

February 13, 2013

Mr. Des Ngunangwa
Production Coordinator
Bruce Power
177 Tie Road
Tiverton, Ontario
N0G 2T0

Dear Mr. Ngunangwa:

***Bruce A GS Replace MOT 3 & 4
Notification of Conditional Approval of Connection Proposal
CAA ID Number: 2012-EX636***

Thank you for the information regarding the proposed replacement of the main output transformers T3 & T4 at Bruce A GS. The IESO has concluded that the proposed changes will not result in a material adverse impact on the reliability of the integrated power system. The IESO is therefore pleased to grant **conditional approval** for the modification detailed in the attached expedited System Impact Assessment report. Please note that any material changes to your proposal may require a re-assessment by the IESO, and may nullify your conditional approval.

You may now initiate the IESO's **Facility Registration/Market Entry** process. To do so, please contact Registration & Compliance Support at market.entry@ieso.ca as soon as possible prior to your expected energization date. The SIA report, attached hereto, details the requirements that your company must fulfill during this process, including demonstrating that the equipment *as installed* will not be materially different from the equipment *as approved* by the IESO. The document entitled [Market Entry: A Step-by-Step Guide](#) describes the key steps in the Market Entry process.

When your company has successfully completed the IESO's **Facility Registration/Market Entry** process, the IESO will provide you with a **final approval**, thereby confirming that the facility is fully authorized to connect to the IESO-controlled grid.

For further information, please contact me via connection.assessments@ieso.ca.

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cc: IESO Records

**Final Report - Expedited System Impact Assessment
Bruce Power**

1. GENERAL DESCRIPTION & PROPOSED MODIFICATIONS

Bruce Power is planning to replace the transformers T3 and T4 at Bruce A GS.

The expected in-service dates will be communicated to the IESO.

2. TECHNICAL SPECIFICATIONS

A comparison between the technical specifications of the existing and replacements transformers is given in the following table.

Bruce A GS		
All values for replacement equipment are specified at the time of order. Actual values to be provided prior to in-service dates.		
	Existing T3 & T4	Replacement T3 & T4
Configuration	single phase x 3	single phase x 3
Transformation (kV)	525.0 / 17.6	525.0 / 17.6
Winding Configuration	Wye/Delta (3 phase configuration)	Wye/Delta (3 phase configuration)
Thermal Rating	267.0 MVA/phase OFWF	320.0 MVA OFWF/phase
Continuous Thermal Rating (summer 30°C)	267.0 MVA/phase OFWF	320.0 MVA/phase OFWF
10 Day Thermal Rating (summer 30°C)	N/A	N/A
Positive Sequence Impedance (H-X)	R = 0.22% X = 12.01 to 12.13% 267 MVA base	R = to be provided X = 14.4% 320 MVA Base
Impedance to Ground	HV 0 Ω; LV ungrounded	HV 0 Ω; LV ungrounded
Off-load tap-changer (OLTC)	Tap 1: 550.0 kV Tap 2: 537.5 kV Tap 3: 525.0 kV Tap 4: 512.5 kV Tap 5: 500.0 kV	Tap 1: 550.0 kV Tap 2: 537.5 kV Tap 3: 525.0 kV Tap 4: 512.5 kV Tap 5: 500.0 kV
In service off-load tap position	Tap 3: 525.0 kV	Tap 3: 525.0 kV

Table 1 – Comparison of Transformer Parameters at Bruce A GS

3. REQUIREMENTS

Bruce Power must notify the IESO as soon as it becomes aware of any changes to the assumptions made in the connection assessment. The IESO will determine whether these changes require a re-assessment.

IESO Monitoring Requirements

According to Section 7.3 of Chapter 4 of the Market Rules, the connection applicant shall provide to the IESO the applicable telemetry data listed in Appendix 4.15 of the Market Rules on a continual basis. The data shall be provided with equipment that meets the requirements set forth in Appendix 2.2, Chapter 2 of the Market Rules, in accordance with the performance standards set forth in Appendix 4.19, subject to Section 7.6A of Chapter 4 of the Market Rules.

As part of the IESO Facility Registration/Market Entry process, the connection applicant must also complete end to end testing of all necessary telemetry points with the IESO to ensure that standards are met and that sign conventions are understood. All found anomalies must be corrected before IESO final approval to connect any phase of the project is granted.

Protection Requirements

The connection applicant shall ensure that the protection systems are designed to satisfy all the requirements of the Transmission System Code as specified in Schedules E, F and G of Appendix 1 and any additional requirements identified by the transmitter. New protection systems must be coordinated with the existing protection systems.

Transformer Impedance Requirements

The impedance provided by the connection applicant for the replacement transformers is similar with the impedance of the existing transformers, if calculated on the same MVA basis. The transformer impedance as determined by the commissioning test must not differ materially from the transformer impedance shown in table 1 above.

Knowledge of the actual transformer impedance is critical to the reliable operation of the ICG and the IESO encourages Bruce Power to submit the actual impedance as determined by the commissioning test or factory acceptance test as soon as possible to avoid any delay in the project.

Provided that the TSC requirements are satisfied, the IESO does not have additional requirements.

4. ASSESSMENT & CONCLUSIONS

The following table presents the ranges of reactive power output for G3 under the maximum/minimum terminal voltage limits (1.05/0.95 pu) at three transformer tap settings. The voltage on the Bruce A bus was fixed at 547 kV which is the average over the past year.

Bruce G3 Reactive Power Output			
OLTC tap	MVAR Absorption at 0.95 pu (Qmin = -255 MVAR)	MVAR Injection at 1.05 pu (Qmax = 325 MVAR)	MVAR Range
Tap 3: 525.0 kV	-247 MVAR	325 MVAR	572 MVAR
Tap 2: 537.5 kV	-87 MVAR	325 MVAR	412 MVAR
Tap 1: 550.0 kV	67 MVAR	325 MVAR	258 MVAR

Table 2 – G3 Reactive Power Output Range at Bruce A GS

The results indicate that the existing tap changer setting is acceptable.

This expedited System Impact Assessment concludes that the replacement of the six single phase transformers comprising T3 and T4 at Bruce A GS is not expected to have a material adverse impact on the IESO-controlled grid provided that all requirements in this report are met provided that all requirements in this report are met.