



# **CONNECTION ASSESSMENT & APPROVAL PROCESS**

## **Connection Assessment Report for Installation of New Step-up Transformer at Decew Falls GS**

Connection Applicant: Ontario Power Generation Inc.

**CAA ID 2002-EX031**

Final Report

Prepared by  
Long Term Forecasts & Assessments Department &  
Consistent Information Set Department

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## 1.0 Project Description

Ontario Power Generation Inc. has submitted a connection assessment application for the replacement of the 2.35 kV/44 kV T4 step up transformer and the 44 kV/115 kV 23T3 transformer at Decew Falls #1 GS with a single unit.

The new transformer unit specifications are:

- Rating – 32 MVA
- Transformation – 2.35 kV to 115 kV
- Wye connected solidly grounded HV winding , delta connected LV winding,
- Positive Sequence Impedance of 9.4% on 32 MVA,
- Five off-load taps at 112.125, 115, 117.8, 120.75 and 123.62 kV

The proposal also includes:

- the replacement of the existing 44 kV circuit breaker 1D2D with a new SF6 115 kV breaker which will be installed in the same position,
- the replacement of the present 44 kV revenue metering CVTs with a new 115 kV rated CVTs near the new breaker,
- the installation of a new 115 kV disconnect on the 115 kV line near the revenue meter,
- the replacement of the existing 44 kV wood pole line D2D with a 500 meters 115 kV wood pole line,
- retaining the existing 115 kV disconnect switch 23T3-A.

OPG proposes to supply the ND1 (G9 to G5 yard) station service from the NF23 (G1 & G2 yard) station service via a cable and to carry out all the required modifications to the protection systems.

Single line diagrams of the existing and the new configurations are included in the attached figures 1 and 2.

## 2.0 Assessment

The IMO has assessed the effect of the proposed modifications on the reliability of IMO-controlled grid. This connection assessment did not require a formal connection assessment study.

### *Transformer*

The existing transformers T4 and 23T3 have impedances of 10.18% and 7.4% on a 25 MVA base, respectively. Their equivalent total impedance recalculated on 32 MVA base is 13.73%. By comparison the new transformer will have smaller impedance. This will result in a reduction in the reactive power losses over the new transformer as compared with the existing configuration.

The new transformer is adequately rated to allow maximum output from Decew Falls I GS.

### *Generating Units Performance*

The Decew Falls I (NDI) GS unit's output and performance will not be affected by the proposed equipment replacements. However, any exemptions that are materially affected by the new facilities should be reviewed.

For example waiver application # 011120 for exemption from Appendix 4.2 reference 2 of the *Market Rules*, was deemed not to be required because this particular *Market Rules* requirement is only applicable to non-embedded generation and NDI in its present configuration is connected to the distribution system. With the proposed modification, the NDI generators will be connected directly to the IMO-controlled grid. It is thus required that an exemption application be resubmitted to the IMO.

### *115 kV Breaker*

The applicant has indicated that the new 115 kV breaker interrupting medium will be SF6, but did not provide other technical specifications for the new 115 kV breaker.

The breaker is also required to meet the following specifications:

Maximum Continuous Operating Voltage	127 kV <sup>1</sup>
Rated interrupting current	50 kA symmetrical <sup>2</sup>
Insulation level	550 kV BIL (min)
Rated Interrupting Time	5 cycles (max) <sup>2</sup>

### *Revenue Meter Location*

OPG proposes to install the revenue meter on the high voltage side of the new 115 kV breaker. The new revenue meter and associated facilities must meet the requirements of the IMO facility registration process. If it is found that the distance from the revenue meter and the connection point to the IMO-controlled grid is considerable, OPG will be required, at the time of revenue meter registration, to provide calculation for Site Specific Loss Adjustment.

### *New 115 kV Line Section*

The existing 44 kV wood pole line between T4 and 23T3 transformers will be replaced with a 115 kV line installed on new 85 feet high wood structures. The line will be approximately 500 meters long.

