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January 10, 2023

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

Dear Ms. Blundon:

**Re: NLH – Application for Approval of Capital Expenditures for Section Replacement and Weld Refurbishment for Bay d'Espoir Hydroelectric Generating Facility Penstock 1 – Newfoundland Power's Requests for Information**

Please find enclosed Newfoundland Power's Requests for Information NP-NLH-001 to NP-NLH-012 in relation to the above-noted Application.

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

Yours truly,

A handwritten signature in blue ink that reads "D. Foley".

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**IN THE MATTER OF** the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 ("EPCA") and the *Public Utilities Act*, RSNL 1990, Chapter P-47 ("Act"), and regulations thereunder; and

**IN THE MATTER OF** an application by Newfoundland and Labrador Hydro ("Hydro") for approval of capital expenditures for section replacement and weld refurbishment of Penstock 1 at the Bay d'Espoir Hydroelectric Generating Facility, pursuant to Section 41(3) of the Act.

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

**NP-NLH-001 to NP-NLH-012**

**January 10, 2023**

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## Requests for Information

NP-NLH-001

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’Espoir, Page 12, line 21 to Page 13, line 2.**

*"The current operational restrictions of operating Penstock 1 in the rough zone will continue, restricting Hydro’s flexibility in operating Units 1 and 2. From a system reliability perspective, Hydro does not consider Option 1 to be a viable strategy."*

Please describe in detail the restrictions Hydro is experiencing in operating units 1 and 2 in the rough zone. How do these restrictions impact Hydro’s customers?

NP-NLH-002

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Page 13, lines 5-8.**

*"If a minor failure were to occur during peak winter demand, this would likely take longer to repair and remove 153 MW from the system when it is needed. Hydro estimated the cost to replace 153 MW with generation from the Holyrood Thermal Generating Station ("Holyrood TGS"), at a high level, would be approximately \$120/MWh."*

What other options are there for replacement generation other than the Holyrood TGS, and what is the estimated cost?

NP-NLH-003

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Page 14, lines 17-19.**

*"This option would see operational constraints lifted and Units 1 and 2 return to normal operation, thus increasing operational flexibility of the plant. Annual inspections could be reduced to every three to five years."*

Are the downstream 15-foot and 13.5-foot diameter sections of penstock also included in the three to five-year frequency of inspection?

NP-NLH-004

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Page 14, lines 24-25 and Page 15, lines 6-8.**

*"Hydro anticipates that the new 17-foot diameter penstock section will have an operational life of 80–100 years."*

and,

*"By implementing a planned refurbishment and following operational and maintenance guidelines, Hydro anticipates these sections of penstock would have an operational life of 30–50 years."*

- a) What is the inspection and recoating regime for the new 17-foot diameter section of penstock to achieve the 80-100 year life? Furthermore, what is the lifecycle cost for this inspection and recoating regime over its 80-100 year life?
- b) The existing 17-foot diameter penstock section had a service life of approximately 55 years. Please elaborate on why Hydro would anticipate: (i) the 17-foot diameter replacement section will have a service life of 80-100 years; and (ii) the 13.5 and 15-foot diameter sections can be extended to an operational life of 30 to 50 years.
- c) Given Hydro’s experience to date with the 13.5 and 15-foot diameter penstock sections, would Hydro anticipate an operational life to be closer to 30 years or 50 years?

NP-NLH-005

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Page 15, lines 9-10.**

*"It is estimated that this option can be completed in 138 days, with the outage facilitated during low demand and low flow periods between May and November."*

What measures will Hydro undertake to ensure reliability of supply in the event that Penstock 1 is not able to be returned to service in advance of the 2025-2026 winter season? For example, will Hydro make arrangements to acquire additional temporary generation capacity or secure generation capacity from the Maritime Link?

NP-NLH-006

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Page 16, lines 12-14.**

*"During the risk workshop, the risk of a minor penstock failure for Option 1 was assigned as 16, the highest possible risk score. The group assumed, based on historical failures, that if operations continue as "Status Quo," Penstock 1 was "Highly Likely" to experience a weld failure (potentially as often as every second year)."*

- a) Based on Hydro’s experience with minor penstock failures since 2016, what outage duration would likely be experienced if these failures occurred every second year?
- b) Has Hydro assessed the risk of a major penstock failure? If yes, provide the assessment including outage duration and cost to repair. If not, why not?

NP-NLH-007

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Page 16, lines 15-17.**

*"The risk assessment workshop demonstrated that Option 1 is the highest risk option due to its probability of multiple failures and associated significant costs over the next 30 years if a solution is deferred in the short term."*

- a) Provide a detailed estimate of the significant costs identified in the reference.
- b) Has Hydro completed a full lifecycle cost estimate for each of the options assessed? If yes, provide the lifecycle cost estimate, with detailed calculations. If not, why not?

