#T75 South River 230kV

Generation Interconnection

This analysis was completed to assess the reliability impact for the increase in generation interconnecting to the PJM system as a capacity resource.

Network Impacts

The Queue Project #T75 was studied as a 20MW injection at the South River 230 kV substation in the JCPL area. Project #T75 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No problems identified

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only for the full energy output. Stuck breaker and bus fault contingencies will be performed for the Impact Study)

No problems were identified

Short Circuit

No problems identified on the transmission system.

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

1. The Red Oak A-Raritan River 230kV line loads from 196.12% to 197.62% (DC power flow) of its emergency rating (805MVA) for the single line contingency outage of the Red Oak B-Raritan River 230kV line. This project contributes approximately 12.1MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 195.7%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

2. The Red Oak B-Raritan River 230kV line loads from 195.79% to 197.30% (DC power flow) of its emergency rating (805MVA) for the single line contingency outage of the Red Oak A-Raritan River 230kV line. This project contributes approximately 12.1MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 195.4%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

3. The Raritan River-Kilmer "I" 230kV line loads from 106.61% to 107.69% (DC power flow) of its emergency rating (742MVA) for the single line contingency outage of the Gillette-Raritan River "W" 230kV circuit. This project contributes approximately 8.0MW to the thermal

violation. It must be noted that the same thermal violation (DC power flow: 106.2%) already exists in the 2012 base case.

4. The Parlin-Williams 230kV line loads from 146.07% to 147.16% (DC power flow) of its emergency rating (805MVA) for the tower line outage of the Raritan River-Red Oak "G" and Raritan River-Red Oak "T" circuits. This project contributes approximately 8.8MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 146.1%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

5. The Williams-Freneau 230kV line loads from 145.40% to 146.49% (DC power flow) of its emergency rating (805MVA) for the tower line outage of the Raritan River-Red Oak "G" and Raritan River-Red Oak "T" circuits. This project contributes approximately 8.8MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 145.4%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

6.The South River-Atlantic 230kV line loads from 149.00% to 150.38% (DC power flow) of its emergency rating (805MVA) for the tower line outage of the Raritan River-Red Oak "G" and Raritan River-Red Oak "T" circuits. This project contributes approximately 11.1 MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 149.0%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

7. The South River-Red Oak Q11/R39 230kV line loads from 109.62% to 112.14% (DC power flow) of its emergency rating (793MVA) for the tower line contingency outage of the Atlantic-South River & Freneau-Atlantic 230kV circuits. This project contributes approximately 20.0MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 109.6%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

8. The South River-Red Oak Q11/R39 230kV line loads from 109.62% to 112.14% (DC power flow) of its emergency rating (793MVA) for the single line contingency outage of the Atlantic-South River 230kV circuit. This project contributes approximately 20.0MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 109.6%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

9. The Red Oak Q11/R39-Parlin 230kV line loads from 132.92% to 134.02% (DC power flow) of its emergency rating (805MVA) for the tower line outage of the Raritan River-Red Oak "G" and Raritan River-Red Oak "T" circuits. This project contributes approximately 8.8MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 132.9%) already exists in the 2012 base case due to unresolved problems in the R & S queues.
10. The Red Oak - Red Oak Q11 230kV line loads from 119.97% to 121.7% (DC power flow) of its emergency rating (805MVA) for the tower line outage of the Parlin-Q11 "G" and Red Oak-R39 Option 1 "T" 230kV circuits. This project contributes approximately 14.0MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 119.8%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

11. The Red Oak - Red Oak R39 230kV line loads from 106.94% to 108.37% (DC power flow) of its emergency rating (793MVA) for the tower line outage of the South River-Atlantic and Parlin-Williams 230kV circuits. This project contributes approximately 11.3MW to the thermal violation. It must be noted that the same thermal violation (DC power flow: 106.9%) already exists in the 2012 base case due to unresolved problems in the R & S queues.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

1 & 2. The Red Oak A-Raritan River and the Red Oak B-Raritan River 230kV line overloads can be alleviated by reconductoring of the double circuit tower line from 1590 Kcmil 45/7 ACSR (2.6 mile) to 1590 Kcmil 54/19 ACSS/AW – Bundled (2.6 mile) for 1642/1850 MVA summer normal/emergency ratings. It also requires replacement of bundled drop loop conductors at Raritan River substation and at Red Oak A and B substations. Total estimated cost is **$8,331,000**.

