Report Recommendations dated December 17, 2014, please find attached the original plus 12 copies of the quarterly report *Rolling 12 Month Performance of Hydro's Generating Units*.

We trust the foregoing is satisfactory. If you have any questions or comments, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Tracey L. Pennell
Legal Counsel

TLP/cp

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Sheryl Nisenbaum – Praxair Canada Inc.
ecc: Roberta Frampton Benefiel – Grand Riverkeeper Labrador
Thomas Johnson – Consumer Advocate
Thomas O' Reilly – Cox & Palmer
Danny Dumaresque

A REPORT TO
THE BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

QUARTERLY REPORT
ON
PERFORMANCE OF GENERATING UNITS
FOR THE QUARTER ENDED MARCH 31, 2015

NEWFOUNDLAND AND LABRADOR HYDRO

April 22, 2015

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Table of Contents

1.0 Introduction

In this report, Newfoundland and Labrador Hydro (Hydro) provides data on forced outage rates of its generating facilities. This data is provided in relation to past historical forced outage rates and as well, in relation to assumptions used in Loss of Load Hours (LOLH) calculations for system planning purposes.

The forced outage rates are provided for individual generating units at hydraulic facilities; the three units at the Holyrood Thermal Generating Station (HTGS) and Hydro's gas turbines for the current 12-month reporting period of April 1, 2014 to March 31, 2015. The report also provides, for comparison purposes, the individual generating unit data on forced outage rates for the previous period April 1, 2013 to March 31, 2014. Further, total asset class data is presented on an annual basis for years the 2004-2013. This report provides data on outage rates for forced outages, not planned outages.

The forced outage rates of Hydro's generating units will be presented using two measures: Derated Adjusted Forced Outage Rate (DAFOR) for the hydraulic units and the units at the HTGS, and Utilization Forced Outage Probability (UFOP) for the gas turbines.

Derated Adjusted Forced Outage Rate (DAFOR), as defined by the Canadian Electricity Association (CEA), measures the percentage of time that a unit or group of units is unable to generate at its Maximum Continuous Rating (MCR) due to forced outages. The DAFOR for each unit is weighted to reflect differences in generating unit sizes in order to provide a company total and reflect the relative impact a unit's performance has on overall generating performance. This measure is applied to hydraulic and thermal units. However, this measure is not applicable to gas turbines because of their nature as a standby unit and therefore low operating hours.

Utilization Forced Outage Probability (UFOP), also defined by the CEA, measures the percentage of time that a unit or group of units will encounter a forced outage and not be available when required. This metric is used for the gas turbines.

Included in the forced outage rates in this report are outages that remove the unit from service completely, as well as instances when units' output was de-rated. If a unit's output is reduced by more than 2%, the unit is considered de-rated by CEA guidelines. Per CEA guidelines, to take into account the de-rated levels of a generating unit, the operating time at the de-rated level is transformed into an equivalent time as a full outage.

In addition to providing data on forced outage rates, this report provides outage details for those outages that contributed materially to forced outage rates exceeding those used in Hydro's generation planning analysis.

2.0 Period Ending March 31, 2015 Overview

Class of Units	Previous Period (%)	Current Period (%)	Base Planning Assumption (%)
Hydraulic	1.92	4.45	0.90
Thermal	32.38	10.99	9.64
Gas Turbine	19.36	17.87	10.62

The hydraulic DAFOR diminished in performance for the current period, the 12-months ending March 31, 2015 compared to the previous period, the 12-months ending March 31, 2014. The thermal DAFOR and gas turbine UFOP improved in the current period compared to the previous period.

In the ten year period prior to 2014, the hydraulic units show a somewhat consistent DAFOR. The DAFOR of the current 12-month period compared to the previous ten years is higher primarily due to a rectifying transformer failure on Unit 6 at Bay d'Espoir.

The thermal units at HTGS, in the ten year period prior to 2014, exhibit more variability than the hydraulic units, but many years were close to a rate of approximately 10%. Considering the forced outage rate of the current period ending March 2015 compared to the previous ten years, the 10.99% DAFOR is near the rate of many years, and notably improved compared to the previous 12-month period when the rate exceeded 30%.

Hydro's gas turbines UFOP in the ten year period prior to 2014 was generally consistent at approximately 10% until 2012 when the rate exceeded 50%. Since 2012, the UFOP is improving each year, including the current 12-month period ending March 31, 2015. The newest unit in this asset class is the 123.5 MW unit. The data for this unit began to be measured in March 2015.

