ATLANTIC CITY 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 City 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 City Electric service territory is governed by the reliability standards established by the North American Electric Reliability Corporation (NERC), Reliability*First* (RF), 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 City 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 City 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 City Electric zone:

Thermal Requirements (Based on a 50/50 Load Forecast)

- 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, connected to the system should not exceed its emergency (4 hour) rating.

Notes: Capacity resources in AE are studied at their Pmax. Once each generator outage is taken, no other dispatch changes are made.

Thermal Requirements (Load Deliverability Based on a 90/10 Load Forecast)

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

Reactive Requirements (Applied to all Internal Criteria)

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	550 **1.10**	242 **1.05**	145 **1.05**	72.5 **1.05**
Normal Low	500 **1.00**	219 **0.95**	131 **0.95**	65.5 **0.95**
Emergency Low	485 **0.97**	212 **0.92**	130 **0.94**	65 **0.94**
Load Dump	475 **0.95**	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 3 of the PJM Transmission Operations Manual M03. These differences are recognized by PJM and provide more conservative operational limits for the AE transmission zones.

3. Stability Requirements

Atlantic City Electric's Transmission Planning team conducts stability studies to ensure the system can withstand NERC criteria disturbances and maintain stable operation throughout its territories. This analysis is to ensure nearby changes to the system configuration do not adversely impact the stability of the system.

Studied Contingencies

The stability of the system shall be maintained without loss of load during and after the following types of contingencies occurring at the most critical locations at all load levels:

- A three-phase fault with normal clearing time.
- A single-phase-to-ground fault with stuck breaker or other cause for delayed clearing.
- The loss of any single facility with no fault.

Generation Dispatch

As outlined in PJM Manual 14B, it is generally accepted that units operating at their highest possible power output and generating as little reactive power as necessary to maintain voltages are likely to be less stable. Under most circumstances, the units in the vicinity of a project under study will be turned to their maximum real power output with unity power factor at the high side of the GSU, or units' VAR output will be adjusted to hold scheduled voltages. Generators should be evaluated utilizing a 50/50 forecast under normal conditions or for single contingencies.

Studied Plant Selection

Atlantic City Electric should evaluate system stability for areas where generators are connected to the BES system. Stability evaluation for generators not connected to a BES system should be determined on a case-by-case basis depending on impact and may be less stringent.

Monitoring Requirement

- Rotor angle, real power output, speed and terminal voltage are monitored.
- Bus voltage in the area of study is monitored.
- Following the disturbance, the voltages of the monitored buses maintain voltages within +/- 5% of the pre-contingency voltages.

Evaluation Frequency

Atlantic City Electric shall conduct stability analysis every five years, or as needed when there have been significant changes to the transmission system and/or generation profile.

4. Tests by Simulation for the Ability of the Atlantic City Electric System to Withstand Abnormal Disturbances

It is recognized that it is impossible to anticipate or test for all of the contingencies that can occur on the present or future Atlantic City Electric system. The system, therefore, will be tested by simulation to determine the effect of various types of abnormal disturbances on system performance. These sensitivity tests serve primarily as a means to measure the ability of the system to withstand less probable contingencies, some of which may not be readily apparent. These tests are prescribed not on the basis of a high level of probability, but rather as a practical means to study the system for its ability to withstand disturbances beyond those which can reasonably be expected.

Recognition should be given to the occurrence of similar contingencies in neighboring systems and their effect on the Atlantic City Electric system.

Examples of less probable contingencies to be studied are:

A. The sudden loss of the entire generating capability of any station for any reason.

B. The outage of the most critical transmission line on any one of the interconnected systems as the result of a three-phase fault immediately following (i.e., before adjustment) the tripping of another critical line on the same or an adjacent system.

C. A single-phase-to-ground fault coupled with the malfunction of a protective device.

D. The sudden loss of all lines of one voltage emanating from a substation.

E. The sudden loss of all lines on a single right-of-way.

F. The sudden dropping of a large load or a major load center.

G. The occurrence of a multi-phase fault with delayed clearing.

5. Design Standards

Atlantic City Electric applies specific design criteria to new and existing facilities, as applicable. Refer to the publically available documentation on PJM's website.