



# Out with the old, in with the new

**Location:**

Canada

**Segment:**

Hydroelectric

**Problem:**

Need to upgrade the electrical infrastructure of a 40-year-old system

**Solution:**

Upgrade the station protection to a state-of-the-art digital protection scheme

**Results:**

EESS performed a complete upgrade consisting of generator, bus, transformer and line protection. Project started January 2007 and was completed in December 2009.

**Background**

The Otter Rapids Generating Station is a 40-year-old, hydroelectric generating station with four 46 MVA generators.

The station is unique in that the two dual secondary generator step-up (GSU) transformers are both equipped with a high voltage tap-changer allowing the station to transmit power at either 115 or 230 kV.

**Challenges**

Low voltage bus ties add to the complexity of the station protection scheme.

The project was completed successfully and returned to service early following the second outage.

In line with the electrical infrastructure upgrade, Eaton Electrical Services & Systems was awarded a turnkey project to upgrade the station protection to a state-of-the-art digital protection scheme.

**Solution**

The scope of the project included:

- Protection system design, including updates to station one-line diagram
- New elementary and connection wiring diagrams
- Procurement and fabrication of the new relay panels
- Installation and commissioning

**Results**

Installation was performed in two separate outages, requiring that half of the station remain in operation during the changeout.

The Otter Rapids digital protection upgrade comprised the following protection elements:

- Generator A and B multi-function relays (MFRs)
- Generator split-phase differential protection
- Separate field ground detection

- 13.8 kV bus A and B MFRs
- Transformer A and B MFRs
- 230 kV line protection A and B MFRs
- Station service overcurrent protection
- Auxiliary relays and breaker tripping modules
- Communications interface for communication of relay data and alarms to the station SCADA system

Project highlights:

- Turnkey project
- Generator protection
- Bus protection
- Transformer and line protection



*Powering Business Worldwide*



Existing station prior to electrical upgrades



Station following completion of electrical upgrades



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