Q. **Project C-53: Upgrade Corner Brook Frequency Converter, Corner Brook**

Hydro, at page C-53 (Volume I) of its Application states the following:

"Both the 50 and 60 Hz synchronous machines still have their original stator coils, but due to concerns with age and expected condition of the coils, the unit has been load restricted to 19 MVA. A 2015 condition assessment by Siemens recommended that the converter not be operated at its maximum output of 25 MW, but limited to 19 MVA, until both machines have been upgraded."

Is it Hydro's position that this entire proposed Project would need to be undertaken to achieve the 25 MW maximum output from the frequency converter or would the stator rewinding and cleaning alone achieve that result?

A. It is Hydro's position that the stator rewinding, stator and rotor cleaning, and transformer vault ventilation system components of the project would need to be undertaken to achieve maximum output from the Corner Brook Frequency Converter from an asset reliability perspective. Discussion regarding the maximum output capability of the frequency converter can be found in IC-NLH-194 (Revision 1, Sep 4-15) filed during the Hydro's 2013 General Rate Application and attached as IC-NLH-012, Attachment 1).

Q. Further to IC-NLH-162: Please provide the frequency converter maximum loading (MW) imposed by Hydro since 2007 (showing dates).

A. The frequency converter is operated with a maximum loading of 19 MVA and has operated in this manner since the late 1990s. As stated in Hydro's response to IC-NLH-162, discussions have taken place with CBPP in the last quarter of 2014, and it was agreed by both parties to complete an overall condition assessment to help determine the safe operating capacity for this unit. The fieldwork for this assessment was completed on April 10, 2015 and a report is expected in May 2015 with a recommendation from the Original Equipment Manufacturer on a safe operating limit for this unit.

In recent years, on a temporary basis, Hydro has allowed increased output from the frequency converter under controlled conditions in which staff would be stationed at the converter recording operational data.

Since the initial filing of this RFI, through review of archived reports relating to the Corner Brook Pulp and Paper Power system, Hydro has improved its understanding of the loading limits at the Corner Brook frequency converter. Although the unit has been physically constrained in recent years due to operational issues, the transfer limit of 18 MW imposed at the unit predates these issues. A 1982 Canadian General Electric Company Limited (CGE) study conducted on behalf of Bowater Newfoundland Limited (the predecessor to Corner Brook Pulp and Paper Limited) established an either direction real power transfer limit of 18 MW on the converter. This limit was established to ensure sufficient reactive power availability to maintain stability for certain disturbances. The study also recommended that the

"last step" before going to total 60 Hz conversion should have at least three units on the 50 Hz side in the Deer Lake plant as 50 Hz performance with only two units was less robust. It is Hydro's understanding that Corner Brook Pulp and Paper currently operates with two units on the 50 Hz side in the Deer Lake plant.

A restoration of the unit by Hydro to its original capacity would likely be of little value because of this 18 MW limit which, in all likelihood, is still applicable today and will be for the foreseeable future. There is a provision in the Service Contract for Corner Brook Pulp and Paper which provides for up to 18 MW of replacement power to the Customer, at firm rates, with no demand charges, in the event of an outage or derating of the frequency converter.

Excerpts from the CGE study are attached as IC-NLH-194 Attachment 1.

1982 Power System Study Results and Recommendations for Canadian General Electric Company Limited for Bowater Newfoundland Limited Corner Brook, Newfoundland, Canada

IPSEO

GENERAL ELECTRIC COMPANY
APPARATUS AND ENGINEERING SERVICES OPERATIONS
INDUSTRIAL POWER SYSTEMS ENGINEERING OPERATION
SCHENECTADY, N.Y. 12345

ENGINEERING AND ECONOMIC STUDIES

GENERAL ELECTRIC

Part 3 1982 Base Case Except Converter Off (Fig. 3C, Printout Case 825-4)

The 1982 50 Hz Base Case load is supplied with the Converter out of service. The active power demand on 50 Hz sources is reduced by the amount previously transferred by the Converter to the 60 Hz system. The reactive power demand on 50 Hz sources is increased by the amount previously supplied by the 50 Hz Converter winding.

It is assumed that Deer Lake generators 8 and 9 operate at less than maximum active power and all Deer Lake generators share the increased reactive power required. As shown on Fig. 3C, the Mill bus voltage at 63 kV requires a slightly higher Deer Lake generator bus voltage for the increased reactive power flow, despite the reduced active power.

These are initial conditions for Dynamic Simulation Case 4.

Part 3 1991 Conditions (Fig. 3D, Printout Cases 916-5, 915-5)

The "1991" loads, used for the last step before complete conversion to 60 Hz in Load Flow - Part 2, are 127.1 MW at 60 Hz and 20.4 MW at 50 Hz, without the Electric Boiler. The 50 Hz load in excess of the Grinders is quite small.

Case conditions discussed with Bowater have the ST Generator off, only one Watson's Brook Generator operating at at least two Deer Lake Generators operating. Subsequent motor starting and line relaying considerations suggest three Deer Lake Generators would be better.

This case assumes there are three Deer Lake Generators, and the Frequency Converter is carrying 18 MW (specified as a limit in Part 2) to use as much as possible of the available generator active power; even so, Generators 8 and 9 operate at only 72 percent of rating.

3C. Reactive capability for a single source equivalent depends on the weighted-average power factor, and is assumed to be as illustrated by the curves of page LF2:1-8.

