

1    Q.    **System Protection**

2            The response to PUB-NLH-100 indicates that Hydro expended \$264,295 in 2009 and  
3            \$172,173 in 2010 for relay replacements, with no expenditures for 2011, 2012, and  
4            2013. Describe the relay replacement projects for 2009 and 2010 and explain why  
5            no relay replacement work was conducted in 2011 to 2013.

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8    A.    In 2009, Hydro expended \$264,295 to upgrade the transmission line protection on  
9            the Great Northern Peninsula (GNP). The transmission line protection for the GNP  
10           was reviewed in 2007 due to concern about the number of outages that had  
11           occurred in previous years. The report recommended replacement of older relays  
12           with modern microprocessor based models to give more dependable operation and  
13           improved fault coordination. This involved replacing distance and overcurrent  
14           relays at the following terminal stations:

- 15           • Berry Hill;
  - 16               ○ TL259 Berry Hill to Peter's Barren (distance and overcurrent).
  - 17               ○ TL227 Berry Hill to Daniel's Harbour (overcurrent only).
- 18           • Peter's Barren;
  - 19               ○ TL241 Peter's Barren to Plum Point (distance and overcurrent).
  - 20               ○ TL221 Peter's Barren to Hawke's Bay (overcurrent only).
  - 21               ○ TL262 Peter's Barren to Daniel's Harbour (overcurrent only).
- 22           • Plum Point;
  - 23               ○ TL241 Plum Point to Peter's Barren (distance and overcurrent).
  - 24               ○ TL244 Plum Point to Bear Cove (overcurrent only).
- 25           • Bear Cove; and
  - 26               ○ TL256 Bear Cove to St. Anthony Airport (distance and overcurrent).
- 27           • Roddickton Woodchip.

- TL257 Roddickton Woodchip to Main Brook (distance and overcurrent).

In 2010, Hydro expended \$172,173.37 to replace the protection and reclosing relay on transmission line TL208 at the Western Avalon Terminal Station. The TL208 relays at Western Avalon had to be replaced to match the relays installed at Voisey's Bay Nickel Terminal Station as the protection scheme being used was current differential and the existing relays at Western Avalon were not suitable for this scheme. The reclosing relay was replaced with a microprocessor controller as used in other stations. This provided updated line protection and reclosing control on TL208. TL208 runs from Western Avalon to the Voisey's Bay Nickel Terminal Station. The existing protection at Western Avalon was electromechanical distance relays and overcurrent relays. A current differential relay using communications to compare both ends of the line was used as Primary Protection 1 and a microprocessor based distance relay was used as Primary Protection 2 at the Voisey's Bay Nickel Terminal Station. A matching current differential relay was installed at Western Avalon as Primary Protection 1 and the distance and overcurrent relays were replaced with a microprocessor based distance relay as Primary Protection 2 matching the relay used at Voisey's Bay Nickel Terminal Station.

In addition, a new microprocessor based reclosing controller was installed to replace the existing reclosing relay on TL208 at Western Avalon Terminal Station.

In 2010, Henville Consulting was contracted to review the protection on five 230 kV transmission lines east of Bay D'Espoir. The review was done because of concerns with the performance of the relaying on the lines during fault disturbances. As an example, in December 2007 there was a suspected misoperation of the Primary

Protection 1 (Areva Optimho relay) on TL237 for a fault on TL203 although this was not proven. The review was to check the performance of the line relaying and to make recommendations for improvement. In addition, the review would determine if the Optimho relays should be replaced. These lines are:

- TL202 Bay D’Espoir to Sunnyside;
- TL206 Bay D’Espoir to Sunnyside;
- TL203 Sunnyside to Western Avalon;
- TL207 Sunnyside to Come by Chance; and
- TL237 Come by Chance to Western Avalon.

In 2011, Henville Consulting was contracted to review the protection on the remaining five 230 kV transmission lines east of Bay D’Espoir. These lines are:

- TL201 Western Avalon to Hardwoods;
- TL217 Western Avalon to Holyrood;
- TL218 Holyrood to Oxen Pond;
- TL242 Holyrood to Hardwoods; and
- TL236 Hardwoods to Oxen Pond.

These reports had a number of recommendations including the replacement of the existing Areva Optimho LZFP111 distance relay as Primary Protection 1 with a modern microprocessor relay. Primary Protection 2 is provided by a Schweitzer Engineering Laboratories SEL-321 distance relay that will not need to be replaced. A capital budget proposal was prepared in 2012 for the 2013 capital program submission to replace the Optimho relay on TL242 at Holyrood and Hardwoods Terminal Stations. This proposal was approved for execution in 2013. The Optimho relays were recommended to be replaced in the report done by Henville Consulting Inc. due to age and limitations on event recording and setting flexibility. However,

1 with the construction of the Soldiers Pond Terminal Station for the Lower Churchill  
2 Project, transmission lines TL201, TL217 and TL242 will be terminated there and the  
3 sections leaving the terminal station will be renamed. This results in six lines where  
4 originally there were three. The consultant for the Soldiers Pond Terminal Station  
5 specified a current differential protection scheme for Primary Protection 1 with  
6 distance relaying for Primary Protection 2. Once the consultant for the Soldiers  
7 Pond Terminal Station chooses the distance relay to be used for Primary Protection 2  
8 Hydro will use this relay as the replacement relay for the Areva Optimho type.  
9 Therefore, it was decided to cancel the capital project to replace Primary Protection  
10 1 (Optimho relay) on TL242.