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HAND DELIVERED

September 7, 2016

Board of Commissioners
of Public Utilities
P.O. Box 21040
120 Torbay Road
St. John's, NL A1A 5B2

Attention: G. Cheryl Blundon
Director of Corporate Services
and Board Secretary

Ladies and Gentlemen:

**Re: The Board's Investigation and Hearing into Supply Issues and Power Outages on
the Island Interconnected System - Phase Two – Requests for Information**

Please find enclosed the original and 12 copies of Newfoundland Power's Requests for Information NP-PUB-001 to NP-PUB-026 in relation to the above noted Application.

For convenience, the Requests for Information are provided on three-hole punched paper.

A copy of this letter, together with enclosures, has been forwarded directly to the parties listed below.

If you have any questions regarding the enclosed, please contact the undersigned at your convenience.

Yours very truly,

A handwritten signature in blue ink, appearing to read "Gerard Hayes".

Gerard Hayes
Senior Counsel

Enclosures

Newfoundland Power Inc.

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Roberta Frampton Benefiel
Grand Riverkeeper Labrador, Inc.

IN THE MATTER OF

the *Electrical Power Control Act, 1994*,
SNL 1994, Chapter E-5.1 (the “*EPCA*”)
and the *Public Utilities Act, RSNL 1990*,
Chapter P-47 (the “*Act*”), as amended; and

IN THE MATTER OF the Board’s Investigation
and Hearing into Supply Issues and Power Outages
on the Island Interconnected System.

**Requests for Information by
Newfoundland Power Inc.**

NP-PUB-001 to NP-PUB-026

September 7, 2016

Requests for Information

NP-PUB-001

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page ES-2.

“While it had long been contemplated that Muskrat Falls would preclude the need for more supply until the 2030s, this is not likely to be the case. Liberty expects that new supply will be needed before Muskrat Falls is in service, to mitigate near-term supply issues, and after Muskrat Falls is in service, to mitigate the impact of extended outages of the Labrador-Island Link (LIL)”,

and;

“Liberty believes the supply risks are greater than suggested by Hydro’s assessment and that new generation is likely required prior to the interconnection.”

Based on Liberty’s own knowledge and experience, including information received from Hydro, please provide an approximate estimation of the type, capacity, and cost of such required new generation.

NP-PUB-002

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page ES-2.

“This additional supply can be sourced through firm purchases, if available, over the Maritime Link or additional new generation on the IIS.”

Since an extended outage to the Labrador Island Link will likely occur in the winter season, can Liberty comment on the realistic feasibility of firm power purchases in the winter season through the Maritime Link and the additional cost to Hydro and Newfoundland Power.

NP-PUB-003

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page ES-3.

“The IIS is a relatively small system, approximately 1,700 megawatts, with the majority of its load centered on the Avalon Peninsula. The size of Muskrat Falls (824 megawatts) and the associated delivery capacity, the LIL, is large for the size of the IIS. This presents challenges from a reliability perspective given the consequences of the instantaneous loss of the LIL. Hydro’s system design seeks to minimize the potential for outages, but outages cannot be completely avoided.”

The supply to the Avalon Peninsula requires 230 kV transmission lines as well as the Labrador Island Link. These lines pass through the Isthmus of the Avalon which is exposed to severe winds and icing and where previous transmission line failures have occurred. The same occurs in the Long Range Mountains where the corridors of the Labrador Island Link and other transmission lines are in close proximity. Please describe the extent to which Liberty considered the consequences of simultaneous failures of multiple transmission lines on the Isthmus of the Avalon or in the Long Range Mountains in its review?

NP-PUB-004

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page ES-3.

“Liberty believes, however, that there will be more LIL bipole outages than estimated by Hydro”

and;

“Although Hydro’s stated objective is to complete repairs for the overhead lines within two weeks, it is difficult to have confidence that two weeks is the maximum limit for an OHL-related outage, recognizing the magnitude of the challenge of repairing significant OHL damage in potentially extreme weather and in harsh terrain.”

Based on its review, what would Liberty expect to be a realistic duration of bipole failures during the winter season due to freezing precipitation and/or in-cloud icing in Labrador and on the Island?

NP-PUB-005 Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, page ES-3.

“Adequate backup capacity will be new combustion turbines or firm, dependable capacity from Nova Scotia via the Maritime Link.”

Please explain the relative advantages and disadvantages of providing backup capacity in the form of (i) new combustion turbines, and (ii) firm, dependable capacity from Nova Scotia.

NP-PUB-006 Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, page ES-3.

“Adequate backup capacity will be new combustion turbines or firm, dependable capacity from Nova Scotia via the Maritime Link.”

Where would Liberty recommend as the most appropriate location to install new combustion turbines to provide adequate backup capacity? In the response, please explain in detail why the recommended location is most appropriate.

