

1 Q. **Reference: Application, v. 2, Jean Lake Terminal Station, Att. 1, page 11 of 25 (486 pdf)**

2 Citation:

3 **4.1.2 Deferral**

4 The alternative of not proceeding with this project in 2023 is not recommended.
5 The inability to meet firm transformation capacity at Jean Lake TS violates
6 Hydro’s Transmission Planning Criteria that transformers shall not be
7 overloaded under normal operation, or in the event of the failure of the largest
8 power transformer. As per the load flow analysis results in Section 3.1.2,
9 Transformer T6 is expected to reach 100% loading in the winter of 2023–2024,
10 when the expected P90 peak non- coincident demand in Wabush is 23.862 MW
11 (25.27 MVA8). In the event of a failure to Transformer T1, the total
12 transformation capacity that can be sustained is 24.97 MVA, which is less than
13 the forecasted peak demand for that winter. The load is forecast to continue to
14 increase over the ten-year period and beyond. This could result in the inability
15 to reliably serve the Jean Lake TS customers.

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

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- 25 A. a) The expression “transformers shall not be overloaded under normal operation” refers to the
26 summer nameplate rating, which for transformers manufactured in Canada to the CAN/CSA
27 C88-M90¹ standard is 25°C ambient with 65°C temperature rise, and for transformers

¹ *Power Transformers and Reactors*, CAN/CSA C88-M90.

1 manufactured elsewhere to American National Standards Institute (“ANSI”) IEEE C57.92-
2 1981² standard is 30°C ambient with 65°C temperature rise.

3 **b)** Yes, the peak loads in Wabush occur in the winter.

4 **c)** While transformer capacity at winter temperatures is greater than at summer temperatures,
5 there are some caveats, as loading transformers above the nameplate summer ambient
6 rating can reduce the transformer expected life. Newfoundland and Labrador Hydro
7 (“Hydro”) purchases transformers manufactured to the Canadian Standard CAN/CSA C88-
8 M90. This standard gives the transformer rating for transformers at 25°C ambient and 65°C
9 temperature rise. For ambient temperatures below 25°C, clause 3.5 of CAN/CSA C88-M90
10 permits an increase in rating by 0.75% for every degree Celsius below 25°C down to a
11 minimum of 0°C ambient. This standard therefore forms the basis of the transformer rating
12 used by Hydro for the annual review process to identify the requirement for future
13 transformation capacity.

14 It is Hydro’s perspective that the incremental capacity described above must be reserved as
15 an operational margin for the effective planning of a reliable transmission system. This
16 margin is essential for reliable operation during emergency conditions and in the event of
17 unplanned load growth, particularly when considering timelines for procurement and
18 installation (greater than two year duration) following regulatory approval.

19 It is also important to note that based on the guidelines outlined in the ANSI IEEE C57.92-
20 1981 standard, loading transformers above the nameplate 30°C ambient, 65°C rise rating
21 can cause loss of service life to the transformer insulation. The Newfoundland and Labrador
22 System Operator operating instruction, TOP-P-057, Terminal Station Transformer
23 Overloading Guidelines, utilizes the guidelines provided in ANSI IEEE C57.92-1981 to outline
24 the permissible emergency transformer loadings for ambient temperatures below 0°C, such
25 that there will be minimal sacrifice to transformer expected life.

26 **d)** It is necessary to avoid transformer overloading above the nameplate 30°C ambient rating
27 even under normal winter operations because operation above this rating runs the risk of

² *Guide for Loading Mineral-Oil-Immersed Power Transformers*, ANSI IEEE C57.92-1981.

- 1 causing loss of service life. Hydro's transformer overloading guidelines, which are based on
- 2 the ANSI IEEE C57.92-1981 standard described in part c), will result in minimal loss of life.