

IN THE MATTER OF the *Public Utilities Act*,
RSNL 1990, c P-47 (“Act”); and

AND IN THE MATTER OF an application by
Newfoundland and Labrador Hydro (“Hydro”) for
approval of: (i) its capital budget for 2023, pursuant to
Section 41(1) of the Act, (ii) its proposed capital
purchases and construction projects for 2023 in excess
of \$50,000, pursuant to Section 41(3)(a) of the Act,
and (iii) for an Order, pursuant to Section 78 of the
Act, fixing and determining its average rate base for
2021 (“Application”).

**Request for Information
by the Labrador Interconnected Group**

Application for Approval of the 2023 Capital Budget Application

LAB-NLH-001 to LAB-NLH-006

August 26, 2022

Request for Information Regarding the 2023 Capital Budget Application

LAB-NLH-1. **Re: Application, v. 2, Jean Lake Terminal Station, Att. 1, page 6 of 25 (481 pdf)**

Citation:

Transformer T1 will be in service by 2023 and serving 100% of the Wabush town load. Transformers T4 and T6 will remain as spares that can be connected in the event of a failure to Transformer T1. However, Transformers T4 and T6 cannot be paralleled with Transformer T1, due to short-circuit levels exceeding the 12 kA rating of the reclosers.

- a) **Please clarify in layman’s terms the meaning of the expression “cannot be paralleled with Transformer T1”, and the reason why this is the case.**
- b) **Are there any technical modifications possible that would allow Transformer T4 and/or T6 to be paralleled with Transformer T1? If so, please (i) describe the modifications that would be required, and their approximate cost, and (ii) indicate the firm capacity of the station that would result.**

LAB-NLH-2. **Re: Application, v. 2, Jean Lake Terminal Station, Att. 1, page 6 of 25 (481 pdf)**

Citation 1 (p. 486 pdf):

As part of Hydro’s *Labrador Interconnected System Transmission Expansion Study*, a three transformer solution was proposed for Jean Lake TS. This solution was demonstrated to provide adequate capacity to accommodate system demand until it exceeds the firm transformation capacity of 24.97 MVA. It was subsequently identified in the 2021 CBA Additions for Load – Wabush Substation Upgrades project that once the Jean Lake TS system demand reached that threshold, both Transformer T4 and T6 would be replaced with one 20/26.7/33.3 MVA transformer with an on-load tap changer (“OLTC”), resulting in a two transformer solution. Hydro’s analysis has since determined that there has been an acceleration to the load growth in Wabush necessitating the advancement of this transformer upgrade timeline.

Citation 2 (p. 481 pdf):

A ten-year load forecast for the Jean Lake TS is provided in Table 2. These values are based on the Wabush Spring 2022 Operating Load Forecast, dated July 5, 2022. The extended forecast indicates that peak demand in the Town of Wabush will exceed 29 MW by 2041.

Citation 3 (p. 487 pdf):

The load is forecast to continue to increase over the ten-year period and beyond. This could result in the inability to reliably serve the Jean Lake TS customers.

**Table 2: Wabush Spring 2022 Operating Load Forecast
Town of Wabush Load (Jean Lake TS)**

Year	Peak (kW)⁶ P50	Peak (kW)⁶ P90
2022–2023	22,684	23,164
2023–2024	23,382	23,862
2024–2025	23,719	24,199
2025–2026	23,901	24,381
2026–2027	24,101	24,581
2027–2028	24,332	24,812
2028–2029	24,487	24,967
2029–2030	24,677	25,157
2030–2031	24,899	25,379
2031–2032	25,149	25,629

- a) **Please confirm that, according to the Load Forecast shown in Table 2, even under the P90 forecast, the Town of Wabush Load will remain under the firm transmission capacity of 24.97 MVA through 2030-2031 (according to the P50 forecast) and until 2028-2029 (according to the P90 forecast).**
- b) **Please provide the Wabush Spring 2021 Operating Load Forecast for the Jean Lake TS, and explain the reasons for the differences.**
- c) **Please explain in detail Hydro’s reasons for believing that the Wabush load forecast will continue to increase during the period 2032-2041.**

LAB-NLH-3. **Re: Application, v. 2, Jean Lake Terminal Station, Att. 1, page 9 of 25 (484 pdf)**

Citation:

This operating instruction is based on the ANSI / IEEE C57.92–1981 “American National Standard—Guide for Loading Mineral-Oil-Immersed Power Transformers” and includes recommended overload capabilities, as summarized in Table 4. It is noted that these guidelines are based upon the transformer ratings at 30°C ambient temperature.

