Q. **Reference: 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.

A. **a)** The expression "Transformers T4 and T6 cannot be paralleled with Transformer T1" means that the terminal station cannot operate in the configuration when the 12.5 kV Bus Tie B2B3 is closed and all three transformers are in-service (i.e., all three transformers are connected in parallel between 46 kV Bus B1 and 12.5 kV Buses B2/B3). The reason for this is that the 12.5 kV reclosers on the distribution feeders have an interrupting rating of 12 kA. If a short circuit current on the 12.5 kV buses exceeds the interrupting rating of 12 kA, then the reclosers could fail to interrupt the fault, which is a safety and reliability issue. When only Transformer T1 is in-service with Bus Tie B2B3 closed, the short circuit currents on the 12.5 kV buses are less than 12 kA, which is acceptable. Likewise, when Transformer T1 is out-of-service, and Transformers T4 and T6 are in-service with Bus Tie B2B3 closed, the short circuit currents on the 12.5 kV buses are also less than 12 kA. However, when all three transformers are in-service and operating in parallel with Bus Tie B2B3 closed, the short circuit currents on the 12.5 kV buses exceed 12 kA, which is not acceptable. It is noted that

operating the three transformers in parallel does not increase the firm transformation capacity of the terminal station.

b) In order to allow Transformer T4 and/or T6 to be operated in parallel with Transformer T1, all six distribution feeder reclosers and associated disconnects and bypass fused switches would require replacement.

i. The modifications required include the following:

1. Removal of six reclosers (JL11-R1, JL7-R1, JL12-1, JL13-R1, JL9-R1, JL3-R1), associated disconnects and bypass fused switches; and
2. Purchase and installation of six 27 kV class, 630 A vacuum interrupters, each with interrupting rating of 20 kA, complete with disconnects and bypass fused disconnect switches.

The approximate, high level cost for this work would be $800,000. Further modifications may be required to accommodate this larger equipment.

ii. Operating the station with Transformers T1, T4 and T6 in parallel does not impact the firm capacity of the station. The firm transformation capacity is the total station capacity less the transformer with the largest rating, which would still be 24.97 MVA.