

August 29, 2014

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: The Board's Investigation and Hearing into Supply Issues and Power Outages
on the Island Interconnection System - Generation Master Plan for Winter Preparation**

We refer to the Board's letter of August 12, 2014 in which the Board requested that Hydro file a comprehensive generation master plan for winter preparation. Please find attached Hydro's submission in this regard.

The enclosed "2014 Master Generation Plan for Winter Preparation" is a compilation of the various actions and projects that Hydro is undertaking, and in some cases has completed, in order to maintain and improve generation availability in preparation for the 2014/15 winter season. These activities have been outlined previously in different reports that have been submitted to the Board, and in the regular bi-weekly and monthly updates that Hydro is providing.

Appendix A in the enclosed Report identifies all of Hydro's 2014 generation reliability actions and projects. These are indicated for all of its major generation asset groups – thermal, hydraulic, and gas turbines. This listing also includes other key generation-related projects, including the installation and commissioning of a new 120 MW combustion turbine at Holyrood. In all cases, we indicate the actual or expected completion status of the action/project. For convenience, we have also indicated the Hydro plan(s) in which these actions and projects are contained, and which are being tracked regularly to monitor progress.

The enclosed report also reviews the purpose and status of Hydro's Generation Winter Readiness Assessment process. We hope we have clarified that the self-assessment tool developed by Hydro, which is modeled on industry best practices, is intended to provide checklist guidance to operations managers on what must be reviewed and assessed from a winter preparation standpoint. The action plan that Hydro is developing in response to this self-assessment will address gaps in the Company's readiness assessment process. The preliminary self-assessment provided to the Board on August 1 was not intended to indicate Hydro's assessment of operations readiness for the coming winter season.

As the Board is aware, Hydro's action plan flowing from its internal review of the January 2014 supply disruptions and rotating outages is an all encompassing one and addresses areas other than generation availability improvement. For example, Hydro's Integrated Action Plan (IAP) contains many actions and projects related to transmission availability improvement as well. These are also being progressed according to plan, and updates are being provided to the Board on a regular basis.

Hydro is confident that its plan for generation availability and winter preparation is both comprehensive and complete. The actions and projects which comprise this plan address the areas of highest value and priority, and are intended to ensure that Hydro's system is in the best possible position going into the 2014/15 winter season. This plan is also a demanding one, but Hydro is highly confident in the ability of its employees and external contractors to meet our 2014 objectives.

Should you have any questions, please contact the undersigned.

Regards,



R. J. Henderson
Vice President
Newfoundland and Labrador Hydro

RJH/cp

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
ecc: Roberta Frampton Benefiel – Grand Riverkeeper Labrador

Thomas Johnson – Consumer Advocate
Danny Dumaresque

*Investigation and Hearing into Supply Issues and Power Outages on the
Island Interconnected System*

**REPORT TO THE BOARD OF COMMISSIONERS OF PUBLIC UTILITIES
INDICATING HYDRO'S 2014 MASTER GENERATION PLAN
FOR WINTER PREPARATION**

Newfoundland and Labrador Hydro

August 29, 2014



TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	BACKGROUND.....	3
3	GENERATION AVAILABILITY	7
3.1	Gas Turbines – Hardwoods and Stephenville	8
3.1.1	Operations and Maintenance Initiatives	8
3.1.2	Capital Project Initiatives	8
3.2	Holyrood Thermal Generating Station.....	9
3.2.1	Operations and Maintenance Initiatives	9
3.2.2	Capital Project Initiatives	9
3.3	Hydraulic Generation	10
3.3.1	Operations and Maintenance Initiatives	10
3.3.2	Capital Projects Initiatives.....	10
3.4	New Generation Supply	11
3.4.1	New Combustion Turbine Capacity	11
3.4.2	Securing Economically Available Interruptible Loads.....	11
3.5	Emergency Preparedness and Response	11
4	WINTER READINESS ASSESSMENT.....	13
5	CONCLUSION.....	16

Appendices:

- Appendix A 2014 Master Generation Plan for Winter Preparation – Cross Referenced to the Applicable Hydro Plans
- Appendix B Hydro’s Master Generation Outage Schedule for the Balance of 2014
- Appendix C Hydro’s Generation Winter Readiness Assessment Template

1 **1 INTRODUCTION**

2
3 Newfoundland and Labrador Hydro (Hydro) is undertaking a number of actions throughout
4 2014 to improve the reliability of supply of the electrical system on the Island of Newfoundland.
5 A number of these actions are incremental to Hydro’s established maintenance and capital
6 programs. In its Interim Report of May 15, 2014 and through additional correspondence, the
7 Board of Commissioners of Public Utilities (the “Board”) requested Hydro to submit various
8 reports outlining the actions it is taking to improve generation and transmission equipment
9 reliability performance, and to address other areas of its operations such as customer
10 communications.

11
12 On June 16, 2014 Hydro submitted a Generation Availability Report to the Board. That Report
13 outlined Hydro’s plans and schedules related to actions it is undertaking in 2014 to improve the
14 availability of its generation equipment during the winter period when customer demand is the
15 highest (generation availability), and also to ensure the generation capacity is ready to reliably
16 operate prior to the start of the winter period (winter readiness).

