Q. **Reference: Construct Second Distribution Feeder Nain, Volume II, Tab 25, Page 29**

"Although a voltage regulator is a technically viable alternative to eliminate the low voltage issue in Nain, it would not be a practical option. In the event of a regulator failure, the necessary heavy equipment to perform a voltage regulator replacement is not available in Nain. As well, access by sea may not be available for up to nine months depending on ice conditions. As a result, this alternative was not considered and was screened out prior to the economic analysis."

What is Hydro's best estimate of (i) the cost of installation of the necessary voltage regulators in Nain, (ii) the cost of provision of a spare regulator stationed in Nain and (iii) the cost of the necessary heavy equipment to replace a voltage regulator?

A. (i) The cost to purchase and install the necessary voltage regulator arrangement in Nain is estimated to be approximately $744,500, including interest, escalation and contingency.

(ii) The cost of a provision for a spare regulator stationed in Nain is estimated to be approximately $71,100.

(iii) The cost for the necessary heavy equipment to lift a 5,200 lb voltage regulator is approximately estimated to be $200,000 (plus shipping). It should be noted that the appropriate equipment can be rented in Nain at $1,200 per day. However, this equipment is not guaranteed to be in Nain for the expected life of the regulators. Hydro requires a guaranteed method of replacing a regulator. In the event that this lifting equipment is not available it must be shipped in from Happy Valley-Goose Bay. This may not be possible during the winter season when there is no boat

access into Nain due to sea ice build-up. The time frame of this inaccessibility into Nain could last up to nine months.

The estimated total capital cost of installing a bank of voltage regulators in Nain, including a spare and the equipment to replace a voltage regulator, is estimated to be $1,015,600 which is marginally less than constructing a second feeder ($1,050,300). However, the lifecycle costs associated with voltage regulators would be higher than for a second feeder due to power losses[1]. Power losses associated with regulators can be significant, especially for a system whose generating source is a diesel plant. Hydro anticipates that the cost in losses would be approximately $15,000/year[2] for a three phase bank of 400A voltage regulators in Nain.

The construction of a second feeder would not only support future load growth but would provide improved reliability to the Nain system. With a unit out of service following an outage in Nain during peak conditions, the diesel plant may be incapable of re-energizing the entire system all at once. Although this is a rare occurrence, currently the only way to mitigate this problem and accommodate cold load pick-up is to sectionalize the distribution system. This can be challenging and costly because a line-crew is required. It should also be noted that Hydro does not have a line-crew stationed in Nain and therefore one must be transported from one of Hydro's other locations. This can be time consuming and therefore can prolong a system outage. Although each diesel plant has a DSR or diesel plant operator, they are not trained to perform line work.

A second feeder would allow a DSR to sectionalize the system directly from the diesel plant and avoid any switching on the distribution system. The DSR and the

[1] Load and no-load losses
[2] Assuming an plant efficiency of 3.60 kWh/L and a fuel cost of $1.107/L

diesel units would have the capability of restoring one feeder at a time in the event of an outage. This would lessen the strain on the diesel units when picking up the load after an extended outage and avoid the need for a line crew. This would avoid the situation that occurred during December 2012, when, with a unit out of service, Hydro couldn't reenergize the town distribution system without first bringing in a line crew from Happy Valley to perform switching on the distribution system.

A second feeder would also improve flexibility as it pertains to performing maintenance. It would reduce the need for planned outages to perform corrective and preventative maintenance. With a two feeder system, sections of the distribution system could be easily isolated with minimal power interruptions to the customers.