Note that the data in the charts provider later in this report for 2004 to 2013 are annual numbers (January 1 to December 31), while March 31, 2014 and March 31, 2015 are 12-month rolling data (April 1 to March 31 for each period).

3.0 Generation Planning Assumptions

The base assumed DAFOR and UFOP indicators used in the planning model are representative of a historic average of the actual performance of these units over the five years 2008 – 2012. The base planning assumption numbers are noted in the table below under the column "Base Planning Assumption".

Hydro also provides a "Sensitivity" number for DAFOR and UFOP as part of its generation planning analysis. This number takes into account a higher level of unavailability, should it occur, to assess the impact of higher unavailability of these units on overall generation requirements. The 2014 analysis demonstrated that with the implementation of the new gas turbine generating unit and the capacity assistance arrangements, the LOLH reliability criterion of 2.8 hours per year will be met in each year out to 2018 for the full range of sensitivity in the table below.[1]

The new gas turbine (Holyrood CT) has a lower expected rate of unavailability than the original gas turbines, 5% compared to 10.62% respectively, due to the fact that the unit is new and can be expected to have better availability than the older units.[2]

Hydro's current generation planning assumptions for DAFOR and UFOP are:

	DAFOR (%)		UFOP (%)	
	Base Planning Assumption	**Sensitivity**	**Base Planning Assumption**	**Sensitivity**
Hydroelectric Units	0.90	0.90		
Thermal Units (Holyrood)	9.64	11.64		
Gas Turbines – Existing			10.62	20.62
Gas Turbines – New			5.0	5.0

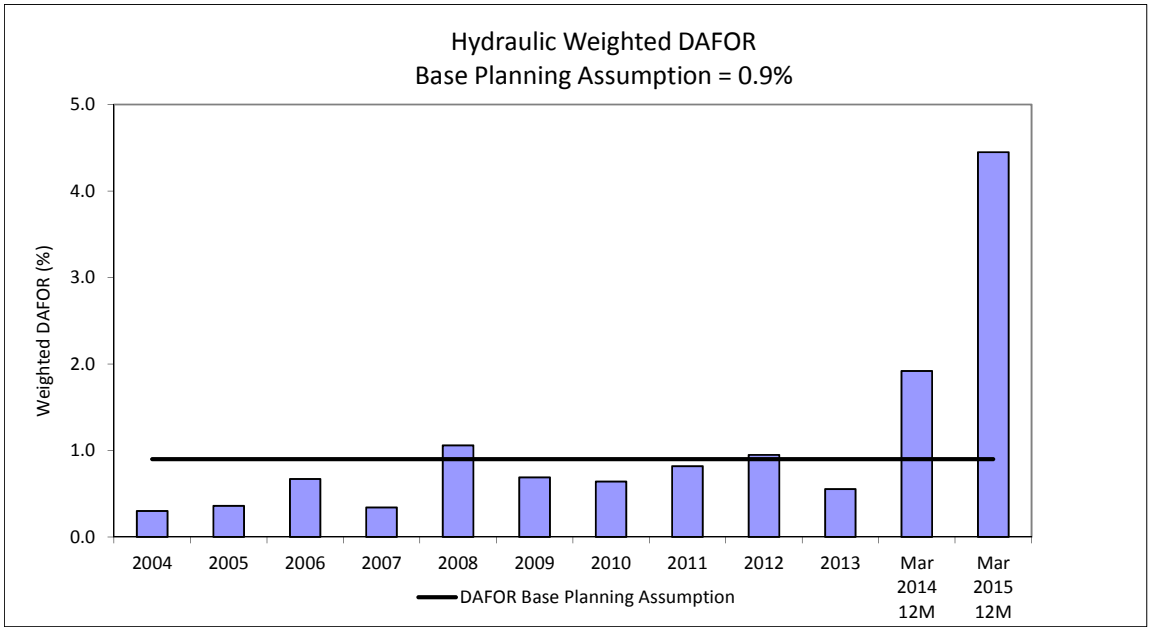
[1] During the 12-month period ending March 31, 2015, the thermal and gas turbine units performed within the sensitivity range for DAFOR and UFOP.

