8.2 OFFSITE POWER SYSTEM

8.2.1 Description

Each unit generates electric power at 25 kV which is fed through an isolated phase bus to the main transformer bank where it is stepped up to 500 kV and delivered to the switching station. The 500-kV switching station design incorporates a breaker-and-a-half scheme for high reliability and is connected to three 500-kV transmission lines. Two transmission lines go north via separate rights-of-way to two major switching stations: Public Service Electric & Gas (PSE&G) New Freedom Switching Station and Atlantic City Electric's Orchard Switching Station. The New Freedom Switching Station is solidly connected to the PSE&G 230-kV bulk power system via four 500/230-kV autotransformers. Orchard Switching Station is also connected to Atlantic City Electric's 230-kV bulk power system via a autotransformer. In addition, it is connected to the Pennsylvania/New Jersey/Maryland 500-kV interconnected system.

The third transmission line serves as a tie line to the adjacent Hope Creek 500-kV switchyard which is also integrated into the Pennsylvania/New Jersey/Maryland 500-kV interconnected system. All three 500-kV power lines are available for either or both units.

Site transmission lines are routed as shown on Plant Drawing 205415. A one-line diagram of the 500-kV switching station Electrical System is shown on Figure 8.2-2.

There are no present plans to incorporate automatic load dispatching for the Salem units.

8.2.2 Analysis

Reliability considerations to minimize the possibility of power failure due to faults in the network interconnections and the associated switching are as follows:

1. Each of the three transmission lines takes a separate route to its destination

2. The breaker-and-a-half switching scheme in the 500-kV switching station

3. Primary and backup relaying systems have been provided for each circuit along with circuit breaker failure protection

4. Two independent dc circuits are provided for each 500-kV breaker from the two independent and separate sources of dc control power which are supplied to the 500-kV switchyard from the station batteries. Loss of either dc source will not prevent connection of the station auxiliary power system to a 500-kV source.

System network performance has been analyzed and evaluated on a computer model for critical three-phase faults cleared by primary relay protection. The Salem nuclear units are stable for the following postulated conditions:

1. Loss of One Salem Nuclear Unit

   For the loss of one of the two Salem nuclear units (i.e., a fault in the generator or in its step-up transformer), the remaining Salem nuclear unit is stable. From the stability standpoint, the loss of a Salem unit is less severe than the loss of the most critical line as described below.

2. Loss of Largest Generating Unit on the Grid

   The largest generators on the system are the Salem units. Therefore, the results of "1" above apply.

3. Loss of the Most Critical Transmission Line

There are three 500-kV transmission outlets from Salem Generating Station, one to New Freedom Switching Station, one to Orchard Switching Station, and one to the adjacent Hope Creek 500-kV switchyard.

For stability analysis purposes, a three-phase fault at Salem was simulated on each of the three 500-kV circuits. A fault on the Salem-Hope Creek 500-kV line is the most critical line fault in evaluating Salem stability. For a fault on this line the Salem units will remain stable.

System Stability Studies performed for unexpected operating conditions such as Hope Creek - Red Lion 500-kV or East Windsor - New Freedom 500-kV line having an extensive outage, have indicated that the most critical condition is the disconnection of the East Windsor - New Freedom or the Hope Creek - Red Lion 500-kV line respectively. In such a situation to maintain System Stability, the tripping of one of the Salem Units is required. The relay protection circuitry was modified to incorporate this change.

The above considerations minimize the possibility of loss of more than one offsite power source. In the event of a loss of all offsite power sources, the Engineered Safeguards Systems will be supplied from the standby ac power supply (see Section 8.3.1.5).

Emergency lighting is provided throughout various areas of the plant where operator action may be required. In addition, 8-hour battery pack lights have been provided in selected areas of the plant as part of the fire protection program. Sufficient lighting exists for postulated loss of ac power events. No action is required for these lights to be operational.