



CONNECTION ASSESSMENT & APPROVAL PROCESS

ASSESSMENT SUMMARY

Applicant: Hydro One Networks Inc.

*Project: Installation of a new 125MVar 128kV Capacitor Bank
at Hearn TGS*

CAA ID No. 2002-EX022

***Long Term Forecasts & Assessments Department
Consistent Information Set Department***

Date: 27th March 2002

ASSESSMENT SUMMARY

HYDRO ONE NETWORKS Inc.

HEARN TGS - Install New 125MVA_r 128kV Capacitor Bank

1.0 GENERAL DESCRIPTION

Hydro One Networks Inc. is proposing to install a 125MVA_r 128kV shunt capacitor bank at Hearn TGS to complement the existing 96MVA_r capacitor bank at that location.

The scheduled in-service date for the new capacitor bank is 1st May 2003.

2.0 PROPOSED FACILITIES

The new capacitor bank, SC12, rated at 125MVA_r 128kV is to be connected directly to the existing A6 busbar at Hearn TGS through two series-connected breakers as shown in Diagram 1.

In this position, if the 115kV busbar is operated split, either ‘vertically’ at breaker positions 6P7 & A1P8, or ‘diagonally’ at breaker positions 5A6 & 7P8, one of the capacitor banks will always be associated with each half of the split busbar.

To minimise the effect on local customers of switching the capacitor banks into service, an independent pole breaker is to be used as the principal breaker for each capacitor bank. This will involve replacing the existing breaker, SC11SC, on capacitor bank SC11 with a new IPO breaker. The breaker that is removed will then become the back-up breaker for the new capacitor bank, SC12, to complement the new IPO principal breaker.

Series reactors are also to be installed on each capacitor bank to limit the out-rush current. On the new capacitor bank these are to be installed between the disconnect switch and the back-up breaker, as shown in Diagram 2. This is also the preferred location for the series reactors that are to be retro-fitted to the existing capacitor bank, SC11. However, if space constraints preclude their installation in this location, then the preferred alternative would be between the two breakers.

In the event that the series reactors cannot be located at either of the positions above, then they would need to be installed either between the IPO Breaker and the SC11 capacitor bank, or in its neutral connection. These locations, although acceptable, are not preferred because the IPO breaker would then need to be rated at 63kA.

Each capacitor bank is to be equipped with surge arresters and these are to be located between the IPO breaker and the actual capacitor bank.

Specifications

- Capacitor Bank:
 - 125MVA_r ±5% at 128kV ±1kV
 - Maximum operating voltage 128kV
 - Configuration Double Y ungrounded - using internally fused cans, with 5-minute discharge resistors
 - Symmetrical short-circuit rating 40kA
 - Insulation level 550kV BIL

- Series Reactors:

Rating at 60Hz	2.0mH per phase
Maximum operating voltage	127kV continuous 150kV for 5 minutes
Continuous current	625A rms
Symmetrical short-circuit rating	63kA for 12 cycles
Asymmetrical short-circuit rating	160kA peak
Insulation level	550kV BIL

- Circuit Breakers:

Type	SF ₆ - Independent pole operation (IPO) equipped with control units for synchronised closing.
Maximum operating voltage	128kV continuous
Rated interrupting capability	40kA symmetrical & 48kA asymmetrical [63kA symmetrical & 75.6kA asymmetrical if the series reactors are located downstream of the new circuit breaker.]
Rated interrupting time	3-cycles
Insulation level	550kV BIL
TRV across pole	310kV peak

Diagram 3 shows the ‘operating’ arrangement at Hearn TS following the completion of the work under the de-merger project and the installation of the new 125MVA_r capacitor bank (i.e. only those facilities that will remain effective are represented). The nomenclature of the remaining breakers (upon completion of the De-merger Project) may change depending on a decision within Hydro One regarding the nomenclature that is to be adopted for the individual busbars.

3.0 ASSESSMENT

The analysis that was performed for the Preliminary Assessment for the proposal to Quarter Terauley TS confirmed the need for additional reactive support at the Hearn 115kV busbar to support voltages in the area and to minimise reactive power flows on the 230kV and 115kV facilities in the Leaside sector. No further analysis is therefore considered necessary.

Voltage Change on Switching the Capacitor Bank

The voltage change upon switching a 125MVA_r capacitor bank either in- or out-of-service has been shown to be 2.5% for the following system arrangement:

- Terauley quartered and operated open
- The 115kV busbar at Hearn TS split diagonally at breaker positions 5A6 & 7P8
- The 115kV busbar at Leaside TS open, and
- With no generation capacity in-service in the Hearn area

This would comply with the maximum limit of 4% for capacitor switching that is quoted in the Market Rules

Auto-Reclosure

Since none of the 115kV circuits between Leaside TS to Hearn TGS is presently equipped for auto-reclosure following a line fault, any impact that the installation of the new capacitor bank at Hearn TGS could have on its deployment will not be an issue.

The proposed installation of a new 125MVA capacitor bank on the 115kV busbar at Hearn TGS is therefore not expected to have any adverse impact on the IMO-controlled grid.

4.0 CUSTOMER IMPACT ASSESSMENT

The existing 96MVA capacitor bank at Hearn TGS is presently being switched without the assistance of an IPO breaker and Hydro one is not aware of any customer concerns associated with switching of this bank.

Once the present Project is complete, synchronised closing of both the existing capacitor bank and the new one is to be employed using their respective IPO breakers. Since the use of these IPO breaker will further reduce the impact that the switching of the existing bank will have on local customers, and since the use of an IPO breaker will similarly minimise the impact of switching the new bank, Hydro One has therefore decided that a customer impact assessment will not be required for this Project.

5.0 NOTIFICATION OF APPROVAL

It is therefore recommended that a Notification of Approval of the Connection Proposal be issued.