[2] Hydro selected a 5% UFOP for the new Holyrood CT following commentary on forced outage rates contained in the *Independent Supply Decision Review - Navigant (September 14, 2011).*

4.0 Hydraulic Unit DAFOR Results

The hydraulic units forced outage rates are measured using DAFOR. Detailed results for the 12-month period ending March 31, 2015 is presented as well as the data for the 12-month period ending March 31, 2014 and the Hydro Generation Planning Assumption for the forced outage rate.

Generating Unit	Maximum Continuous Unit Rating (MW)	12 months ending March 2014 (%)	12 months ending March 2015 (%)	Hydro Generation Base Planning Assumption (%)
All Hydraulic Units - weighted	**954.4**	**1.92**	**4.45**	**0.90**
Hydraulic Units				
Bay D'Espoir 1	76.5	0.04	0.03	0.90
Bay D'Espoir 2	76.5	3.23	0.01	0.90
Bay D'Espoir 3	76.5	0.03	0.00	0.90
Bay D'Espoir 4	76.5	0.00	0.64	0.90
Bay D'Espoir 5	76.5	2.23	0.18	0.90
Bay D'Espoir 6	76.5	19.36	45.48	0.90
Bay D'Espoir 7	154.4	0.00	2.10	0.90
Hinds Lake	75	0.12	0.21	0.90
Upper Salmon	84	0.12	2.22	0.90
Granite Canal	40	1.42	0.32	0.90
Cat Arm 1	67	0.00	0.62	0.90
Cat Arm 2	67	1.06	1.34	0.90
Paradise River	8	0.65	0.00	0.90



The weighted "All Hydraulic Units" DAFOR was 4.45% for the current 12 month period ending March 31, 2015. The forced outage to Unit 6 at Bay d'Espoir was the primary contributor to the DAFOR of 4.45% as compared to a base planning assumption of 0.9%. This one forced outage, contributed 86% of the total DAFOR in this asset class.

Considering the individual units performance for the current period, the assumed Hydro Generation Planning DAFOR was materially exceeded for Bay d'Espoir Unit 6. Also, there were minor exceedances compared to base planning assumption for Bay d'Espoir Unit 7, the Upper Salmon Unit and Cat Arm Unit 2.

The DAFOR at Bay d'Espoir Unit 6 was as a result of a failure of the in-service rectifying transformer, followed by a failure of the spare replacement transformer. The in-service rectifying transformer failed on January 30, 2014 and the unit was returned to service on February 1, 2014 using the spare transformer. This spare transformer failed on February 17, 2014 and, with no other spares available, a new transformer had to be procured. The unit was returned to service on August 5, 2014 with a new rectifying transformer.

If the two rectifying transformer failures had not occurred, the DAFOR for Unit 6 would have been 0.18% and the weighted "All Hydraulic Units" performance would have been 0.87%, compared to the base planning assumption of 0.9%. If the in-service transformer had failed but the spare had not, the Unit 6 DAFOR would have been 1.18% and the weighted "All Hydraulic Units" DAFOR would have been 0.94%, compared to base planning assumption of 0.9%.

Prior to the failure of the Unit 6 rectifying transformer, Hydro had established a replacement plan for all rectifying transformers in its 20 year capital plan. In support of this plan, a condition review (oil analysis) of all Bay d'Espoir rectifying transformers was carried out in late 2013, with results indicating a need to expedite the plan. As a result of the Unit 6 failure and the 2013 condition review, Unit 6 and Unit 7 transformers were replaced in 2014. The transformer replacement program is now ongoing, and by November 2015, all Bay d'Espoir

units will have new rectifying transformers in service, and a critical spare transformer will remain in inventory.