17
18 In addressing the topic of winter readiness specifically, Hydro’s Generation Availability Report
19 indicated that it was taking the initiative to introduce an approach for self-assessing its
20 processes for verifying winter readiness. This self-assessment tool is used by, among others,
21 the managers responsible for the operation of generation equipment to assist them in
22 determining whether they have effective processes in place to ensure each and every year that
23 equipment is ready to operate reliably and safely during the winter period when the equipment
24 experiences its highest load and harshest weather conditions. This was an action introduced by
25 Hydro to adopt best practices for improving its preparation for the winter.

26
27 Hydro reported in the June Generation Availability Report that a self-assessment survey would
28 be completed by July 30, 2014, and that an appropriate winter readiness action plan would be
29 completed by November 30, 2014. This self-assessment was provided to the Board on

1 August 1, 2014 with a commitment that the actions Hydro would undertake as a result of the
2 self-assessments, which are primarily annual winter preparation procedures, would be
3 identified by September 30.

4

5 In a letter dated August 12, 2014, the Board indicated its view that the above-referenced
6 reports did not address the issues of winter preparedness as required by the Board in its
7 Interim Report. This update report is in response to the Board's request that Hydro file a
8 comprehensive generation master plan for winter preparation by August 29, 2014.

1 **2 BACKGROUND**

2
3 Between December 14 and December 26, 2013 Hydro experienced problems with five of its
4 generating plants which resulted in a loss of 233 MW of generating capacity out of its total
5 capacity of 1,593 MW¹. On January 2, 2014, as a result of cold weather and high customer
6 demand, the total electrical system load on Newfoundland and Labrador Hydro's (Hydro) Island
7 Interconnected System, and Hydro's available generation supply to meet this load, converged
8 to a point where it was necessary for Hydro to issue a request for conservation to the general
9 public. As system load increased further going into the late afternoon of January 2, it became
10 necessary for Hydro to request that Newfoundland Power initiate rotating outages, and these
11 continued into January 3.

12
13 On January 4, an unrelated event involving the failure of a 230 kV circuit breaker and a 230 kV
14 power transformer at the Sunnyside terminal station resulted in a wide disruption of power
15 supply to the Avalon Peninsula and other areas of the province. This event, and the failure of
16 individual 230 kV circuit breakers at other locations, set in motion a series of transmission
17 system events that restricted generation output and extended the need for rotating outages
18 through to January 8.

19
20 **Internal Review**

21 Hydro initiated an internal review of these unprecedented supply disruptions and outages
22 immediately following system restoration on January 10. The primary purpose of this review
23 was to identify any actions, conditions or other factors that contributed to these disruptions
24 and outages, and to identify immediate and longer-term actions required to prevent similar
25 events from occurring in the future.

¹ These equipment problems and Hydro's recommended actions are outlined in Schedule 6 (Generation Availability) of Hydro's March 24 Report submitted to the Board, and available on the Board's web site.

1 Hydro's review was structured to be both expeditious and comprehensive. Teams were formed
2 to review all aspects of the Company's performance in the areas of load forecasting; generation
3 planning; asset management; generation availability; transmission availability; emergency
4 response and restoration; communication and coordination with customers; and technology
5 and communications infrastructure. Internal reviews were supplemented by the use of
6 external consultants with significant experience in electric utility operations, to provide
7 independent, expert reviews and opinions.

8

9 A copy of Hydro's Internal Review Report, including the reports of the various investigation
10 teams noted above, may be viewed or downloaded from the Board's web site.

11

12 **Hydro's Priority Actions Related to Generation Availability**

13 Several key priority actions were identified by Hydro through its internal review of the causes of
14 the January interruptions. Several of these related specifically to improvements in generation
15 availability, and they included the following:

16

17 1) Implement actions to improve gas turbine availability, including:

18

a. review gas turbine maintenance practices;

19

b. assess the effects of test starts and run-ups prior to severe weather;

20

c. identify repeat failure events and address the root causes;

21

d. identify plan required for additional plant and equipment refurbishment not

22

already completed; and

23

e. review fuel storage processes and procedures.

24

25 2) Complete the planned initiatives in Hydro's Integrated Critical Spares Strategy² as well
26 as implement improvements identified by the Critical Spares Council³ in 2013. In the

² Hydro had an established initiative for 2014 as part of a multi-year strategy for reviewing and assessing its critical spares requirements for ensuring equipment reliability.

³ Hydro has established teams of experienced employees with expertise and responsibilities in specific aspects of its operations which it refers to as councils. One of those councils has a focus on critical spares.

1 process of this review revisit the Company's critical spares philosophy for Holyrood and
2 other generation assets within Hydro's system, and implement any changes in time for
3 the 2014/15 winter season.

- 4
- 5 3) Review current winter readiness program in reference to industry best practices and
6 formally implement/document for Hydro operations.

7

8 Another key priority action noted by Hydro was to proceed with the addition of a new
9 generation supply in order to meet the forecasted generation deficit in 2015, and to ensure
10 adequate generation supply for future winter seasons leading up to the in-service of Muskrat
11 Falls. Two options among the various alternatives being evaluated by Hydro at the time were:
12 a) source an already built combustion turbine in the 50-100 MW range to meet the forecast
13 deficit and to replace the temporary blackstart capability at Holyrood; and b) enter into
14 interruptible contracts with large industrial customers. As discussed in later sections of this
15 Report, both of these options have been actioned and are part of the Company's Integrated
16 Action Plan arising from the events occurring between January 2 and 8, 2014.

