

1 **Reference: 1.2 Feeder Additions for Load Growth**
2

3 **Q. Newfoundland Power states that three feeder additions identified for**
4 **upgrades in 2024 have loads ranging from 125 to 180 amps on single-phase**
5 **sections of feeders as compared to its planning criteria maximum current of**
6 **85 amps on a single-phase distribution line.**

7 **a) Please explain how these current levels were able to increase to a point**
8 **whereby they exceeded Newfoundland Power's planning criteria by 47%**
9 **to 112%.**

10 **b) Have there been any outages caused by these elevated amperages?**

11 **c) Has Newfoundland Power considered revising its planning criteria of a**
12 **maximum 85 amps on a single-phase distribution line?**

13 **d) Are there other instances of feeder overloading currently occurring on**
14 **Newfoundland Power's system? If yes, list the feeders, the feeder**
15 **amperage and any outages they have caused.**

16
17 A. a) Newfoundland Power's planning criteria limit of 85 amps for single-phase sections
18 of feeders aims to minimize potential unbalanced load conditions on the
19 three-phase trunk in the event of a fault on the single-phase section. It should be
20 emphasized that the existing conductor ampacities for the single-phase sections of
21 feeders referenced in the Application have nominal winter ampacities at or
22 exceeding 203 amps.¹

23
24 The Company forecasts load at the substation transformer and distribution feeder
25 levels annually. Loading on individual single-phase sections of distribution line are
26 examined on a case-by-case basis when warranted by operational concerns, such
27 as protection device trips or inquiries regarding new developments.

28
29 The Company also uses computer modeling software to simulate load flows during
30 various load conditions. In the case of distribution feeders, total feeder load is
31 allocated across the feeder to approximate load at each distribution transformer
32 downstream from the substation, based on their individual capacities. As the
33 Company does not currently utilize Advanced Metering Infrastructure, loading on
34 individual sections of distribution line can only be approximated by the modeling
35 software, and must be verified in the field when warranted as per the operational
36 concerns listed above.

37
38 In the case of distribution feeders BVS-04, OXP-01 and PUL-02, verification of the
39 loading on the single-phase sections referenced in the Application were prompted
40 by load flow results from computer modeling software as well as observed increases
41 in property developments in the areas. The overload conditions were subsequently
42 verified, and the project has been brought forward to correct the overload
43 conditions.

¹ See Newfoundland Power's 2024 Capital Budget Application, report 1.2 Feeder Additions for Load Growth, Appendix A.

1 b) Newfoundland Power has no record of any outages on the overloaded single-
2 phase sections of BVS-04, OXP-01 and PUL-02 feeders caused by elevated
3 amperages. Following the identification of potential overloads due to the
4 operating conditions described in part a), single-phase sections are re-fused with
5 larger fuses to temporarily avoid customer outages until a more permanent
6 solution can be determined. Temporarily re-fusing single-phase sections of
7 distribution feeders with fuse ratings exceeding 85 amps should be minimized as
8 to avoid potential unbalancing of the three-phase trunk following a trip of the
9 single-phase section.

10
11 c) Newfoundland Power has not considered revising its planning criteria of a
12 maximum 85 amps on a single-phase distribution line. Newfoundland Power's
13 distribution planning criteria, including the 85 amp criteria, is longstanding and
14 aligns with the Distribution Planner's Manual published by the Electricity Canada.²

15
16 The planning criteria for maximum current on a conductor under normal
17 operating conditions is generally related to thermal loading and the adequacy of
18 protection. The lower of these two constraints is used to set the maximum
19 current.

20
21 The planning criteria for maximum current on single-phase and two-phase
22 distribution lines is established to ensure safe and reliable operation of feeder
23 protection devices. The 85 amp limit assists Newfoundland Power in maintaining
24 a balanced three-phase system, which is necessary to detect line to ground
25 faults. This, in turn, ensures adequate protection of the public, employees and
26 electrical equipment in the event of a fault.³

27
28 d) Three additional single-phase sections of distribution feeders on Newfoundland
29 Power's system with estimated loads exceeding the 85 amps limit are included
30 in Table 1. These single-phase sections have been identified using computer
31 modeling software. Field verification of the identified loads is ongoing and
32 should it be determined that an overload condition is indeed present on these or
33 other feeders, capital projects may be brought forward in a future application.
34 If required, these feeders would also be temporarily re-fused with larger fuses
35 to avoid customer outages. These feeders and estimated peak load are
36 provided in Table 1.

² 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.

³ Single-phase 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 ground protection setting as low as reasonably possible.

Table 1 Single-phase Feeder Sections with Estimated Peak Loads Exceeding 85 Amps	
Feeder Section	Estimated Peak Load [Ampere]
GOU-03-F14	108
SPF-01-F46	103
DLK-03-F97	144

1 Newfoundland Power has no record of any outages resulting from overloads to the
2 single-phase sections listed in Table 1.