NP-PUB-007 Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, page ES-3.

“Adequate backup capacity will be new combustion turbines or firm, dependable capacity from Nova Scotia via the Maritime Link.”

Does Liberty consider firm capacity over the Maritime Link to be equivalent to new combustion turbines as a means of providing adequate backup capacity on the Avalon Peninsula in the event of a loss of the Labrador Island Link? If so, please explain.

NP-PUB-008 Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, page ES-3.

“Adequate backup capacity will be new combustion turbines or firm, dependable capacity from Nova Scotia via the Maritime Link.”

If Liberty does not consider firm capacity over the Maritime Link to be equivalent to new combustion turbines in terms of servicing the load centers located on the Avalon Peninsula, please explain Liberty’s views with respect to the need for backup generation located on the Avalon Peninsula.

NP-PUB-009

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, page ES-3.

“Adequate backup capacity will be new combustion turbines or firm, dependable capacity from Nova Scotia via the Maritime Link.”

Given that Liberty has performed services for the Nova Scotia Utility and Review Board, is Liberty aware of any existing transmission constraints in the Maritime Provinces that may limit Hydro’s ability to acquire firm capacity that can be delivered via the Maritime Link? If so, please explain.

NP-PUB-010

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, page ES-3.

“Adequate backup capacity will be new combustion turbines or firm, dependable capacity from Nova Scotia via the Maritime Link.”

The load centre for the island interconnected system is located on the Avalon Peninsula which is currently supplied by Hydro’s Holyrood Thermal Generating Station and transmission lines passing through the Isthmus of the Avalon which is a narrow corridor exposed to extreme weather conditions.

Considering that Hydro plans to retire the Holyrood Thermal Generating Station, to what extent has Liberty considered the need for backup generation located on the Avalon Peninsula to mitigate the risk of transmission line failures on the Isthmus of the Avalon regardless of whether or not firm capacity may be available over the Maritime Link?

NP-PUB-011

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page ES-4.

“Liberty recommends that, given the criticality of the Maritime Link to the reliability of the IIS, additional studies be completed not only with the Link in service, but also with it out of service.”

Please provide details about the required studies including (i) a prioritized listing of studies, (ii) when these studies should be completed, and (iii) the possible implications of these studies to the Muskrat Falls, Labrador Island Link, and Maritime Link projects.

NP-PUB-012

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 2.

“As directed by the Board for the scope of the phase two investigation, we did not address detailed technical information or project engineering and construction issues, except as necessary to understand the reliability risks associated with the interconnection to the IIS.”

Please confirm whether or not Liberty obtained data from Hydro relative to the structural/mechanical reliability of the Labrador Island Link. If so, please provide the data obtained from Hydro.

NP-PUB-013

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 2-3.

“As directed by the Board for the scope of the phase two investigation, we did not address detailed technical information or project engineering and construction issues, except as necessary to understand the reliability risks associated with the interconnection to the IIS.”

Please describe the extent to which Liberty performed any calculations to verify the 1:150 and 1:500 return periods depicted in the response to Request for Information NP-NLH-004.

NP-PUB-014

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 7, Figure II.2: Historical Unserved Energy (MWh)

Please provide either a reference to a Request for Information containing the historic data used to produce Figure II.2 or provide the back-up data including the basis by which the data was calculated by either Liberty or Hydro.

NP-PUB-015

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Pages 9-10.

“The failure of both units during each of the last three winters gives a strong basis for concern that the chances this capacity will be there when needed are not good. Any capacity assessment that assumes a good chance of both units [Hardwoods and Stephenville] starting when needed must be considered questionable in our opinion.”

Please elaborate on what Liberty would consider to be appropriate options or actions that can be taken to mitigate the reliability issues associated with the Hardwoods and Stephenville gas turbines.

NP-PUB-016

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 15.

“Any scenario that is beyond N-1 is not designed for by Hydro so that Hydro does not design the system to prevent loss of load under N-2 or N-1-1 conditions.”

Hydro considers a single pole failure on the Labrador Island Link to be an (N-1) contingency and a bipole failure to be an (N-2) contingency. It is also recognized that the terrains crossed by the Labrador Island Link are amongst the most severe terrains in the world from the point of view of icing and wind. Irrespective of Hydro’s N-1, N-1-1, and N-2 condition definitions, what does Liberty believe to be an appropriate planning criteria for a Labrador Island Link bipole failure?

NP-PUB-017

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 17.

“Hydro has taken pollution levels and forest fires into account in the design of the insulation of the HVdc OHL. Longer insulator strings will be used in areas subject to higher levels of contamination.”

and the response to Request for Information PUB-NLH-516:

“Heavy pollution (e.g., salt fog) or forest fires can cause flashovers. However, environmental conditions, including salt contamination and natural or man-made sources of pollution, are standard design inputs for insulators. Longer insulator strings have been specified in areas with higher levels of contamination.”

