Q. Reference: "2020 Capital Budget Application," Newfoundland Power, July 5, 2019, Report 4.2 "Feeder Additions for Load Growth." secs. 2.1 and 2.3.

On page 1, Newfoundland Power states "An overloaded section of conductor on a distribution line is at risk of failure. Failures are caused by overheating of the conductor as the customer load exceeds the conductor's capacity ratings."

On page 3, footnote 4, Newfoundland Power states "Newfoundland Power's planning criteria for maximum current on a single-phase distribution line is 85 amps."

Please provide details of Newfoundland Power's distribution planning criteria for maximum current on single-phase, two-phase, and three-phase lines and how the criteria were developed. How long has the 85 amp criteria been in effect for single-phase lines?

A. Newfoundland Power's distribution planning criteria, including the 85 amp criteria, is longstanding and aligns with the *Distribution Planner's Manual* published by the Canadian Electricity Association ("CEA").[1]

The planning criteria for maximum current on a conductor under normal operating conditions is generally related to thermal loading and the adequacy of protection. The lower of these 2 constraints is used to set the maximum current.

The planning criteria for maximum current on single-phase and 2-phase distribution lines is established to ensure safe and reliable operation of feeder protection devices. The 85 amp limit assists Newfoundland Power in maintaining a balanced 3-phase system, which is necessary to detect line to ground faults. This, in turn, ensures adequate protection of the public, employees and electrical equipment in the event of a fault.[2]

The planning criteria for maximum current on 3-phase lines is established based on the thermal loading constraints on the distribution conductor. The thermal loading constraints of a conductor relate to the potential failure of conductor caused by overheating resulting from excessive current flow. The planning ampacity is derived as a function of winter loading on the line, cold load pick-up and the sectionalizing capability of the line.

Newfoundland Power's planning criteria was reviewed by the Board's consultant, The Liberty Consulting Group ("Liberty"), in 2014.[3]

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1 For example, the 2008 version of Newfoundland Power's *Feeder Protection Overcurrent Setting Guidelines* included the 85 amp criteria for limiting current on distribution feeder taps.

2 Line to ground faults can be difficult to detect as a consequence of low short circuit fault currents. To provide adequate protection a utility must set its line to ground protection setting as low as reasonably possible.

3 Regarding Newfoundland Power's distribution and transmission planning, Liberty stated: *"Newfoundland Power employs appropriate criteria and standards"* (see the *Report on Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power*, December 17, 2014, page 23).