ATLANTIC ELECTRIC

FERC Form 715 (Part 4) - Transmission Planning Study Guidelines

Transmission Reliability Guidelines

1. General Overview

The reliability guidelines used to plan the transmission system of Atlantic Electric are the criteria by which the ability of the transmission system to serve the future load is determined. In addition to load growth, any significant changes to the generation capacity on Atlantic Electric's or neighboring utility systems must also be included in any evaluation.

2. Transmission Criteria

The Atlantic Electric service territory is governed by the reliability standards established by the North American Electric Reliability Council (NERC), Reliability*First* Corporation (RFC), PJM Interconnections, LLC (PJM), and the legacy Mid-Atlantic Area Council (MAAC) organizations. The exact planning requirements of these regulated institutions can be found on their websites and external publications. Atlantic Electric will adhere to any requirements directed by these agencies in order to meet their established reliability planning criteria.

In addition to these external organizations, Atlantic Electric also has its own internal planning criteria which will meet or exceed the strict standards above. The following criteria will be used for all transmission facilities (69kV and above) within the Atlantic Electric zone:

Thermal Requirements

- For normal system conditions with no line, transformer, or generation unit out of service all transmission facilities should not exceed their normal (continuous) rating.

- For a contingency loss of any one facility (line, transformer, or generator), the system should not exceed its emergency (4 hour) rating.

- For a contingency loss of any one facility (line, transformer, or generator) and the discrete outage of one generator, the system should not exceed its emergency (4 hour) rating.

Reactive Requirements

For all the conditions listed under the thermal requirements, voltages should be within the ranges shown in the following chart:

AE Zone Base Line Voltage Limits				
Limit	**500 kV**	**230 kV**	**138 kV**	**69 kV**
High	-	242 **1.05**	145 **1.05**	72.5 **1.05**
Normal Low	-	219 **0.95**	131 **0.95**	65.5 **0.95**
Emergency Low	-	212 **0.92**	130 **0.94**	65 **0.94**
Load Dump	-	207 **0.90**	124 **0.90**	62 **0.90**

Note:
These values may be different than the PJM base line voltage limits listed in Section 3, Exhibit 5 of the the PJM Transmission Operations Manual M03. These differences are recognized by PJM and provide more conservative operational limits for the AE and DPL transmission zones.

Stability Requirements

Dynamic Stability analysis is applied when we are studying either transient or voltage stability cases. It addresses the transmission system dynamic behavior for certain disturbances and determines if adjustments or enhancements are needed for reliable system operation.

For Transient Stability analysis, we study the system at light load. Transient stability refers to a situation where following a disturbance (e.g., single-line to ground or three-phase fault), electromechanical oscillations occur between generators. These oscillations may cause generators to become unstable and trip offline at some point after the disturbance. The time frame of this instability will be in the order of 0 to 10 seconds which will capture only generator inertial and excitation dynamics. We will apply the rotor angle maximum swing criteria (<100 degrees) and use bus voltage & frequency deviations.

For Voltage Stability analysis, we study the system at peak load. Voltage stability accounts for the longer-term effects, which are generally times greater than 30 seconds. This type of analysis will involve the loss of more controls and equipment reaching their limits, which will eventually lead to a progressive voltage decrease followed by collapse. This includes the effects of prime mover control, LTC, and excitation limiters.

Atlantic Electric, at a minimum, applies the same criteria set forth by PJM and MAAC regarding stability analysis. We use the same power flow cases and supporting files. We evaluate three-phase (3PH) faults, single-line-to-ground (SLG) faults, and single-line-to-ground (SLG) faults with stuck breaker. We also follow their same criteria for load modeling (100% constant current for real power and 100% constant impedance for reactive power).