3. The Raritan River-Kilmer "I" 230kV line overload can be alleviated by replacing the 2000 amp wave trap with one rated 3000 amp at Raritan River substation. Total estimated cost is **$117,000**.

4. The Parlin-Williams 230kV line overload can be alleviated by reconductoring the line from 1590 Kcmil 45/7 ACSR (2.9 mile DCT) to 1590 Kcmil 54/19 ACSS/AW -Bundled (1.7 mile DCT) for 1642/1850 MVA summer normal/emergency ratings. It also requires replacement of a 2000 amp disconnect switch with a 4000 ampunit, bundled drop loop conductor at Williams substation and at Parlin substation. Total estimated cost is **$3,860,400**.

5. The Williams-Freneau 230kV line overload can be alleviated by reconductoring the line from 1590 Kcmil 45/7 ACSR (7.77 mile DCT) to 1590 Kcmil 54/19 ACSS/AW-Bundled(7.37 mile DCT) for 1642/1850 MVA summer normal/emergency ratings. It also requires replacement of disconnect switch (4000 amp) (1), bundled drop loop conductor at Freneau substation and at Williams substation. Total estimated cost is **$15,300,000**.

6. The South River-Atlantic 230kV line overload can be alleviated by reconductoring the line from 1590 Kcmil 45/7 ACSR (18.7 mile DCT) to 1590 Kcmil 54/19 ACSS/AW-Bundled(10.03 mile DCT) for 1642/1850 MVA summer normal/emergency ratings. It also requires replacement

of disconnect switch (4000 amp) (1), line trap (4000 amp) (1), bundled drop loop conductor at Atlantic substation and replacement of line trap (4000 amp) (1) and bundled drop loop conductor at South River substation. Total estimated cost is **$20,660,800**.

7 & 8. The South River-Red Oak Q11/R39 230kV (T1034) line overload can be alleviated by reconductoring the line from 1590 Kcmil 45/7 ACSR (1.91 mile DCT) to 1590 Kcmil 54/19 ACSS/AW-Bundled(1.71 mile DCT) for 869/1068 MVA summer normal/emergency ratings. It also requires replacement bundled drop loop conductors at South River substation. Total estimated cost is **$640,000**.

9. The Red Oak Q11/R39-Parlin 230kV line (G1047) overload can be alleviated by reconductoring the line from 1590 Kcmil 45/7 ACSR (1.91 mile DCT) to 1590 Kcmil 54/19 ACSS/AW-Bundled(1.71 mile DCT) for 1642/1850 MVA summer normal/emergency ratings. It also requires replacement bundled drop loop conductor at Red Oak Q11/R39 and Parlin substations. Total estimated cost is **$3,500,000**.

10. The Red Oak - Red Oak Q11_230kV line (G1047) overload can be alleviated by reconductoring the line from 1590 Kcmil 45/7 ACSR (0.2 mile DCT) to 1590 Kcmil 54/19 ACSS/AW-Bundled(0.2 mile DCT) for 869/1068 MVA summer normal/emergency ratings. It also requires replacement bundled drop loop conductors at Red Oak and Red Oak Q11/R39 substations. Total estimated cost is **$200,000**.

11. The Red Oak - Red Oak R39_ 230kV (T1034) line overload can be alleviated by reconductoring the line from 1590 Kcmil 45/7 ACSR (0.2 mile DCT) to 1590 Kcmil 54/19 ACSS/AW-Bundled(0.2 mile DCT) for 869/1068 MVA summer normal/emergency ratings. It also requires replacement bundled drop loop conductors at Red Oak and Red Oak Q11/R39 substations. Total estimated cost is **$200,000**.