Q. (Reference Application, 3.1 2024 Transmission Line Rebuild, page 8) It is stated "*An outage to Transmission Line 146L results in two sections of the Central Newfoundland 138 kV transmission system becoming radial. Following an outage, all substations in the Eastern half of the system from Port Blandford to Wesleyville would be radially supplied from the series of transmission lines originating from SUN Substation. When radially supplied, any single failure on one of these transmission lines could result in outages to between 4,900 and 8,700 customers downstream of the affected line. Similarly, on the Western portion of the system, Gander Substation would be radially supplied by Transmission Line 144L from Cobbs Pond Substation, increasing the risk of an outage to approximately 1,700 customers*."

a) Is this a positive outcome given that supply to all customers would be maintained following the loss of transmission line 146L?

b) What reliability criteria are used by NP to design its transmission system?

c) What criteria are used by NP to design its distribution system?

d) Would loss of any transmission line on NP's system result in a similar reliability risk exposure described in the above statement?

e) Does the above statement suggest that NP should plan its transmission system to meet an n-2 or n-3 criterion? What cost impact would result, and have customers indicated a willingness to pay for increased levels of reliability?

f) What criteria do most utilities in North America use when planning their transmission systems? What criteria do most utilities in North America use when planning their sub-transmission systems? What planning criteria for transmission systems and sub-transmission systems are recommended by NERC?

A. a) The ability for the Central Newfoundland 138 kV looped transmission network to be able to withstand a single contingency event without customer outages is considered a basic characteristic of looped transmission systems. However, the resulting split of the network into two radial systems following the loss of Transmission Line 146L is considered an emergency event and should be minimized to avoid further risk to customers.

b) Newfoundland Power does not design transmission systems to any specific reliability criteria, as the Company operates a variety of looped and radial transmission systems with differing levels of redundancy. The presence of both looped and radial systems is largely a result of the original interconnection of the Newfoundland electricity system, and is driven by the geographical proximity of infeed supply points to the bulk power system. During the evaluation of potential transmission line upgrades, condition and risk assessments are conducted to inform potential reliability impacts. Typically, if evaluated alternatives have similar costs, the more reliable option will be pursued. Fundamentally, the Company aims to either maintain or improve upon its transmission reliability through capital projects, when it is economically justified to do so.

c) The reliability criteria used by Newfoundland Power to design and operate its distribution system is outlined in the Company's *Distribution Planning Guidelines*, as provided in the response to Request for Information CA-NP-027.

d) Newfoundland Power operates numerous looped transmission networks as well as many radial transmission systems. The impact of losing any one transmission line on Newfoundland Power's transmission system would vary depending on the line.

Loss of one transmission line in a radial transmission system would result in a customer outage.

Loss of one transmission line in a single contingency looped transmission network similar to the Central Newfoundland 138 kV transmission system would likely not result in a customer outage. The result would be the loss of a looped transmission network and the creation of two radial transmission systems. In this scenario, there would be an increased likelihood of customer outages in the case of a second transmission line failure, or if planning violations such as undervoltage conditions or equipment overloads are created as a result of peak loading.[1] Such circumstances would require a forced customer outage.

Loss of one transmission line in a complex looped transmission network such as the St. John's 66 kV transmission system would likely not result in a customer outage. In this scenario, the possibility for customer outages is more likely in the case of a second transmission line failure or if planning violations are created as a result of peak loading that require a forced customer outage.

e) No, the above statement does not suggest that Newfoundland Power should design its transmission systems to N-2 or N-3 criteria. The above statement demonstrates the prudency of maintaining the established Central Newfoundland 138 kV looped transmission network.

Customers have not been surveyed on their willingness to pay for increased levels of reliability as a result of Newfoundland Power moving to an N-2 or N-3 criteria on its transmission system because Newfoundland Power has no plans to pursue this as an alternative.

f) Newfoundland Power does not track planning criteria of transmission or sub-transmission systems of other utilities, nor does the Company track NERC transmission criteria as it is not a member utility.

[1] See the response to Request for Information PUB-NP-044 for computer modelling results demonstrating voltage impacts resulting from the loss of Transmission Line 146L.