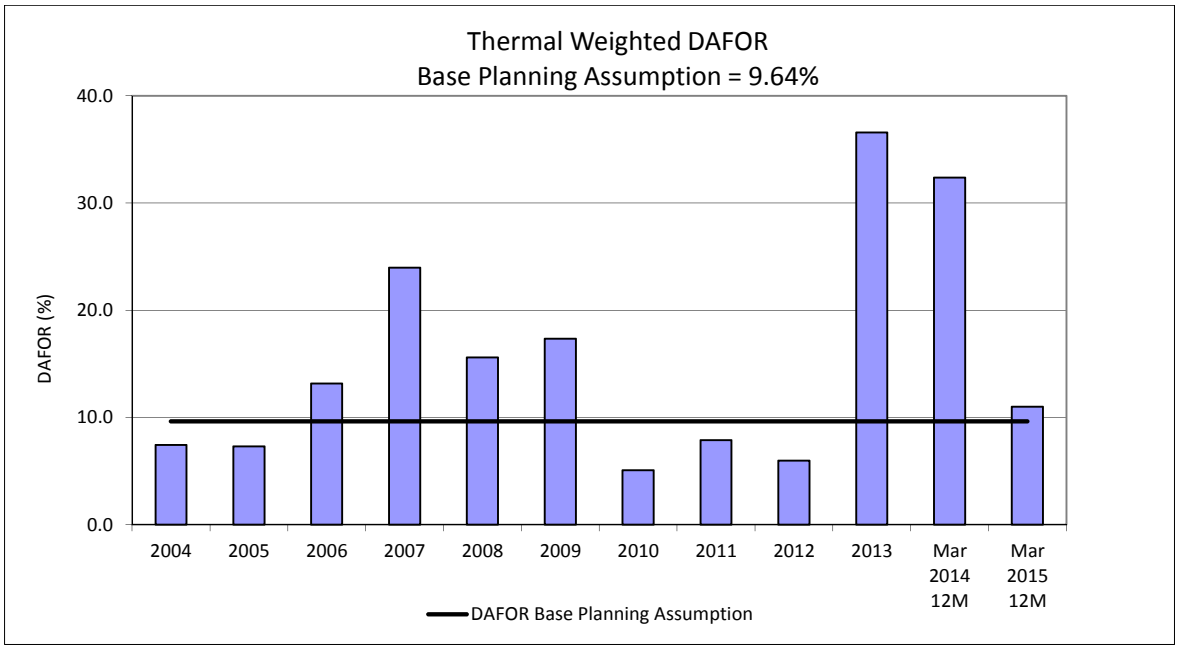
Bay d'Espoir Unit 7 DAFOR of 2.1%, compared to a base planning assumption of 0.9%, was primarily affected by a vibration issue which caused forced unit deratings ranging from 100 to 120 MW from July 23 to September 14, when the unit was taken out for annual maintenance. This vibration issue is recurring and is suspected to be related to the "floating rim" design of the unit. The solution to the recurring issue is that the unit is re-centered every five to seven years, with a requirement for re-balancing. In 2014, a turbine vibration expert was on site and provided technical direction for the balancing of the unit. The vibration levels have dropped to the lowest seen in the past ten years. The unit was back in service following the annual maintenance on October 5 at full MCR of 154 MW.

The DAFOR for Cat Arm Unit 2 was 1.32% compared to a base planning assumption of 0.9%. The actual DAFOR was attributable to two forced outages, of approximately two days each. The DAFOR for the Upper Salmon unit was 2.22% compared to a base planning assumption of 0.9%. The actual DAFOR was primarily attributable to three outages of about two days each.

5.0 Thermal Unit DAFOR Results

The thermal units forced outage rates are measured using DAFOR. Detailed results for the 12-month period ending March 31, 2015 is presented as well as the data for the 12-month period ending March 31, 2014 and the Hydro Generation Planning Assumption for the forced outage rate.

Generating Unit	Maximum Continuous Unit Rating (MW)	12 months ending March 2014 (%)	12 months ending March 2015 (%)	Hydro Generation Base Planning Assumption (%)
All Thermal Units - weighted	**490**	**32.38**	**10.99**	**9.64**
Thermal Units				
Holyrood 1	170	57.65	15.45	9.64
Holyrood 2	170	5.25	11.95	9.64
Holyrood 3	150	19.37	5.55	9.64



For the 12-month period ending March 31, 2015, the weighted "All Thermal Units" DAFOR of 10.99% was not materially different than the assumed Hydro Generation Planning DAFOR value of 9.64%, and the DAFOR improved compared to the previous 12-month period DAFOR of 32.38%. The base planning assumption DAFOR for the three Holyrood units combined, at 10.99%, is less than the "Sensitivity" value of 11.64%.

The variance in "All Thermal Units" weighted DAFOR compared to base planning assumption in the current period was attributable to exceedances for Units 1 and to a lesser extent, Unit 2. Unit 3 DAFOR materially improved compared to the previous period of 19.37% and finished the current period at 5.55% compared to base planning assumption of 9.64%.

The DAFOR performance for Holyrood Unit 1 (170 MW) was affected by several events, with the most significant discussed below.