OPG has indicated that their plan includes the installation of a new 115 kV disconnect and that the existing 115 kV disconnect 23T3-A (figure 2) will also be retained. One option to be considered by OPG is to use the existing 115 kV disconnect, provided that it is adequately rated,

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<sup>1</sup> The *Market Rules*, Appendix 4.2 reference 2 requires that generation facilities be capable of operating continuously within  $\pm 5\%$  of the generation facility's terminal voltage. Based on this requirement and assuming the step-up transformer is on the highest tap, it was calculated that the maximum continuous operating voltage could be about 130 kV ( $1.05 * 123.62$  kV).

<sup>2</sup> In accordance with the Transmission System Code performance standards for 115 kV breakers.

as the point of isolation from the IMO-controlled grid and avoid the need for the installation of a new disconnect.

OPG will not be entitled to congestion management payments if the output of NGI is restricted due to limitation associated with OPG owned equipment up to and including the disconnect switch 23T3-A.

### **3.0 Conclusions and IMO Requirements**

This assessment concluded that the proposed replacement of the 2.35 kV to 44 kV T4 step up transformer and the 44 kV to 115 kV 23T3 transformer at Decew Falls #1 GS with a single 2.35 kV to 115 kV unit is unlikely to have any adverse impact on the reliability of the IMO-controlled grid.

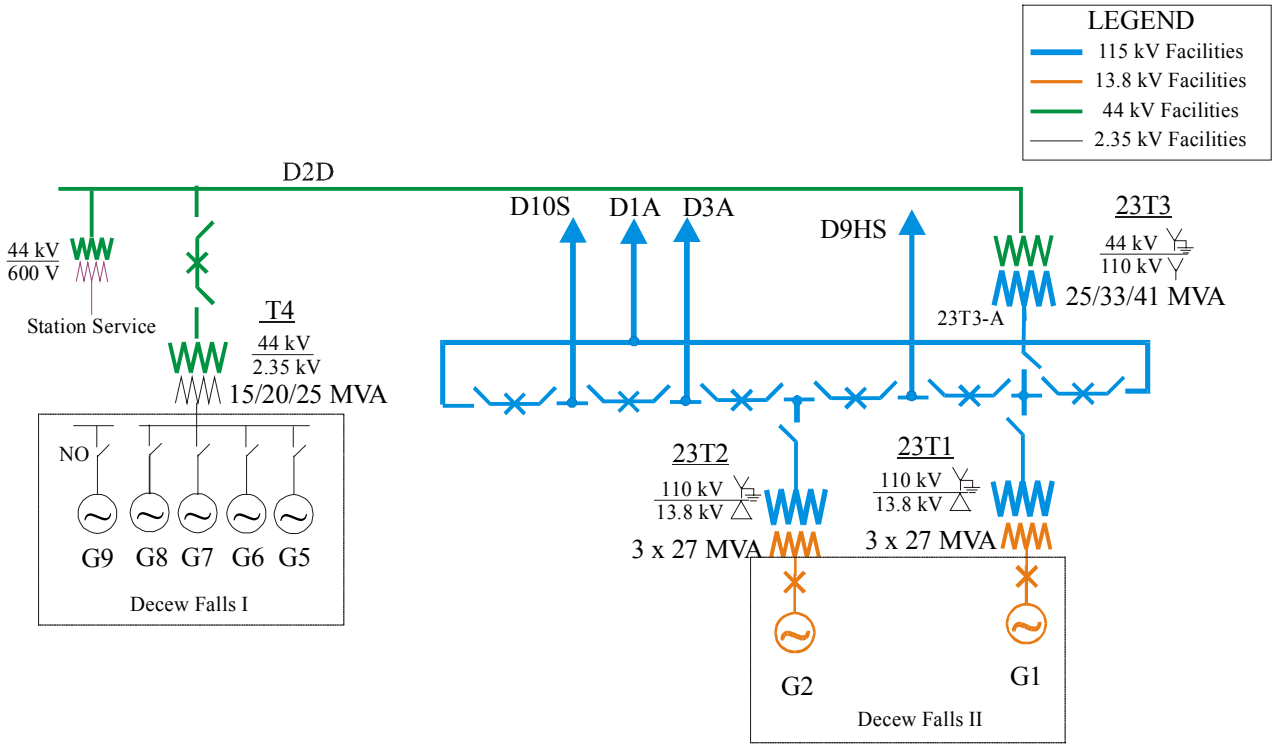
It is required that OPG ensure that:

- the new 115 kV breaker is appropriately rated and meet the specifications listed in section 2.,
- before coming into service, the new facilities complete the IMO Facility Registration process,
- an exemption application to Appendix 4.2 reference 2 of the *Market Rules* is submitted to the IMO,
- if applicable, provide the calculation for Site Specific Loss Adjustment.

