

- 1 **Q. In relation to Newfoundland Power’s reply to CA-NP-016 please advise as to**
2 **whether there are any policies or procedures within Newfoundland Power regarding**
3 **the use and application of critical customer lists.**
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- 5 A. Newfoundland Power’s *System Restoration Plan SRP-001: Rotating Power Outages*
6 refers to high priority customers. *Critical customers* are synonymous with *high priority*
7 *customers* in Company operations.
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- 9 Attachment A is a copy of Newfoundland Power’s *System Restoration Plan SRP-001:*
10 *Rotating Power Outages.*
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- 12 Critical customers are also referred to in Newfoundland Power’s *System Restoration*
13 *Manual*. A copy of the Company’s *System Restoration Manual* is Attachment A to the
14 response to Request for Information PUB-NP-187.

**Newfoundland Power's System Restoration Plan
SRP-001: Rotating Power Outages**



System Restoration Plan

SRP-001

Rotating Power Outage

June 13, 2014

Created by: R. Cahill

1.0 Purpose

The purpose of this guideline is to outline the general requirements and process to be followed when completing rotating power outages as a result of a forecasted generation shortfall on the Island Interconnected System.

2.0 Scope

This procedure applies to System Control Center (SCC) supervisors and operators involved with the coordination and implementation of the rotating power outages. This guideline is intended for experienced SCC and operations staff with detailed knowledge of Newfoundland Power's distribution system.

3.0 General

When Newfoundland and Labrador Hydro (Hydro) foresees a possible generation shortfall on the Island Interconnected System, Hydro will advise Newfoundland Power of the amount and duration of the forecast shortfall and indicate the expected start time for specific quantity of load to be shed in a specific area of the province. Hydro's planned response to a possible generation shortfall is outlined in Hydro's System Operating Instruction, T-001. As per this operating instruction, Newfoundland Power will run all its available generation, implement the voltage reduction protocol and issue a request to curtailable service option customers to curtail as requested by Hydro. This initial response will decrease the forecast generation shortfall to limit the number of customer impacted by rotating power outages. Rotating power outages typically involves multiple distribution feeders. The number of feeders involved and customers affected will depend on the size of the forecast generation shortfall.

The approach to rotating power outages adopted by Newfoundland Power is intended to maximize the use of available supply and minimize the duration of aggregate customer outages. This approach will also limit the duration of individual feeder outages times to less than one hour and minimize the impact of cold load pickup upon restoration of the feeder.

It is unlikely Hydro will be able to provide Newfoundland Power with the required timely information in order for Newfoundland Power to provide its customers with specific advance notice of the precise timing and location of rotating power outages due to the dynamic nature of the rotating outage process.



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To provide such advance notice would require more customers to be without power than otherwise would be the case.

Newfoundland Power will however provide general information to customers that rotating outages are imminent, the general geographic location of the rotating outages and the general area where initial rotating outages will commence. Newfoundland Power will also communicate its target individual customer outages to be no more than 1 hour.

4.0 Preparing for Rotating Power Outages

Newfoundland Power maintains a list of distribution feeders for rotating power outages. This list includes information for each distribution feeder such as peak load, priority customers served, and whether the feeder has remote control capability.

The feeder rotation list is maintained as an electronic spreadsheet that has pre-established filters for operating region, priority, and load. The spreadsheet also contains sequential numbering for each feeder within a substation that allows for random sorting of the feeders to aid in the selection process for rotating outages.

Prior to December 1st of each year the Superintendent of Operations for each operating area will ensure that the feeder rotation list is updated with the most current information. The individual feeder rotation lists for each operating area will be located on a rotating power outage SharePoint site under the SCC departmental page on Webster. The Superintendent of SCC will ensure that the individual lists from each area get compiled into the corporate feeder rotation list.

