



March 19, 2004

Mr. Emanuel DaRosa
T&D Asset and Investment Manager
Asset Management and Engineering Dept.
Transmission and Distribution Division
Great Lakes Power Limited – Transmission Division
2 Sackville Road
Sault Ste. Marie, Ontario
P6B 6J6

Dear Mr. DaRosa

New Andrews TS

***Notification of Approval of Connection Proposal
CAA ID Number: 2003-EX181***

Thank you for the detailed information that you provided on the plan to refurbish the transmission system at Andrews GS. This includes the replacement of two exiting distribution transformers at Andrews GS, which provide supply from the 12 kV buses to the 25 kV and 4.16 kV local distribution systems, with a new 120/24.9 kV transformer.

The assessment concluded that the proposed upgrade would improve the reliability of the local transmission system and supply to local loads.

The IMO is therefore pleased to grant **conditional approval** for the installation of the new equipment, as detailed in the attached *System Impact Assessment Report*. Any material changes to your proposal may require a re-assessment by the IMO in accordance with Market Manual 2.10, and may nullify your conditional approval.

Final approval will be granted upon successful completion of the IMO Facility Registration process. During facility registration you will be expected to demonstrate that the project you have installed is materially unchanged from the proposal assessed by the IMO. Contact facility.registration@theIMO.com if you have not received a Facility Registration Summary package within the next 10 days.

A copy of the Report will be posted on the IMO web site: www.theimo.com.

To commence the construction process, please follow the necessary procedures and obtain the required approvals, licences and permits as may be required by the OEB and other regulatory authorities.

For further information, please contact the undersigned.

Yours truly,

Bob Gibbons
Manager - Long Term Forecasts & Assessments
Telephone: (905) 855-6482
Fax: (905) 855-6921
E-mail: bob.gibbons@theimo.com

All information submitted in this process will be used by the IMO solely in support of its obligations under the *Electricity Act, 1998*, the *Ontario Energy Board Act, 1998*, the *Market Rules* and associated policies, standards and procedures and in accordance with its licence. All information submitted will be assigned the appropriate confidentiality level upon receipt.

***System Impact Assessment Report for
New Andrews TS***

1.0 Description of Existing Facilities

GLP- Transmission is proposing to refurbish the transmission electrical system and separate the generation facilities from the transmission facilities at Andrews GS. This includes the permanently removal of two existing distribution transformers at Andrews GS, which provide supply from the 12 kV buses to the 25 kV and 4.16 kV local distribution systems, and the addition of a new 120/24.9 kV transformer. The 4.16 kV load will be supplied from within the 25 kV distribution system. The total distribution peak load is about 350 kW.

Andrews GS existing transmission facilities are composed of three 12/115 kV step-up transformers and two 115 kV breakers. The supply to the 25 kV and 4.16 kV distribution systems is provided via two transformers tapped to the terminals of G1 and G2 at 12 kV, as shown in Figure 1.

2.0 Description of Proposal

Great Lakes Power – Transmission provided a detailed description of the proposed modifications at Andrews GS, the new TS arrangement and modifications to the protection systems. The description submitted by GLP-Transmission is attached in the Appendix A.

A diagram of the proposed modifications is shown in Figure 2.

The planned in service date for this project is November 2004.

3.0 Assessment

3.1 Data Verification

GLP-Transmission submitted with their application, the data associated with the new transformer and isolating devices.

The new transformer will be tapped off Andrews 115 kV line.

The new transformer specifications are:

- Transformation 120/24.9 kV
- Winding Configuration – H delta, X wye, no tertiary winding
- Rating – 5 MVA
- Positive Sequence Impedance – 7.5% on 5 MVA
- Off-load taps : 126 kV, 123 kV, 120 kV, 117 kV, 114 kV

The new motorized disconnect switch specifications are:

- Maximum Operating Voltage - 132 kV
- Continuous Current Rating – 600 A

Transformer fused disconnect switch 702 specifications are;

- Maximum Operating Voltage - 132 kV
- Continuous Current Rating – 250 A

Zinc oxide surge arresters of intermediate class are to be installed on each side of the new transformer.

A comparison was performed between the distribution voltage with the existing transformers and the new transformer.

Existing Transformer

The existing generator step-up transformers are positioned on the 119.7/11 kV taps. The existing 12/25 kV transformers are on a fixed tap. The generator terminal voltage is kept at 11.6 kV. Based on this information the distribution voltages with the existing transformers would be about **24.16 kV** and 4.02 kV.

New Transformer

Based on the settings of the step-up transformers and generator terminal voltages, the voltage on the HV side of the step-up transformer is 126 kV. With the new transformer set on the highest tap the distribution voltage is about **24.9 kV** which is slightly higher than the distribution voltage provided with the existing transformation. However, this variation is within the acceptable range for distribution system voltage variation of 6% based on 25 kV nominal voltage.

The ratings of the new proposed equipment meet the Market Rules requirements with respect to operating voltage.