From June 10 to 25, 2014, the unit was derated (to 150 MW from June 10-17 and to 130 MW from June 17-25) to minimize the electrical load on the east air heater until an alignment issue, caused by failed bolts, could be addressed. From June 25 to June 30, an outage was taken to make necessary repairs. Later, both the east and west air heaters were inspected by an expert during the 2014 maintenance outage for any additional concerns and none were found.

From November 2 to 19, 2014, there was a forced extension to the 2014 planned maintenance outage due to concrete damage found in the condenser cooling water sump. The damage was a safety hazard that had to be mitigated prior to returning the unit to service.

During the 2014 maintenance outage, repairs and adjustments were made to one of the turbine bearings to improve operation. This work was a follow-up to the work that was done in 2013 following the January 2013 failure. Subsequent to the turbine bearing adjustments, the turbine rotor had to be re-balanced. This is an iterative and time consuming process that requires the unit to be brought on line for measurements and calculations and taken off line for placement of balance weights. Four iterations were required to successfully balance the rotor. This work started November 19, and the unit was deemed within standards and returned to service November 30. As system load permitted, Hydro took an additional day to complete another adjustment, improving balancing results even further, on December 2 and the unit was returned to service December 3.

From March 11 to 13, 2015 the unit was taken off line for a forced outage to replace a bearing in the west forced draft fan motor. The bearing has been sent out for a failure analysis.

From March 13 to 30, 2015 the unit was derated due to airflow limitations related to the settings of the new variable frequency drives on the forced draft fans. Hydro has developed a plan to correct this issue and is preparing to implement the solution during the non-critical system load period.

Holyrood Unit 2 (170 MW) DAFOR performance was affected by several events, with the most significant discussed below.

From April 9 to 15, 2014 the unit was derated to 155 MW due to airflow limitations caused by fouled air heaters, as described above for Unit 1. A wash of the air heaters was conducted during a maintenance outage.

From September 17 to October 13, 2014, the unit was returning to service after a major turbine and generator maintenance outage and the turbine rotor required rebalancing. This is an iterative and time consuming process that requires the unit to be brought on line for measurements and calculations and taken off line for placement of balance weights. Four iterations were required to successfully balance the rotor. An extraction pump was delayed returning from overhaul, which limited the available load during the balancing activities.

From October 13 to 24, 2014 the unit was derated due to fuel system restrictions. The heavy fuel oil could not be supplied to the burners fast enough to reach the maximum load due to wear of components such as pumps and burners. Operational adjustments were made to restore load capability. Fuel delivery limitations returned and from November 9 to 20, 2014, the unit was again derated due to fuel system component issues. The west fuel oil pump was replaced in late December to mitigate further issues.

From December 19 to 21, 2014 the unit experienced a forced outage due to arcing of a failed electrical lead on the west forced draft (FD) fan motor. Investigation of the arcing revealed that the connectors were not correctly sized and they were replaced. The failed lead was a recently installed connection. The leads on other motors were not suspected to have a similar issue as the other motors had not been recently re-connected. Through scheduled maintenance activities, all other Unit 1 and Unit 2 FD fan motor leads will be inspected in the 2015 maintenance season.

