Q. **Reference: Study, page 9 - Transmission Planning Criteria TP-S-007 NLSO Standard**
www.oasis.oati.com/woa/docs/NLSO/NLSOdocs/TP-S-007_Transmission_Planning_Criteria_UPDATED_05112018.pdf

In post-contingency scenario, transformers are not allowed to be loaded above their 25˚C ratings, despite the overloading capability of transformers for lower ambient temperatures. Does this also apply to 46 kV "distribution" transformers? Since peak demands occur mainly during the winter season, what are the reasons for not considering this overloading capability for transformers in post-contingency/ emergency scenarios? Has Hydro ever experienced transformer failures due to transformer loading above 25˚C rating at low ambient temperatures?

A. As taken from "NLSO Standard Transmission Facilities Rating Guide Doc # TP-S-001,"[1] November 1, 2017, Sec. 6.1, at p. 14:

> For transmission planning purposes the summer, spring/fall and winter rating limits of all power transformers and autotransformers will be equal to the nameplate rating at 25 °C ambient as provided by the manufacturer. Given the time requirements for the procurement of a new transformer(s) once installed unit(s) reach nameplate rating, the increase in transformer rating limit associated with lower ambient air temperatures at time of system peak (i.e. spring/fall and winter) available from transformers designed to CAN/CSA-C88-M90 is allocated as operational margin to avoid loss of transformer life due to excessive loading in the period between transformer reaching 100% of nameplate rating and installation of additional transformer capacity following transformer failure in multiple transformer installations.

Newfoundland and Labrador Hydro has developed operational guidelines pertaining to the overloading of transformers in emergency situations, as provided in Table 1. These guidelines do apply to 46 kV transformers. Table 1 presents the transformer loading guidelines utilized by System Operations.

[1] Newfoundland and Labrador System Operator ("NLSO").

Table 1: Power Transformer Loading Guidelines: General Emergency Ratings

Allowable loading in pu[2] of continuous ampere rating				
Peak Load Duration (hours)	**Ambient Temperature**			
	< 0°C	**10°C**	**20°C**	**30°C**
0.5	1.50	1.46	1.41	1.36
1	1.41	1.37	1.32	1.28
2	1.32	1.29	1.25	1.21
4	1.26	1.23	1.19	1.15
8	1.23	1.19	1.16	1.12
24	1.18	1.15	1.11	1.08

Newfoundland and Hydro has not experienced transformer failures due to transformer loading above 25°C rating at low ambient temperatures.

[2] Per unit ("pu").