The winding configuration of the new 120/24.9 kV transformer is similar to the configuration of existing transformers.

During commissioning of the new transformer GLP-Transmission is required to determine the optimal tap position, based on historical information of system voltages.

3.2 On-line Monitoring Requirements

The *Market Rules* (Chapter 4 section 7.4) require that each transmitter shall provide the IMO on a continual basis with on-line monitored quantities as specified in Appendix 4.16. It is required that GLP-Transmission provide all the equipment needed to monitor the information required by the IMO on a continuous basis. The IMO requires that the status of all isolating disconnect switches and breakers, power flows (MW, Mvar) on transformers and transmission circuits be monitored on a continual basis.

3.3 Protection Requirements

With respect to the protection and telecommunication requirements, the GLP-Transmission will have to follow the Transmission System Code technical requirements for transmission lines. The existing protection settings will have to be verified, modified and coordinated with the exiting schemes, as appropriate.

GLP-Transmission has indicated that all protection settings will be provided to the IMO via the facility registration process.

3.4 Fault Level Assessment

GLP-Transmission performed short circuit assessment and concluded that the project will not change the fault levels on the 115 kV system and 12 kV system.

3.5 Conclusions

It can be concluded that the proposed new transformer will improve the reliability of local area load supply because the supply will not be interrupted during generation outages. The proposal will not have a negative effect on the reliability of the IMO-controlled grid.

4.0 Customer Impact Assessment

GLP-Transmission performed a Customer Impact Assessment and concluded that:

- The short circuit currents for the 25 kV distribution feeder increases from 274 A to 1.41 kA,
- The distribution system voltage will be maintained with acceptable limits with the new transformer tap set appropriately,
- The reliability of supply at customer connection points will improve.

GLP-Transmission is required to verify whether or not the exiting customers' equipment is adequately rated for the increase in short circuit currents resulting from the new station configuration.

5.0 IMO Requirements

The assessment concluded that GLP-Transmission is required:

1. to determine the optimal tap position for the new 120/24.9 kV transformer based on historical information of system voltages.
2. to verify whether or not the exiting customers' equipment is adequately rated for the increase in short circuit currents resulting from the new station configuration.
3. To meet IMO's on-line monitoring requirements.
4. To meet Transmission System Code requirements with respect to protection systems.
5. To meet Distribution System Code requirements with respect to voltage variation.

6.0 Notification of Approval

It is recommended that Notification of Approval be granted to GLP-Transmission for the construction of the new Andrews TS.

This Notification of Approval is granted subject to GLP-Transmission meeting the requirements listed in section 5., and those of the facility registration process.