4. Watson's Brook Generator Ratings and Operation:

4A. Each of two generators is rated 4.59 MW, 0.9 PF. A single source represents both.

4B. Reactive capability is assumed to be as illustrated on page LF2:1-8 for 0.9 PF generators.

4C. For Part 2 cases, the generators supply a total of 0.8 MVAR reactive power regardless of the active power supplied.

5. ST (Steam Turbine) Generator at the Mill, Ratings and Operation.

5A. The ST Generator is rated 6.6 MW, 0.9 PF.

5B. Reactive Capability is assumed to be the same as for Watson's Brook Generators.

5C. For Part 2 cases, power factor is 1.0 when the generator operates.

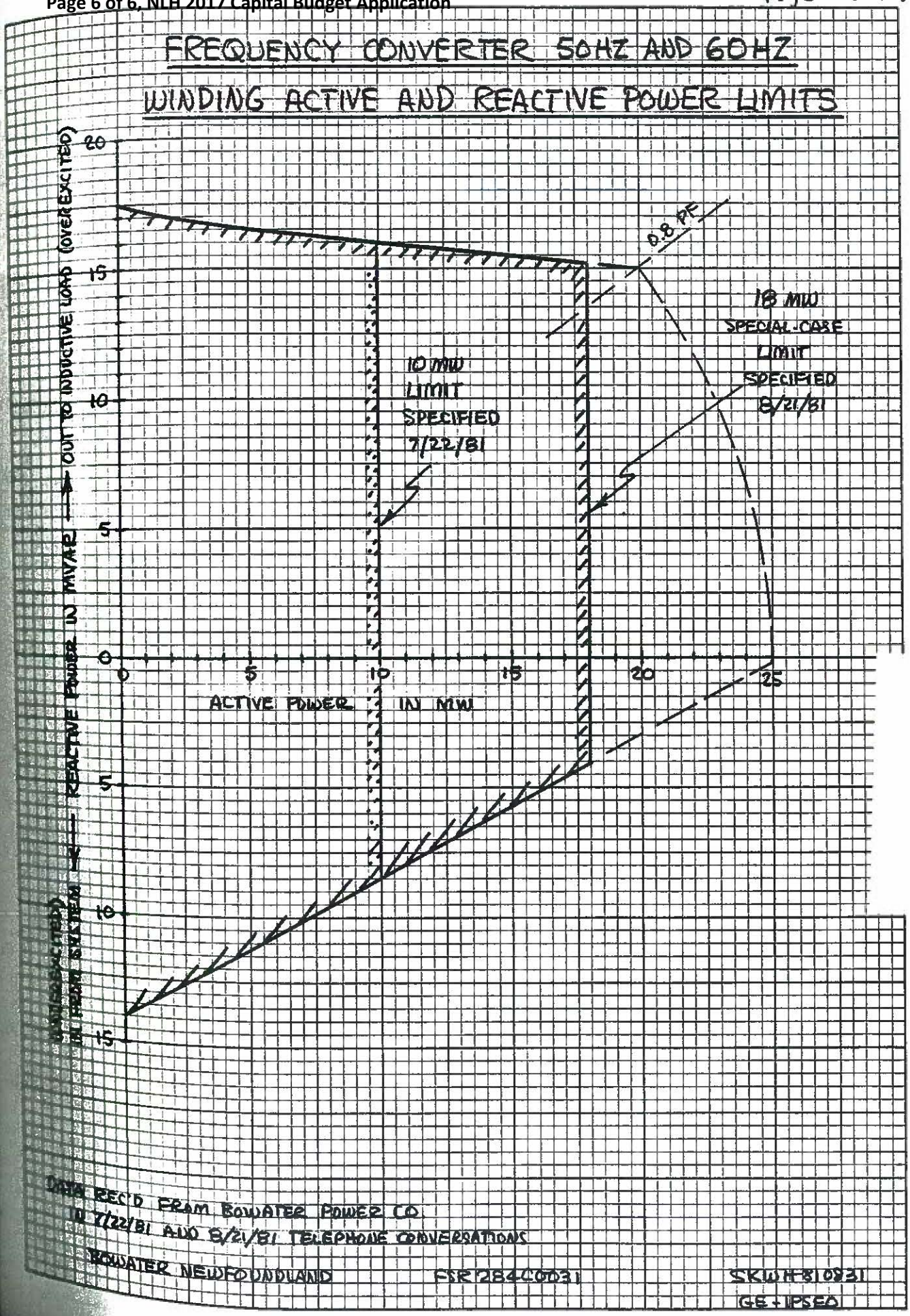
6. Frequency Converter Operating Limits.

6A. The cases of the Load Flow Part 2 are special cases illustrating limits of expected operation, and for these cases the active power transferred by the Frequency Converter may be as high as 18 MW (above the previously specified 10 MW limit).

6B. Reactive power capability according to manufacturer's information supplied is as illustrated on page LF2:1-9, which also shows active power limits.

FREQUENCY CONVERTER 50HZ AND 60HZ

WINDING ACTIVE AND REACTIVE POWER LIMITS



DATA REC'D FROM BOWATER POWER CO.
IN 7/22/81 AND 8/21/81 TELEPHONE CONVERSATIONS

BOWATER NEWFOUNDLAND FSR1284C0031 SKWH810831
GE-IPSEO