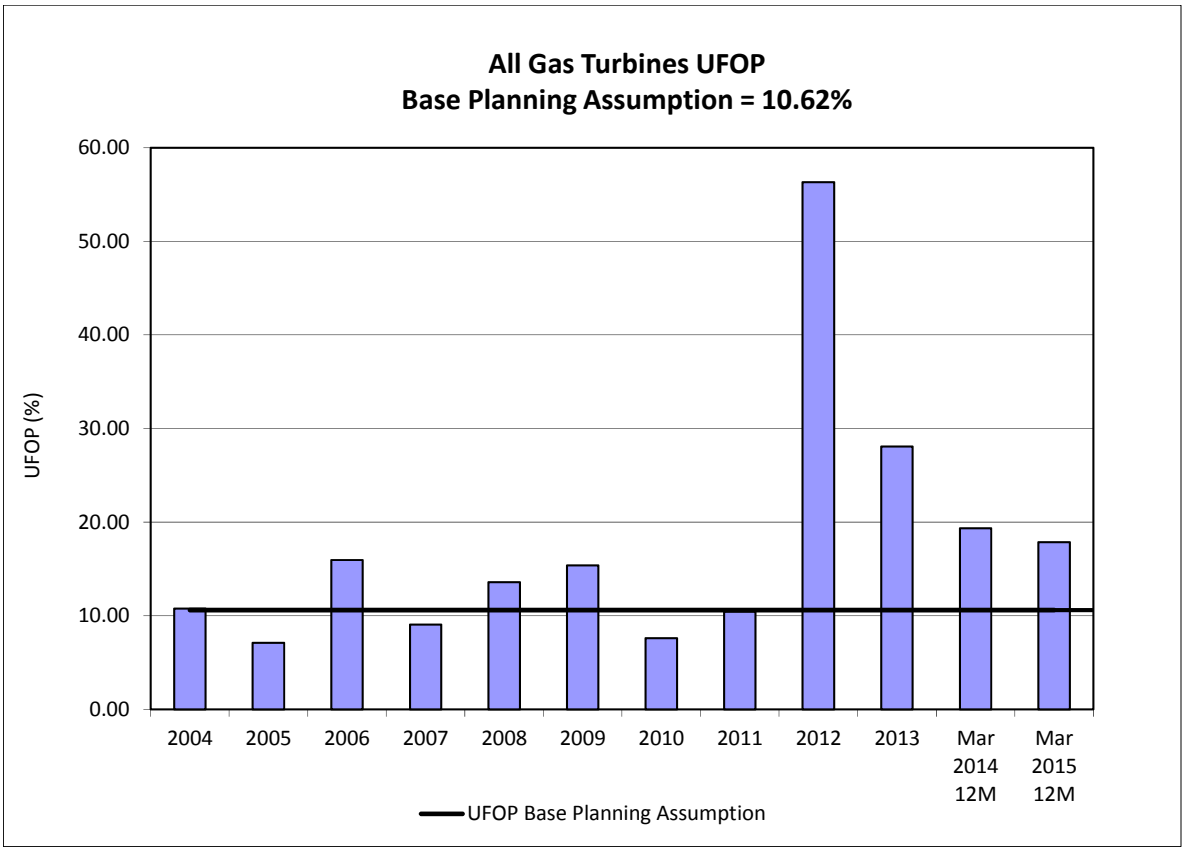
From December 26 to 28, 2014 the unit was off line for a forced outage to replace a failed gasket in the steam inlet line to the turbine upper control valves. The gasket was replaced with an alternate design that has been successfully used in the same flange of Unit 1.

6.0 Gas Turbine UFOP Results

The combined UFOP for all gas turbines was 17.87% for the 12-month period ending March 31, 2015. This was higher than the base planning assumption of 10.62%, but was better than the "Sensitivity" UFOP of 20.62%, and was better than the previous period UFOP of 19.36%. The current period UFOP was impacted by the performance of the Hardwoods unit. Hardwoods UFOP for the current period was 33.98% compared to a base planning assumption of 10.62%. The Stephenville unit's current period UFOP of 9.44% improved compared to the previous period UFOP of 29.00%, and was better than the base planning assumption.

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending March 2014 (%)	12 months ending March 2015 (%)	Hydro Generation Base Planning Assumption (%)
All CTUs	**248.5**	**19.36**	**17.87**	**10.62**
Holyrood CT*	123.5	n/a	0.67	5.0
Stephenville	50	29.00	9.44	10.62
Hardwoods	50	16.34	33.98	10.62
Happy Valley	25	0.00	0.01	10.62

*data presented for only the month of March 2015



The All Gas Turbine Units UFOP base planning assumption was exceeded in the current period due to the Hardwoods Gas Turbine UFOP.

From July 25 to September 25, 2014, a forced outage of Hardwoods Gas Turbine was the primary contributor to the unit's UFOP. This outage was due to fire in the unit's motor control center which occurred as a result of an air compressor component failure. The affected equipment was replaced. An investigation into the incident resulted in a number of recommendations, some of which are complete and others are in progress.

A forced outage of End B from December 12 to 30, 2014 resulted from a flexible fuel line failure. Replacement of the affected fuel lines was completed at both Hardwoods and Stephenville.

In 2015, a forced outage of End B beginning on March 1 impacted the unit's performance to date. The outage was due to a fire caused by a failed component on a fuel filter pressure relief/drain line. The failed components were replaced on both End A and End B at Hardwoods. At the Stephenville facility, the same components were verified to be fit for service and thus, not requiring immediate replacement. During the fire event at Hardwoods, the engine suffered internal damage which will be addressed in Spring 2015.