To what extent has Liberty checked the adequacy of the insulation requirements adopted by Hydro in heavily polluted areas?

NP-PUB-018

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 29.

“This deferral is possible because the loading on the LIL is not currently planned to be high in the early years of operation.”

Please provide the forecast loading on the Labrador Island Link that supports this statement. In the response, please also indicate if the forecast includes the impact of potential sales other than the firm energy sales agreement with Nova Scotia Power Inc.

NP-PUB-019

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 34.

“Studies of the performance of the IIS should be performed not only with the Maritime Link in service, but also with it out of service.”

Does Liberty expect any important results of these studies, with respect to future reliability on the Island Interconnected System, and did it get any response from Hydro as to why these studies have not been performed? If so, please explain.

NP-PUB-020 Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 36.

“Experience from other bipolar HVdc systems shows that most modern HVdc schemes do not experience bipole trips (simultaneous loss of both poles) very frequently -- only every few years.”

Please provide the source reference for the above statement.

NP-PUB-021 Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 36.

“Experience from other bipolar HVdc systems shows that most modern HVdc schemes do not experience bipole trips (simultaneous loss of both poles) very frequently -- only every few years.”

Please comment on how the projected reliability of the Labrador Island Link can be deduced from other bipolar HVdc projects knowing that the Labrador Island Link passes through one of the most severe climates in the world with regards to icing and wind.

NP-PUB-022 Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 41.

“We have nevertheless reviewed all the information provided and discussed the matter with project personnel. Our interest is primarily on reliability and how the OHL integrity might affect bipole reliability and the impact of OHL-related bipole outages...”

Hydro’s position is that it has adequately designed towers and other components accordingly. We do not provide an opinion on the adequacy of the OHL design, however, we discuss the prospects for multiple tower failures, their impacts and associated restoration challenges in the appropriate sections of this report.”

Since the impacts of bipole losses due to icing and wind on line reliability have been assessed to be very important by Liberty, is it reasonable for Liberty to rely only on Hydro’s statement that Hydro had “adequately designed towers and other components accordingly”?

NP-PUB-023

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 43.

“It must be recognized that repairing significant OHL damage in extreme weather and in the harsh terrain that some of the OHL line is situated will be challenging. Recognizing the magnitude of this challenge, it is hard to have confidence that two-weeks is the upper limit for repair for an OHL-related bi-pole outage.”

Similarly, the average bipole repair time appears to be quite low and does not reflect the reality of harsh environmental conditions of the Labrador Island Link. Hydro’s assumptions are indicated as follows:

<i>“Number of bipole outages per year</i>	<i>0.22</i>
<i>Average time to repair bipole outages</i>	<i>24 hours”</i>

Did Liberty perform reliability calculations using more representative values of bipole repair times during the peak winter season, and if so, what are the consequences of such more realistic durations?

NP-PUB-024

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Pages 71-74, and the response to Request for Information NP-NLH -139.

In the response to Request for Information NP-NLH-139 Hydro indicates that a failure rate of 0.1 failures per year per bipole should be applied and that the structural failure rate of 0.002 per year should be applied for the section of the Labrador Island Link on the Avalon Peninsula and 0.00667 per year should apply to other sections.

Please explain whether or not Liberty accepts the structural failure rates indicated above to be reflective of the potential structural failure on the Labrador Island Link. If Liberty does accept these failure rates, please indicate why Liberty concludes that additional generation is required following the integration of the Muskrat Falls project, the Labrador Island Link, and the Maritime Link.

NP-PUB-025

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Pages 71-72, Table IV.6: Composite Island Link Bipole Reliability, and the response to Request for Information NP-NLH -139.

In the response to Request for Information NP-NLH-139 Hydro indicates that a failure rate of 0.1 failures per year per bipole should be applied and that the structural failure rate of 0.002 per year should be applied for the section of the Labrador Island Link on the Avalon Peninsula and 0.00667 per year should apply to other sections.

Based on Liberty's experience, does the response to Request for Information NP-NLH-139 provide a reasonable basis to expect the frequency of outages from the Labrador Island Link to be considerably better than the failure rates shown in Table IV.6?

NP-PUB-026

Reference: *Review of Newfoundland and Labrador Hydro Power Supply Adequacy and Reliability Prior to and Post Muskrat Falls Final Report*, Page 76.

"In the post-HVdc case, Teshmont assumed that the Maritime Link would instantly change from export of power from the IIS to import of 300 MW of power to the IIS, but this is likely to be unacceptable to the Nova Scotia power system."

Has this issue of major importance to the Project been discussed with Teshmont? And if so, what were the conclusions of such discussions?

RESPECTFULLY SUBMITTED at St. John's, Newfoundland and Labrador, this 7th day of September, 2016.



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