17

18 **Hydro's Integrated Action Plan**

19 In order to track and report on the progress of the actions identified in Hydro's review, Hydro
20 has compiled all the actions into one integrated list. This list is referred to as Hydro's Integrated
21 Action Plan (IAP), and it incorporates all actions identified through its internal review, including
22 the key priority items noted above. In addition, the various recommendations made by the
23 Board's consultant, Liberty Consulting (Liberty), in their April 2014 Report have been integrated
24 into this Plan as appropriate. The IAP is regularly tracked to ensure that 2014 actions are
25 completed as planned.

1 **Updates to the Board**

2 In addition to reports summarizing the actions Hydro is undertaking for reliability improvement,
3 various update reports are submitted to the Board on a bi-weekly or monthly basis. These
4 include updates relative to the following:

5

6 1. Hydro's IAP (monthly);

7 2. Hydro's Annual Work Plan (AWP)⁴ (monthly);

8 3. 2014 Capital Plan⁵ (monthly);

9 4. 2014 Incremental Capital Plan⁶ (bi-weekly);

10 5. Critical Spares Plan (monthly); and

11 6. Plan for Securing Economically Available Interruptible Loads (monthly).

⁴ Hydro's AWP is a consolidation of the work it is undertaking through its skilled trades workforce, supplemented in some cases by contractors, in each of its operational areas of hydro generation, thermal generation, and transmission and rural operations. This includes all maintenance work, capital work, operating projects and non-maintenance work such as training. The update reports provided to the Board specifically address the preventative and corrective maintenance activities to be carried out on system equipment in the AWP.

⁵ The capital plan is the collection of all of Hydro's capital projects which are part of Hydro's ongoing capital program, which have been approved by the Board for completion in 2014.

⁶ The 2014 Incremental Capital Plan is a collection of capital projects with significant scope which were not originally planned for 2014, but which are now planned for execution this year following the events of January, 2014. These include the installation and commissioning of a new combustion turbine at Holyrood and the replacement/refurbishment of the T1 and T4 power transformers at Sunnyside and Western Avalon respectively.

1 **3 GENERATION AVAILABILITY**

2
3 The following sections itemize and briefly describe the various actions and projects that are in
4 progress, and in some cases completed, to improve or maintain generation availability and
5 winter preparation in advance of the 2014/15 winter season. Plans and schedules related to
6 these actions are included in various reports and updates that have been provided to the
7 Board.

8
9 Collectively, these actions and projects represent Hydro’s master plan for generation
10 availability. The *2014 Generation Master Plan for Winter Preparation* included in Appendix A of
11 this Report consolidates all of these actions into one Table, and cross-references the Hydro
12 plan(s) in which they are included.

13
14 In addition to the various operations and maintenance initiatives being actioned, the following
15 sections also identify 2014 capital projects that are directly relevant to generation reliability.
16 These are broken out here to enable a focus on the work that is directly relevant to improved
17 generation availability and ensuring that generating equipment is ready for reliable operation in
18 the winter of 2014/15.

19
20 A key element of Hydro’s overall planning process for winter generation availability is the
21 Company’s master outage schedule. Many of the actions and projects being executed by Hydro
22 require planned generating unit outages so that the necessary work can be completed safely
23 and effectively. This requires extensive coordination between the System Operations and
24 Planning Department and both project managers and operations personnel in the field. An
25 underlying requirement is that a sufficient level of reserve between available generation
26 capability and forecast customer demand is maintained in order to prevent sustained customer
27 interruptions for unforeseen generation problems.

1 This master outage schedule is revised periodically to adjust to changing circumstances, but the
2 schedule continues to indicate that all generating unit outages necessary to accommodate the
3 2014 generation master plan shown in Appendix A will be completed in advance of the start of
4 the winter period. A copy of Hydro's current master outage schedule for the balance of 2014 is
5 included in Appendix B of this Report. As indicated in the report, all major planned Holyrood
6 outages will be complete by November 9; the existing gas turbine annual outages will be
7 completed by October 19; and all hydro-electric generating unit outages are scheduled to be
8 completed by November 21.

9

10 **3.1 Gas Turbines – Hardwoods and Stephenville**

11 **3.1.1 Operations and Maintenance Initiatives**

12 The availability improvement actions that will be completed in 2014 in preparation for the
13 upcoming winter for Hydro's gas turbine generation assets are indicated below.

- 14 1. Review the maintenance strategy for gas turbines and update the Preventive
15 Maintenance (PM) and Corrective Maintenance (CM) plans for 2014 and beyond
16 as required.
- 17 2. Identify any new or additional capital work required flowing from the
18 maintenance review.
- 19 3. Complete a root cause analysis of repeat failures and identify solutions.
- 20 4. Complete a review of fuel storage capacity and fuel management procedures.
- 21 5. Implement a protocol for performing test starts and run-ups on turbine units.
- 22 6. Complete a review of critical spares and procure necessary spares not on hand.
- 23 7. Evaluate vendor service agreements for after-hours supply of parts and/or
24 maintenance support.

25

26 **3.1.2 Capital Project Initiatives**

27 The capital project that is to be fully or substantially completed in 2014 related to sustaining or
28 improving the reliability of Hydro's gas turbine generation assets is identified below.

- 29 1. Upgrade Gas Turbine Plant Life Extension - Stephenville.

