



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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