NP-NLH-008

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Page 18, Table 5.**

Is the capital risk assessment for Option 3 summarized in Table 5 only for the 17-foot diameter section of Penstock 1, or does it also include the capital risk assessment for the 13.5-foot and 15-foot diameter sections of penstock? If the 13.5-foot and 15-foot diameter sections of penstock are included, please explain how the weld refurbishment and recoating reduces the likelihood of post-execution failure to the extent indicated.

NP-NLH-009

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Appendix D, Page 34 of 42 and Table 10-1.**

*"Table 10-1 is a preliminary list of possible long-term solutions with advantages and disadvantages of each.*

*The scope of this study and time constraints do not permit an analysis or discussion of these alternatives at this time. The identification of a long-term solution requires further study."*

- a) Please confirm that Hydro’s analyses of alternatives for the refurbishment of Penstock 1 have identified only one technically feasible alternative to return Penstock 1 to safe and reliable operation.
- b) Other than the list of advantages and disadvantages included in Table 10-1, did Hydro complete any further analysis on the 15 items listed as long-term solutions for Penstock 1? If yes, please provide the analysis. If not, why not?
- c) Does Hydro intend to complete further study as indicated by its consultant? If further study is required why was the further study not completed prior to filing the application?
- d) With respect to item 9 in Table 10-1, in addition to traditional fibreglass liners, did Hydro or its consultants also investigate the use of carbon fibre wrapping as described in ASCE Manuals and Report on Engineering Practice, No. 79 – Steel Penstocks, page 188? If yes, please provide the research completed by Hydro or its consultants. If not, why not?
- e) Please describe Item 15 in Table 10-1 more fully. In particular, what opportunities exist for incorporating unit 8 into the planning for the refurbishment of penstocks 1, 2 and 3 to address project risks, reduce cost and address operational restrictions associated with Penstock 1?

NP-NLH-010

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Appendix H, Page 26 of 76.**

*"Complete replacement poses considerable challenges as some of the existing sections are virtually irreplaceable or replaceable at great cost. These locations include the intake thimble, surge tank tee, sections under the substation, and sections under the powerhouse. Due to the challenges associated with complete replacement it was determined that the replacement option would not include these sections."*

- a) What is Hydro’s overall plan to address the entire length of all three aging steel penstocks supplying water to Powerhouse 1 including eventual replacement of the 15 foot and 13.5 foot sections? In the response please describe the anticipated scopes of work for the entire length of each penstock, the year(s) in which Hydro plans to undertake the work, and at what cost.
- b) Given the challenges of replacing the 13.5 foot and 15 foot diameter sections of penstock, has Hydro assessed whether there are other solutions that could be implemented now to extend the useful life of those sections beyond 30-50 years?

NP-NLH-011

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Appendix J, Page 26 of 51.**

*"Based on inspections of the circumferential seams we know there is pitting corrosion in these seams. To understand the condition of these seams in the various sections of the penstock a more detailed scale removal and magnetic particle inspection could be performed, as noted above. It is possible that further inspection could reduce the requirements for significant weld refurbishment and increase the recommended refurbished period from three to five years to five to ten years."*

Has Hydro completed the more detailed scale removal and magnetic particle inspection as recommended by Hatch? If yes, please provide the inspection report. If not, why not?

NP-NLH-012

**Reference: Application, Schedule 1: Upgrade Report – Penstock 1 Life Extension – Bay d’ Espoir, Appendix M, Page 2 of 219.**

*"The sequence in which the penstocks are to be refurbished assumes all three (3) penstocks will be refurbished within a three (3) year period and the refurbishment will be scheduled sequentially such that no more than a single penstock is out of service at any one time, beginning with Penstock No. 1 and working from right to left across the three (3) penstocks. This would have savings in mobilization and demobilization costs in-between penstocks refurbishments. Having trained and dedicated personnel through all three back-to-back penstocks refurbishments would maximize productivity and consistency. Back-to-back refurbishment would see the project complete in three years which would mitigate risks related to cost increases for material and labour, when compared to a schedule that could extend out over eight years if refurbishment is not back-to-back."*

- a) Was Hydro, or its consultant Kleinschmidt, able to quantify the cost savings associated with completing the three penstocks sequentially as suggested in the reference? If yes, please provide the details associated with the cost savings. If not, why not?
- b) What is Hydro’s anticipated timeline to complete the refurbishment of penstocks 1, 2 and 3? Further, when does Hydro anticipate it will be in a position to file applications for penstocks 2 and 3?

**RESPECTFULLY SUBMITTED** at St. John’s, Newfoundland and Labrador, this 10<sup>th</sup> day of January, 2023.



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