1 **3.2 Holyrood Thermal Generating Station**

2 **3.2.1 Operations and Maintenance Initiatives**

3 The availability improvement and winter preparation activities that will be completed in 2014
4 for Hydro's thermal generation assets at Holyrood are indicated below.

- 5 1. Complete a review of 4.16 kV and 600 V breaker maintenance tactics with the
6 assistance of an external technical expert, and complete refresher training with
7 appropriate staff.
- 8 2. Increase the maintenance frequency on forced draft (FD) fan motors.
- 9 3. Procure and/or negotiate the immediate availability of additional FD fan motors.
- 10 4. Complete a review of other critical spares and procure necessary spares not on
11 hand.
- 12 5. Complete a comprehensive inspection of control valve spindles during the major
13 overhaul of Unit #2.
- 14 6. Investigate and address vibration issues on Unit #1.
- 15 7. Implement corrective actions for turbine generator lube oil systems.
- 16 8. Expand the Inspection Test Program (ITP) on high pressure components during
17 the winter operating season.

18
19 **3.2.2 Capital Project Initiatives**

20 The capital projects to be fully or substantially completed in 2014 that are directly related to
21 sustaining or improving the reliability of Hydro's thermal generation assets in Holyrood are
22 identified below.

- 23 1. Replacement of an Air Compressor (pending Board approval).
- 24 2. Install Fire Protection Upgrades.
- 25 3. Replace DC Distribution Panels and Breakers.
- 26 4. Upgrade Vibration Monitoring System.
- 27 5. Upgrade Hydrogen System.
- 28 6. Replace Condensate Polisher Annunciator Panels.

- 1 7. Install Black Start 16 MW Diesel⁷.
- 2 8. Overhaul Turbine/Generator Unit 2.
- 3 9. Overhaul Boiler Feed Pump East Unit 1.
- 4 10. Overhaul Cooling Water Pump East Unit 1.
- 5 11. Overhaul Extraction Pump South Unit 1.

7 **3.3 Hydraulic Generation**

8 **3.3.1 Operations and Maintenance Initiatives**

9 The availability and winter preparation activities that will be completed in 2014 for Hydro's
10 hydraulic generation assets are indicated below.

- 11 1. Review and update processes for planning, scheduling and executing work.
- 12 2. Complete an analysis of generator vibration issues at Granite Canal and
13 implement any appropriate corrective/mitigation measures.
- 14 3. Complete a review of critical spares and procure necessary spares not on hand.

16 **3.3.2 Capital Projects Initiatives**

17 The capital projects to be fully or substantially completed in 2014 that are directly related to
18 the reliability of Hydro's hydraulic generation assets are identified below.

- 19 1. Rewind Stator Unit 3 – Bay d'Espoir.
- 20 2. Upgrade Generator Bearings Unit 2 – Bay d'Espoir.
- 21 3. Replace Automatic Greasing Systems – Bay d'Espoir (two projects, four units).
- 22 4. Replace Spherical Valve Bypass Valve Assemblies – Bay d'Espoir.
- 23 5. Refurbish Surge Tank 3 – Bay d'Espoir.
- 24 6. Replace Excitation Transformer Unit 6 – Bay d'Espoir.
- 25 7. Replace Excitation Transformers Five Units – Bay d'Espoir (one unit in 2014).
- 26 8. Automate Generator Deluge Systems – Bay d'Espoir (two projects, four units).
- 27 9. Upgrade Intake Gate Controls – Bay d'Espoir.

⁷ This project was completed in the spring of 2014 and a black start test once Units 1 and 2 were shut down in July has proven the success of this project.

- 1 10. Replace Cooling Water Pumps – Bay d’Espoir.
- 2 11. Purchase Low Pressure Screw Compressor Set – Bay d’Espoir.
- 3 12. Replace Automatic Transfer Switch – Hinds Lake.
- 4 13. Replace Turbine/Generator Cooling Water Flow Meters – Upper Salmon.
- 5 14. Replace Generator Bearing Coolers Two Units – Bay d’Espoir.
- 6 15. Overhaul Turbine/Generator Units – Bay d’Espoir and Hinds Lake.

8 **3.4 New Generation Supply**

9 **3.4.1 New Combustion Turbine Capacity**

10 Hydro has procured, and is presently installing, a new combustion turbine at the Holyrood site.
11 This unit is four years old, but is unused, and has been inspected and verified by both Hydro
12 and external experts as being fit for purpose. This unit has a capacity rating of approximately
13 120 MW, and is scheduled to be ready for service on December 7, 2014.

14 The Board is receiving bi-weekly updates from Hydro on the status of this project.
15

16 **3.4.2 Securing Economically Available Interruptible Loads**

17 Hydro has been in contact with its larger Industrial Customers to discuss possible interruptible
18 load arrangements for the 2014/15 winter season. These arrangements are intended to serve
19 as a mechanism for managing risks associated with Hydro’s peak demand periods in a manner
20 that is economic and which reinforces the integrity of Hydro’s Island Interconnected System in
21 meeting customer demands. These discussions and meetings continue with the intention of
22 finalizing appropriate arrangements as required by the end of September.

23
24 The Board is receiving monthly updates from Hydro on this initiative.