Prior to implementing rotating power outages, the distribution feeder list shall be reviewed for accuracy by the Superintendent of SCC and prioritized to minimize impact of feeder rotation to priority customers. High priority customers include, but are not limited to, hospitals, fire and police stations, acute care facilities, long term care facilities, community warming centers, fuel storage and offloading, water treatment/pumping stations and other critical municipal infrastructure.

Depending on the location and size of the generation shortfall, field staff may be dispatched to pre-selected non-automated substations to manually complete the rotating power outages. Since the majority of Newfoundland Power's urban, most loaded feeders, have remote control capability the dispatch of field resources will be limited. The exact number and location of field staff dispatched will be determined prior to starting the rotating power outage and may change throughout the period of rotating outages.



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The list of distribution feeders considered for rotation will be adjusted depending upon operating experience and consultation with customers and other stakeholders.

To prepare for rotating power outages, the Company's communications hub is activated as well as customer service, engineering, operations and System Control Centre staff are mobilized. The aim of the mobilization exercise is to ensure appropriate customer communication and maximize the use of available generation to minimize the number of customers impacted at any given time.

5.0 Technical Considerations

System Frequency and Voltage

The determination of the sequence and timing of when distribution feeders are rotated off and on the electrical system is guided by real time monitoring of system frequency and voltage levels. The nominal system frequency of 60Hz for the Island Interconnected System provides an indication of the balance of electrical demand and supply on a system wide basis and should be maintained above 59.8Hz as per Hydro's System Operating Instruction, T-001. Voltage levels measured at delivery points provide an indication of the balance of electrical demand and supply on a local geographical basis and should be maintained above 0.97 pu. During rotating power outages system frequency and voltage levels must be continuously monitored to prevent the automatic activation of the under frequency and under voltage load shedding schemes or risk system instability and collapse. Together, system frequency and voltage levels provide an indication of how many and which distribution feeders can be rotated off and on the electrical system at any point in time. The targeted minimum and maximum system frequency and voltage levels to be maintained during the rotating power outages shall be determined after consultation between Newfoundland Power and NL Hydro system control operators.

Through the monitoring of system frequency and voltage levels additional small blocks of load are rotated on and off as required to limit the duration of outages and maximize the use of available generation. This dynamic process is responsive to both the available generation and the load dynamics of the customers who remain on the system.

Routine changes in demand by some customers receiving service can delay the reinstatement of service to customers who have no service. The longer a distribution feeder is disconnected the greater the impact of cold load pickup which can delay reinstatement of the feeder.

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Cold Load

The presence of cold load pickup during the power rotation process will cause an increased risk of overloading distribution feeders or sections of feeders. The increased demand associated with cold load pickup can be as much as double the demand at time of disconnection. This additional demand increases the risk that fuses protecting distribution equipment will operate to protect the equipment. Once this occurs, Newfoundland Power is typically required to dispatch a line crew to re-fuse the equipment. This will extend the duration of customer outages and should be avoided if at all possible.

In some circumstances the impact of cold load pickup may require adjustments to be made to substation equipment by engineers and technologists in addition to linecrews. This may involve adjusting relay settings to avoid protection trips due to feeder unbalance or phase over current. This would tend to extend the duration of customer outages even further.

6.0 Rotating Power Outage Process

The process for rotating power outages will include the following steps:

1. Sort feeder rotation list spreadsheet by region, priority and load.
2. Start feeder rotations once notification given from Hydro on quantity and location of the forecasted generation shortfall.
3. Maintain continuous communication with customer service and corporate communications staff on the status of feeders affected.
4. Record the load (MW) and time on each distribution feeder immediately prior to initiating a rotating outage.
5. Use the load information and outage time recorded to estimate the load impact which may occur upon restoration of power to that feeder including the effect of cold load pick-up.
6. Continuously monitor rotating power outage log to ensure the targeted 1 hour maximum outage time is maintained.
7. Monitor system frequency at the three measured locations and voltage levels at Newfoundland Power's supply points.