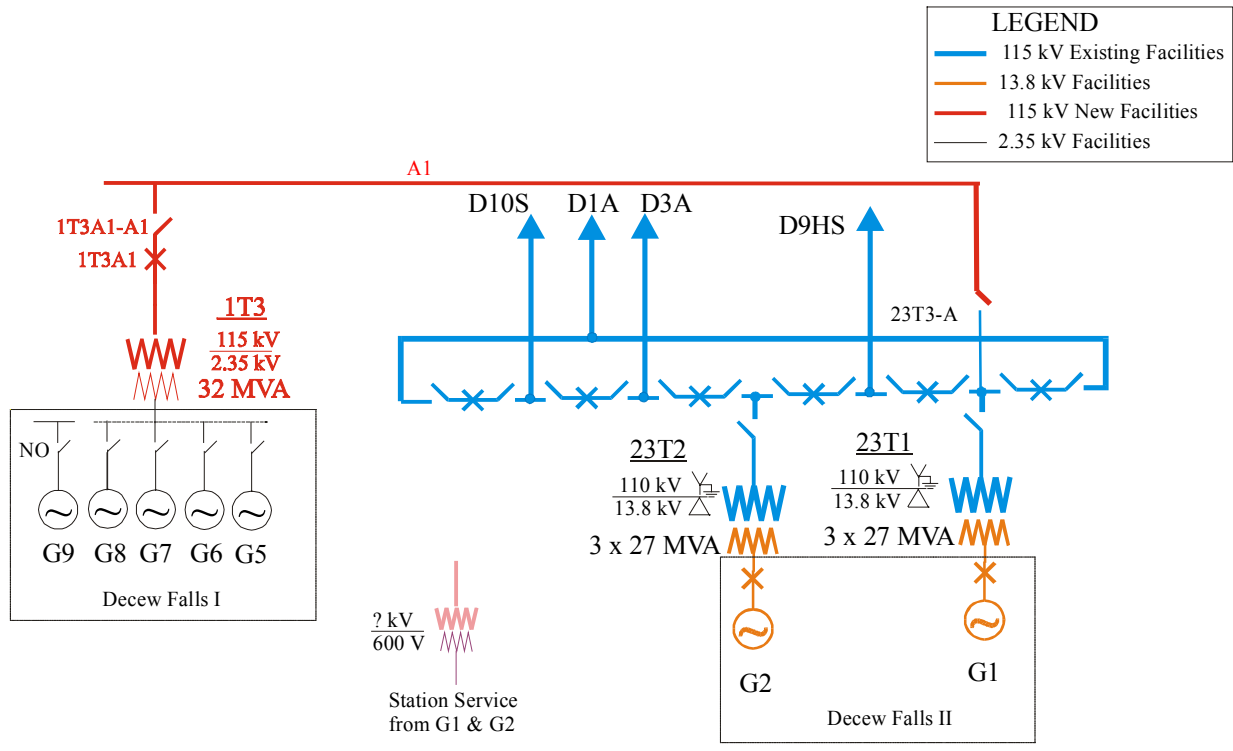
It is recommended that OPG consider to use the existing 115 kV disconnect (23T3-A), provided that it is adequately rated, as the point of isolation from the IMO-controlled grid and avoid the need for the installation of the new proposed disconnect.

### **4.0 Notification of Approval**

It is thus recommended that notification of approval be granted for the replacement of the 2.35 kV/44 kV T4 step up transformer and the 44 kV/115 kV 23T3 transformer at Decew Falls #1 GS with a single 2.35 kV/115 kV unit, subject the OPG meeting all the requirements listed in section 3.0.



**Figure 1. Existing Decew GS Configuration**



**Figure 2. Proposed Decew GS Modifications**