25 **3.5 Emergency Preparedness and Response**

26 Hydro prepares for severe weather events by maintaining effective tools and equipment in key
27 locations; maintaining critical spare parts; locating shops and depots in strategically accessible
28 areas throughout the Province; maintaining a supervisory on-call rotation; and ensuring clear

1 and open communications between the operating areas and the Energy Control Centre (ECC).
2 In March, 2014 Hydro completed a review of these procedures and developed a draft “Severe
3 Weather Preparedness” plan and checklist to ensure that lessons learned from the system
4 outages in 2013 and 2014 were incorporated into Hydro’s emergency preparedness and
5 response protocol. In that process Hydro also reviewed documentation from the North
6 American Electric Reliability Corporation (NERC)⁸ to ensure best practices from other utilities
7 were incorporated into the preparedness plan.

8

9 Hydro’s draft preparedness plan is currently being used to prepare for severe weather events.
10 The Company’s Asset Owners Technical Council is collecting feedback on the use of the plan
11 and will be finalizing the plan and making it an official document in September 2014 (see items
12 48 and 76 in Hydro’s IAP). The Asset Owners Technical Council has representation from Hydro
13 Generation, Thermal Generation, Gas Turbines, Diesels, TRO, Network Services and the ECC.

⁸ NERC is a not-for-profit international regulatory authority whose mission is to ensure the reliability of the bulk power system in North America, and is subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada. NERC develops and enforces reliability standards as part of its mandate.

4 WINTER READINESS ASSESSMENT

As noted in Section 2, a key priority action flowing from Hydro's internal review of the January, 2014 system events was to complete a review of the Company's current winter readiness program in reference to industry best practices, and to formally implement and document this on a go-forward basis. This action is included in Hydro's Integrated Action Plan (action #12), and Hydro's June 16 Generation Availability Report to the Board indicated that this review had been completed.

Hydro's winter readiness assessment process has been modeled on industry best practices as summarized in the *Reliability Guideline for Generating Unit Winter Weather Readiness* published by NERC. This guideline provides a framework for a winter weather preparation procedure which Hydro has modified slightly for its own purposes, and which outlines readiness assessment criteria for each of the following components:

- a) Safety
- b) Management roles and expectations
- c) Processes and procedures
- d) Testing
- e) Training
- f) Winter event communications, and
- g) Program goals/metrics

A winter readiness assessment essentially uses a checklist approach to ensure that the various elements of these components are reviewed in a timely manner in preparation for winter conditions. A copy of Hydro's winter readiness assessment template is included in Appendix C of this Report.

1 The seven components of Hydro's winter readiness assessment standard may be organized
2 under three general headings as follows:

3

4 1. Equipment and Operator Readiness

5 a) Processes and Procedures

6 b) Testing

7 c) Training

8

9 2. Safety and Internal Planning/Communication

10 a) Safety

11 b) Winter Event Communications

12

13 3. Management and Measurement

14 a) Management Roles and Expectations

15 b) Program Goals/Metrics

16

17 Components 1 a), b), and c) above are directly related to assessing equipment and operator
18 readiness, and are the elements most directly related to ensuring equipment winter availability
19 and reliability. Components 2 a) and b) above are not directly related to equipment and
20 operators readiness. However, they do pertain to internal processes related to safety, planning
21 and communication which can have a material impact on the efficiency and effectiveness of
22 work execution concerned with ensuring equipment availability and reliability. Components 3
23 a) and b) are important elements of the winter readiness assessment, but readiness in those
24 areas is not critical to ensuring winter generation availability and reliability.

25

26 Hydro's August 1 report to the Board indicated the results of Hydro's internal survey of current
27 practices relative to its revised generation winter readiness assessment standard. Hydro's self-
28 assessment of its overall level of compliance with this standard was 82%. In the key areas of
29 Equipment and Operator Readiness, and Safety and Internal Planning/Communication, Hydro's

- 1 report indicated an overall level of standard compliance of 86.2%. Table 4.1 below indicates
2 these latter results for each of Hydro’s generation classes and the overall result.

TABLE 4.1 Generation Winter Readiness Assessment For Components Affecting Generation Availability and Reliability			
Generation Class	Possible Score	Actual Score	% Readiness
Thermal Generation: Holyrood	26	23.25	84.6%
Hydraulic Generation: Bay d’Espoir	26	22	89%
Gas Turbines: Hardwoods and Stephenville	26	22	84.6%
Total: All Generation	78	67.25	86.2%

- 3
4 Hydro’s August 1 self-assessment report indicated that action plans to address areas requiring a
5 higher level of process compliance would be developed by no later than September 30, 2014
6 and implemented by no later than November 30, 2014.

1 **5 CONCLUSION**

2

3 Hydro has established a comprehensive and complete plan for generation availability and
4 winter preparation. The actions and projects which comprise this plan address the areas of
5 highest value and priority, and are intended to ensure that Hydro's system is in the best
6 possible position going into the 2014/15 winter season. Hydro is committed to the full and on-
7 time execution of this plan and will continue to provide regular updates to the Board in
8 accordance with the established schedule.