Table 4: Power Transformer Loading Guidelines – General Emergency Ratings

Allowable loading in pu of continuous ampere rating

Peak Load Duration (hours)	Ambient Temperature <0°C
0.5	1.50
1	1.41
2	1.32
4	1.26
8	1.23
24	1.18

- a) Please confirm or correct our understanding that Table 4 provides the allowable loading, in relation to the transformer ratings at 30°C ambient temperature, for temperatures below 0°C.
- b) Please confirm that the lower the ambient temperature, the greater the allowable loading.
- c) Please indicate the approximate ambient temperature that usually occurs during peak hours in Wabush.
- d) Please provide a similar table, or Hydro’s best estimate of a similar table, for a) the temperature mentioned in the previous response, and b) ambient temperatures below -20°C.

LAB-NLH-4. **Re: Application, v. 2, Jean Lake Terminal Station, Att. 1, page 11 of 25 (486 pdf)**

Citation:

4.1.2 Deferral

The alternative of not proceeding with this project in 2023 is not recommended. The inability to meet firm transformation capacity at Jean Lake TS violates Hydro’s Transmission Planning Criteria that transformers shall not be overloaded under normal operation, or in the event of the failure of the largest power transformer. As per the load flow analysis results in Section 3.1.2, Transformer T6 is expected to reach 100% loading in the winter of 2023–2024, when the expected P90 peak non-coincident demand in Wabush is 23.862 MW (25.27 MVA_s). In the event of a failure to Transformer T1, the total transformation capacity that can be sustained is 24.97 MVA, which is less than the forecasted peak demand for that winter. The load is forecast to continue to increase over the ten-year period and beyond. This could result in the inability to reliably serve the Jean Lake TS customers.

- a) Please confirm that the expression “transformers shall not be overloaded under normal operation” refers to their rated capacity at 30°C.
- b) Please confirm that peak loads in Wabush occur during the winter.
- c) Please confirm that transformer capacity at winter temperatures is significantly greater than at 30°C.
- d) Please explain why it is necessary to avoid overloading (based on a 30°C rating) under normal winter operations.

LAB-NLH-5. Re: Raphals, P., Expert report regarding Hydro’s Proposed Network Addition Policy and Transmission Expansion Study, dated April 25, 2019

Citation (pp. 40-42, or pp. 44-46 pdf):

Implications of changes in planning criteria

The creation of the NLSO and the accompanying changes in management structures has led to important changes in the standards applied to different parts of the Labrador transmission system.

The Labrador East and West systems are not considered part of the Primary Transmission System, and as a result, the n-1 criterion is not necessarily applied across the board in these areas.¹

The Labrador West network is classified as a “local network”, and so is not subject to strict application of Transmission Planning Criteria as defined in “NLSO Standard Transmission Planning Criteria Doc # TP-S-007.”² The Labrador East network is considered a “radial network”.

Hydro furthermore indicates that the Labrador West Local Network (46 kV) is now classified as part the Newfoundland and Labrador Interconnected System. Ratings for equipment within this jurisdiction are now calculated on the basis of “NLSO Standard – Transmission Facilities Rating Guide, TP-S-001,” as opposed to methodologies defined in distribution planning standards. This change in methodology has resulted in a 4.9 MVA reduction in firm transformer capacity at the Wabush Substation.³

In addition to the changes in the ratings of the 46 kV power transformers, ratings of the 46 kV transmission lines were also revisited and calculated in accordance with “NLSO Standard – Transmission Facilities Rating Guide, TP-S-001” using an assumed 50°C operating temperature. This resulted in a substantial reduction in the conductor ratings, as shown in the following table:

¹ LAB-NLH-073 a) i), page 2 of 3.

² NP-NLH-020.

³ LAB-NLH-073 a) ii) and iii), page 2 of 3.