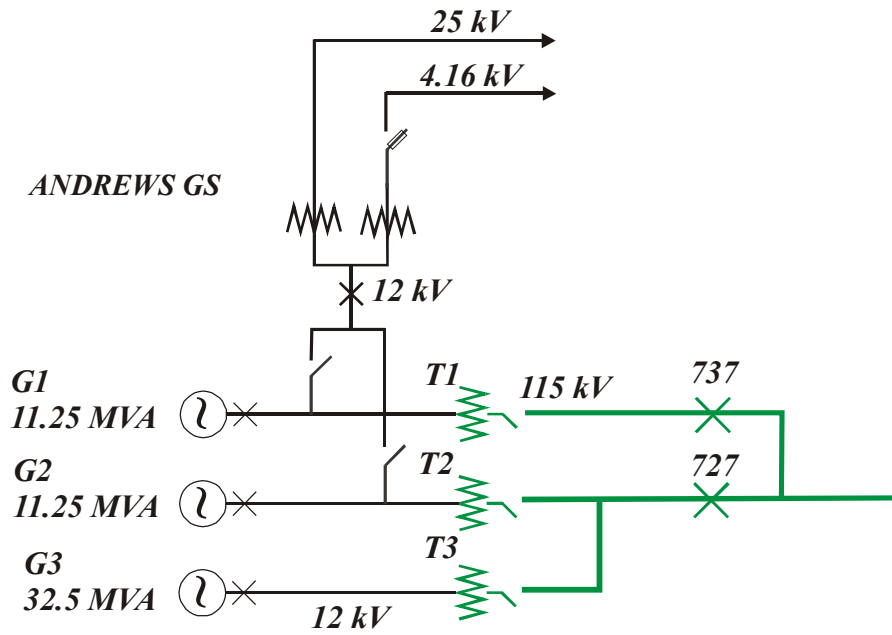


Figure 1. Existing Andrews TS

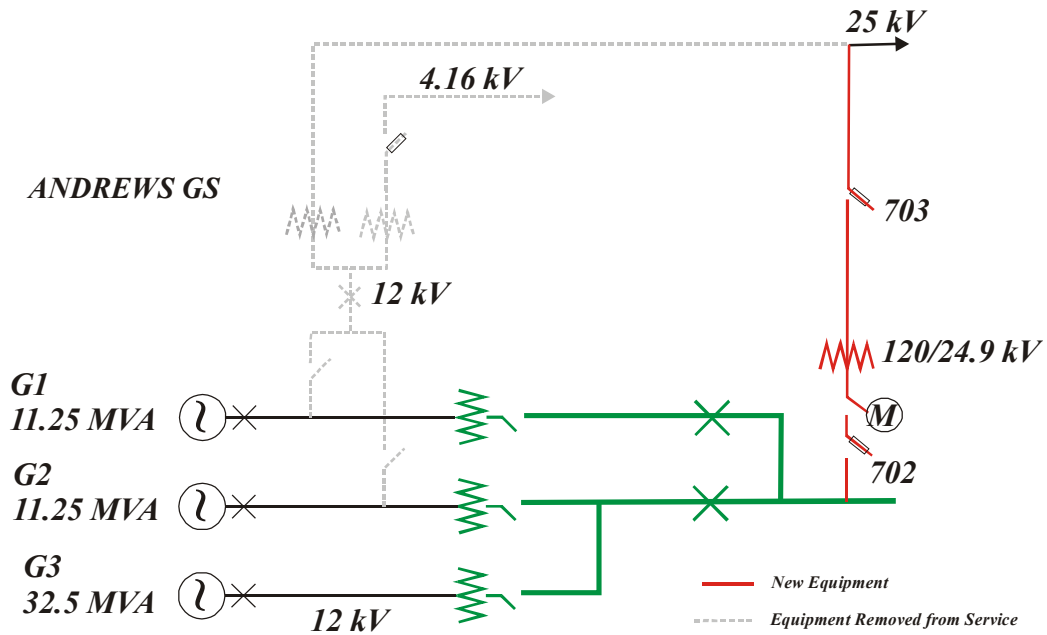


Figure 2. New Andrews TS

Appendix A

Description of Andrews TS Project and Single Line Diagrams for the IMO Expedited System Impact Assessment Application (ESIAA)

1.0 Introduction

The focus of this Expedited SIA is to review the system impact of construction of a new Andrews TS at the existing Andrews GS. The existing Andrews GS is shown in Figure 1 and the new Andrews TS proposed configured is shown in Figure 2.

2.0 Station Reconfigurations

Andrews GS (Figure 1)

The existing 12/25kV step-up transformer and the 12/4.16 kV step-down transformers will be removed.

Andrews TS new (Figure 2)

The new transformer station will be constructed within the existing Andrews GS switchyard. The new Andrews TS will be registered as a separate facility for Transmission and will be separated from the existing Andrews GS with a fence. The transformer station will include a motorized (SCADA controlled) transformer disconnect switch, transformer fused disconnect switch, 120/25kV 5000 kVA transformer, HV and LV lightning arrestors, SCADA cabinet, battery and charger cabinet, cable to distribution facilities and station service transformer.

3.0 Protection System Description

The transformer will be protected with HV fuses which will be coordinated with the line protections and reclosers. If the line protections trip the line for a transformer fault the motorized HV disconnect switch will be remotely controlled to allow the System Control Centre to isolate Andrews TS from Andrews 115kV line and to promptly return the line to service.

4.0 AC & DC System

- There will be a single AC station service supply from one 14.4kv to 120V transformer SSA.
- There will be a single 125Vdc battery and charger system with a separate cabinet and annunciation via SCADA.

5.0 Control System Description

The new station will have a new RTU installed in a separate cabinet which will allow monitoring and control of the station from the GLP System Control SCADA. This will allow GLP to meet the IMO Monitoring Requirements as outlined in the Market Rules Chapter 4 Appendix 4.16

Status:

Transformer Disconnect Switch 701

Metering:

MW and MVAR quantities for transformer T1

Phase to phase voltages on the 25kV

6.0 Customer Impact Assessment (CIA)

GLP is conducting a CIA and will forward any findings to the IMO on completion of the final report. A copy of the Initial Draft Report dated February 16, 2004 is being provided to the IMO as part of this application.

7.0 Station Schematic Diagrams

The following Station Schematic Diagrams are being provided to show the existing and proposed stations.

Figure 1 – Existing System Operating Diagram Andrews G.S.

Figure 2 – Proposed Single Line Diagram for the New Andrews T.S. and Gartshore G.S. (partial)

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Transmission Division
MP ID#105811**

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Figure 2 – Proposed Single Line Diagram for the New Andrews T.S.



AndrewsSLD.PDF

8.0 Tentative Schedule

The entire project will take approximately nine months to complete with the station construction and in service completed by late November 2004. Since detailed engineering has not been completed, staging of construction may change depending on engineering and operational considerations.

9.0 Preliminary Construction Outage Details

Once the new Andrews TS has been constructed it will be connected to Andrews 115kV line which will require an outage to Andrews 115kV line. When the new Andrews TS has been potential tested and phasing checked, the existing 25kV feeder can be transferred to the new station and energized via the reclosers.

A preliminary construction schedule will be developed as part of the in service of the new station. The new station will be located to minimize the outages to the existing feeder and to the existing Andrews GS when it is constructed.