APPENDIX A

2014 Generation Master Plan for Winter Preparation
Cross-Referenced to the Applicable Hydro Plans

2014 GENERATION MASTER PLAN FOR WINTER PREPARATION - NEWFOUNDLAND & LABRADOR HYDRO									
REF		Expected Completion Date	Generation Availability Report	Integrated Action Plan	Annual Work Plan	2014 Capital Plan	Incremental Capital Plan	Critical Spares Plan	Plan for Securing Interruptible Loads
THERMAL GENERATION - HOLYROOD									
Operations and Maintenance Activities									
1	Review of breaker maintenance tactics + refresher training	Complete	■						
2	Increased maintenance on Forced Draft (FD) fan motors	31-Oct-14	■		■				
3	Procurement decision on spare parts for additional FD fan motors	30-Sep-14	■					■	
4	Updated plan and inventory for other critical spares	30-Nov-14	■					■	
5	Major overhaul, inspection of control valve spindles - Unit #2	Complete	■		■				
6	Investigate and address vibration issues on Unit #1	31-Oct-14	■	■	■				
7	Corrective actions for turbine generator lube oil systems	30-Sep-14	■		■				
8	Expansion of Inspection Test Program on high pressure components	Complete	■		■				
Reliability Related Capital Projects									
9	Replacement of an Air Compressor (pending Board approval)	7-Dec-14			■	■			
10	Install Fire Protection Upgrades	See note			■	■			
11	Replace DC Distribution Panels and Breakers	31-Oct-14			■	■			
12	Upgrade Vibration Monitoring System	See note			■	■			
13	Upgrade Hydrogen System	Complete			■	■			
14	Replace Condensate Polisher Annunciator Panels	31-Oct-14			■	■			
15	Install Black Start 16 MW Diesel	Complete			■				
16	Overhaul Turbine/Generator Unit 2	30-Sep-14							
17	Overhaul Boiler Feed Pump East Unit 3	Complete							
18	Overhaul Cooling Water Pump East Unit 1	31-Oct-14							
19	Overhaul Extraction Pump South Unit 1	30-Sep-14							
HYDRAULIC GENERATION									
Operations and Maintenance Activities									
20	Processes for planning, scheduling and executing work	30-Nov-14	■						
21	Analysis of generator vibration issues at Granite Canal	31-Oct-14	■	■					
22	Updated plan and inventory for critical spares	30-Nov-14	■					■	
Reliability Related Capital Projects									
23	Rewind Stator Unit 3 – Bay d’Espoir	Complete			■	■			
24	Upgrade Generator Bearings Unit 2 – Bay d’Espoir	Complete			■	■			
25	Replace Automatic Greasing Systems Two Units– Bay d’Espoir	Complete			■	■			
26	Replace Automatic Greasing Systems Two Units – Bay d’Espoir	See note			■	■			
27	Replace Spherical Valve Bypass Valve Assemblies – Bay d’Espoir	31-Oct-14			■	■			
28	Excitation Transformer Replacement Unit 6 – Bay d’Espoir (Unforeseen)	Complete			■				
29	Replacement of Excitation Transformers – Bay d’Espoir	See note			■				
30	Automate Generator Deluge Systems Two Units – Bay d’Espoir	Complete			■	■			
31	Automate Generator Deluge Systems Two Units – Bay d’Espoir	31-Oct-14			■	■			
32	Upgrade Intake Gate Controls – Bay d’Espoir	30-Sep-14			■	■			
33	Replace Cooling Water Pumps – Bay d’Espoir	Complete			■	■			
34	Purchase Low Pressure Screw Compressor Set – Bay d’Espoir	30-Sep-14			■	■			
35	Replace Automatic Transfer Switch – Hinds Lake	Complete			■	■			

2014 GENERATION MASTER PLAN FOR WINTER PREPARATION - NEWFOUNDLAND & LABRADOR HYDRO									
REF		Expected Completion Date	Generation Availability Report	Integrated Action Plan	Annual Work Plan	2014 Capital Plan	Incremental Capital Plan	Critical Spares Plan	Plan for Securing Interruptible Loads
36	Replace Turbine/Generator Cooling Water Flow Meters – Upper Salmon	30-Sep-14			■	■			
37	Replace Generator Bearing Coolers Two Units – Bay d'Espoir	Complete			■				
38	Overhaul Turbine/Generator Units – Bay d'Espoir and Hinds Lake	See note			■				
GAS TURBINES - HARDWOODS AND STEPHENVILLE									
Operations and Maintenance Activities									
39	Review of maintenance strategy and update of PM/CM plans	30-Nov-14	■	■					
40	Identify new/additional capital work required	30-Nov-14	■	■					
41	Root cause analysis of repeat failures and identify solutions	31-Oct-14	■	■					
42	Review of fuel storage capacity and fuel management procedures	Complete	■	■					
43	Protocol for performing test starts and run-ups	31-Oct-14	■	■					
44	Updated plan and inventory for critical spares	15-Nov-14	■	■					
45	Evaluate vendor service agreements for after-hours support	31-Oct-14	■	■					
Reliability Related Capital Projects									
46	Upgrade Gas Turbine Plant Life Extension - Stephenville	30-Nov-14			■	■			
OTHER ACTIONS/PROJECTS									
47	Installation and commissioning of a new Gas Turbine at Holyrood	7-Dec-14		■			■		
48	Securing economically available interruptible loads	30-Sep-14							
49	Generatiion winter readiness assessment action plan	30-Sep-14	■	■	■	■	■	■	■
50	Emergency preparedness and response	30-Sep-14	■						

NOTES**Ref**

For capital projects generally, the "Expected Completion Date" is the date that the equipment is released for service, and not project close-out.

10 Two deliverables have expected completion in Nov 2014; a third deliverable has expected completion in 2015

12 Scope for Units 1&2 has expected completion in October 2014; scope for Unit 3 is expected to carry over into 2015, however existing vibration monitoring equipment on Unit 3 will remain in place with adequate spare parts to ensure reliable operation until full replacement in 2015.