Table 1: Comparison of Transmission and Distribution Calculated Conductor Ratings

46 kV Transmission Line	Transmission Planning Winter Rating (MVA)	Distribution Planning Winter Rating (MVA)
L32 Sections 1 and 2	59.4	72.0
L40 Section 1	42.6	51.5
L33 and L40 Section 2	60.2	72.9
L36	36.7	44.4

Taken together, these changes result in a substantial downgrading of the capacity of the Wabush Transmission Station and the 46 kV lines connected to it. As such, **it would appear that the need for at least some of the equipment called for to meet the baseline forecast in Labrador West (Alternative 4) is made necessary simply by changes to the ratings of the existing equipment.**

It is recommended that, before any transmission upgrades are approved by the Board for Labrador West, the justification for these changes of ratings be carefully examined in the Capital Budget Application process.

- a) **Has the Board ever explicitly approved the changes in Hydro's planning criteria that were described in the Transmission Expansion Study? If so, please provide detailed references and quotations.**
- b) **Has Hydro provided any additional justification for the changes described in the citation? If so, please provide detailed references and quotations.**
- c) **Would the proposed modifications to the Jean Lake TS have been required at this time, under the planning criteria in effect before the TES? Please explain your response in detail.**

LAB-NLH-6. Re: email from Kimberly Duggan dated August 19, 2022

Citation:

During Newfoundland and Labrador Hydro's ("Hydro") presentation of its 2023 Capital Budget Application ("CBA") on August 10, 2022, the Labrador Interconnected Group inquired about the specific load request leading to the requirement for additional transformation capacity at the Jean Lake Terminal Station, as proposed in Hydro's 2023 CBA. Hydro noted in its discussion that this increase in load is driven by incremental load growth, including requests for service from Transport Canada for an additional peak load of 550 kW to upgrade the Wabush Airport terminal buildings heating system and an additional peak load of 275 kW to construct a new runway sweeper garage and sand & urea shed, for which the Board of Commissioners of Public Utilities approved an exemption to Regulation 17 of Hydro's Rules and Regulations and approved an Upstream Capacity Charge pursuant to the Network Additions Policy in the amount of \$290,625.00.

The Labrador Interconnected Group asked Hydro to reconcile this information with Hydro's response to LAB-NLH-002, filed as a response to an request for information to Hydro's application regarding the Transport Canada requests (Application for

Exemption to Regulation 17 and Approval of an Upstream Capacity Charge), in which Hydro stated *"There are no additions or modifications required to the transmission system in order to supply this load to Labrador West. It is possible that modifications to the distribution system will be required in order to provide an additional 825 kW to the Wabush Airport. This analysis will be conducted if the exemption application is approved as it would otherwise be unnecessary."* Hydro committed to follow up on this apparent discrepancy, and to provide a response to the Labrador Interconnected Group.

In Hydro's proposal for Additions for Load - Wabush Substation Upgrades project included in Hydro's 2021 CBA, Hydro provided a load forecast dated May 2019, which indicated that the station design would accommodate system growth until 2039-2040, at which time both spare Transformers T4 and T6 would require replacement with one larger unit. In 2021, Hydro's Annual Planning Assessment indicated that load growth had accelerated, and that the loss of the largest Transformer, T1, at the Jean Lake Terminal Station would result in the overload of the remaining transformers within the ten-year, long-term planning horizon. To address the accelerated load growth, transformer capacity upgrades would need to be proposed in Hydro's 2023 or 2024 CBA. Transport Canada's load request for 825 kW solidified the need for additional transformation capacity, and Hydro therefore included the Additions for Load Growth - Upgrade Transformer Capacity in its 2023 CBA.

Hydro's response to LAB-NLH-002 was provided in the context of the 230 kV transmission assets that interconnect the Labrador West electrical system with the Churchill Fall's Terminal Station, which serves as the source of power for the region, as transfer capacity constraints on the 230 kV system formed the basis for Regulation 17. In its response, Hydro did not reference potential impacts to the 46 kV transmission system. As these are considered transmission assets as defined in Hydro's Network Additions Policy, Hydro's response to LAB-NLH-002 was incomplete and should have considered impacts on the 46 kV Transmission system as well as impacts to the 230 kV transmission system, including advancement of previously planned upgrades. Hydro apologizes for this oversight.

We trust this response addresses the Labrador Interconnected Groups question.

- a) **Please clarify if the charge to Transport Canada under the Network Additions Policy would have been different, had it been acknowledged at the time that the additional peak loads of $550\text{kW} + 275\text{kW} = 825\text{ kW}$ would have resulted in the advancement of the transformer replacements at Jean Lake TS?**