26 Scope for one unit is complete; scope for the second unit has expected completion in October 2014

29 Scope for one unit has expected completion in October 2014; scope for the remaining units is planned for 2015

38 The overhaul for Bay d'Espoir Unit 3 is complete; the overhaul for Hinds Lake expected completion is November 2014.

APPENDIX B

Hydro's Master Outage Schedule for the Balance of 2014
As of August 29, 2014

2014 Planned Generation Outage Schedule

Unit	MW	August		September				October				November				December				Completed Annual Maintenance Outages		
		Week Starting	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14		21	28
Holyrood - G1	170																				Commenced July 21	
Holyrood - G2	170																					Commenced May 21
Holyrood - G3	150																			April 10 - July 9		
Bay D'Espoir - G1 ^{Note 1}	76.5																			May 13 - May 24		
Bay D'Espoir - G2 ^{Note 2}	76.5																			April 14 - May 9		
Bay D'Espoir - G3	76.5																					May 24 - Aug 26
Bay D'Espoir - G4	76.5																			July 6 - July 29		
Bay D'Espoir - G5	76.5																					
Bay D'Espoir - G6 ^{Notes 3, 4}	76.5																			Feb 17 - Aug 5		
Bay D'Espoir - G7	154																					
Upper Salmon	84																					
Granite Canal	40																			Aug 3 - Aug 14		
Hinds Lake	75																					
Cat Arm - G1	67																			June 15 - June 26		
Cat Arm - G2	67																					Aug 18 - Aug 29
Paradise River	8																					
Hardwoods GT ^{Note 5}	50																					
Stephenville GT	50																					Commenced June 13
Holyrood CT ^{Note 6}	120																					
HBY / STA Diesels	14																					
Star Lake ^{Note 7}	18																			June 23 - July 5		
Exploits	63																					
CoGen	8																					
Available Capacity	1,767	1,081	1,141	1,141	1,215	1,215	1,274	1,256	1,256	1,402	1,326	1,326	1,572	1,572	1,647	1,647	1,767	1,767	1,767	1,767		
Forecasted Gross Peak Load		697	697	719	741	763	785	833	882	938	987	1,027	1,068	1,109	1,150	1,190	1,455	1,455	1,455	1,455		
Total Reserves		384	443	421	474	452	489	423	374	464	339	298	504	463	497	457	312	312	312	312		
Largest Operating Unit		154	154	154	150	150	154	154	154	170	170	170	170	170	170	170	170	170	170	170		
n-1 Reserve		230	289	267	324	302	335	269	220	294	169	128	334	293	327	287	142	142	142	142		
Avalon Load		366	366	378	389	401	412	438	463	493	518	539	561	582	604	625	764	764	764	764		
HTGS Units Required		1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3		

Legend	
	Unit Available
	Unit De-Rated to 35%
	Unit Unavailable

Notes:

1. The BDE Unit 1 outage (Oct 27-31) is required for excitation transformer replacement.
2. The BDE Unit 2 outage (Nov 3-7) is required for excitation transformer replacement.
3. The BDE Unit 6 outage (Sep 29-Oct 10) is required simultaneous with Unit 5 in order to perform intake work (common penstock).
4. BDE Unit 6 was forced out of service on February 17 (excitation transformer). Annual unit maintenance was done during this extended outage.
5. The Hardwoods GT is currently unavailable due to a forced outage.
6. The new Holyrood CT is planned to be available on December 7, 2014.
7. The Star Lake unit outage (Oct 6-10) is required for automatic voltage regulator replacement.

APPENDIX C

Hydro's Generation Winter Readiness Assessment Template

Winter Readiness Self Assessment

Response Definitions		Code	Points
 	Always - consistently done (95-100% of the time)	A	1
 	Often - Majority of the time (75-95% of the time)	O	0.75
 	Sometimes - Sometime completed (10-75% of the time)	S	0.5
 	N - Not completed (completed less than 10% of the time)	N	0
 	NA - Not applicable	NA	0

Completed By:	Region/Plant:	
	Audit Date:	

#	Best Practice Questions	Answer Code	Points	Possible Points	COMMENTS Improvement Opportunities
---	-------------------------	-------------	--------	-----------------	---------------------------------------

I. Safety

1	Have safe work policies, procedures, practices been developed specific to working in severe or extreme weather conditions?				
2	Have personnel equipment and work equipment been acquired specific to allow safe work in severe or extreme weather conditions?				
3	Have procedures and measures been identified and enabled as ready to be undertaken to ensure communication and access to emergency services in the event of severe or extreme weather conditions?				
4	Have procedures and measures been identified and enabled as ready to be undertaken to ensure sustainable, safe, and effective operations and management in the event of severe or extreme weather conditions?				
5	Are safe work practices, methods, work protection, and permitting as per Maintenance Planning and Scheduling self-assessment being followed?				

Category Score				Safety
Percent				

II. Management Roles & Expectations

6	Senior Mgmt have set expectations for safety, reliability, and operational performance				
7	Senior Mgmt ensure a winter readiness preparation procedure exists for each facility/plant/region.				
8	Senior Mgmt implement a system of annual winter preparation meetings, training exercises, or both to share best practices and lessons learned across the business operations.				
9	Senior Mgmt obtain and share insights learned from other jurisdictions.				

10	Plant/Facility/Region Management develop a winter readiness preparation procedure. Appoint a person responsible for keeping the procedure updated with company/industry best practices and lessons learned.				
11	Plant/Facility/Region Management ensure winter readiness preparation procedures includes processes, staffing, plans, timelines that direct key activities before, during and after the winter readiness period.				
12	Plant/Facility/Region Management ensure execution of the winter readiness procedure.				
13	Plant/Facility/Region Management conduct a winter readiness review prior to winter readiness period and prior to an anticipated severe winter event.				
14	Plant/Facility/Region Management conduct a post winter period review of the effectiveness of the winter readiness preparation procedure and incorporate lessons learned.				
15	Plant/Facility/Region Management encourage plant/facility/region staff to identify equipment/processes at risk due to extreme winter conditions and opportunities to improve readiness and response.				
		Percent			Management Roles & Expectations

III. Processes and Procedures

16	Review Work Management System to ensure annual PM work orders exist that address winter readiness requirements, including severe winter weather				
17	Ensure that all winter readiness associated PM work orders have been completed prior to the onset of the winter season				
18	Review Work Management System to ensure open corrective maintenance work orders that could affect plant operation or reliability in severe or extreme weather in winter period.				
19	Ensure that open corrective maintenance work orders that could affect plant operation or reliability in winter period are completed prior to the onset of winter readiness period.				
20	Review Capital and Operating Projects that could affect plant operation or reliability in winter readiness period.				
21	Ensure that Capital and Operating Projects that could affect plant operation or reliability in winter period are completed or placed in a suitable condition prior to the onset of winter readiness period.				

22	Identify all critical site specific equipment and systems that could experience cold weather operational issues that could: i) initiate an automatic trip; ii) affect a unit start-up; iii) initiate auto runback processes and/or initiate outages; iv) result in unit damage; v) impact environmental performance/controls causing a full/partial outage; vi) negatively impact water or fuel flow to units; vii) cause slowed or impaired field devices; and/or viii) result in a weather related safety hazard.				
23	Prior to the onset of winter readiness period review the plant/facility design and configuration and identify potential winter and severe winter problem areas based on previous experience of units and similar facilities and plans to mitigate same.				
24	Prior to the onset of winter readiness period implements plans to mitigate potential winter and severe winter problem areas.				
25	Evaluate risks associated with emergency systems - emergency generators, black start generators, DC/UPS power systems, fire systems to ensure that they adequately can address critical backup needs if and when needed.				
26	Complete Planning & Scheduling Self-Assessment as it relates to work required for Winter Readiness				
Category Score Percent					Processes and Procedures

IV. Testing					
27	Prior to the onset of winter readiness period identify and ensure that plant/facility potential winter and severe winter problem areas that should be tested (i.e. PM transformer tests) are completed.				
28	Prior to the onset of winter readiness period identify and ensure that plant/facility low frequency tasks that are potential winter and severe winter problem areas have been exercised tested.				
29	Prior to the onset of winter readiness period identify and ensure that plant/facility low frequency emergency and back-up facilities (i.e. emergency diesels, black start generators, fire systems) that are potential winter and severe winter problem areas have been exercised and/or tested.				
Category Score Percent			0	0	Testing

V. Training					
30	Undertake annual training in winter readiness specific and plant/facility/region specific awareness and maintenance training, including: i) specific protection panel alarms; ii) extreme winter troubleshooting and repair; iii) identification of extreme winter affected plant/facility/region systems and equipment; iv) reviews of special inspections and checks; v) fuel and air specific issues where applicable; vi) extreme winter protection systems design awareness; and vii) lessons learned from previous experiences or from others.				
31	Consider an annual winter readiness meeting to highlight preparations and expectations for extreme weather and develop any special plans				
32	Review and/or simulate measures for extreme weather scenarios, including instrumentation, readings, alarms, protection and control, plan/facility/region control responses				
33	Monitor and log and consider sharing availability data (GADS or comparable) for extreme weather events				
Category Score					Training
Percent					

VI. Winter Event Communications					
34	Plant/facility/region management communicate before a severe winter weather event with appropriate senior management that the winter readiness extreme weather preparation procedure checklists and readiness reviews have been completed				
35	Before and during an extreme winter weather event, plant//facility/region mgmt communicate with ECC to update plant availability, capacity, and other operational limitations with all personnel about changing conditions and potential areas of concern to emphasize awareness of safe and reliable operation.				
36	After a plant/facility/unit/equipment trip or failure to start/close/trip/open due to severe winter weather, plant/facility/region management shall conduct an analysis, develop lessons learned, and identify/incorporate other industry good practices. Continuous improvement feedback to enhance existing winter readiness programs, processes, procedures, checklists, and training. Sharing of technical information, lessons learned, experiences with industry groups.				
Category Score					Winter Event Communications
Percent					

VII. Program Goals/Metrics				
37	Are winter readiness planning / scheduling Key Performance Indicators (KPIs) in place?			
38	Are winter readiness KPIs goals and trends updated regularly, made available on a dashboard, and reviewed with the relevant personnel on a regular basis?			
39	Is all winter readiness work completed being captured in JDE (hours completed work orders / available hours)?			
40	Is the winter readiness planned work measured (absolute and percent planned work completed / all work completed)?			
		Category Score		Program Goals/Metrics
		Percent		

Notes:
