This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM system as a capacity resource.

Network Impacts -550 MW Injection

Network impacts for the injection of 540 MW into the Sewaren 230 kV Bus were evaluated for 2004 summer peak conditions. Based on the power flow analysis performed the following network impacts were identified:

NETWORK VIOLATIONS

Normal System

- No identified problems.

Single Contingency (MAAC Criteria IIA)

- No identified problems

Multiple Facility Contingency (MAAC Criteria IIC)

- Tower line outages impacted similar circuits as are identified under the Generator Deliverability section of this report.

Generator Deliverability

- The Brunswick - Deans 230 kV circuit is normally overloaded at 110% of the normal rating.
- The Aldene - Springfield Road 138 kV circuit is normally overloaded at 105% of normal rating.
- The Deans - Edison 230 kV circuit is normally overloaded at 110% of normal rating.
- The Aldene - Warinanco 230 kV circuit is normally overloaded at 105% of normal rating.
- The Fanwood - New Dover 138 kV circuit is normally overloaded at 105% of normal rating.
- The Linden - Minue St. "G" 230 kV circuit is contingency overloaded at 105% of emergency rating for the outage of the Sewaren - Metuchen 230 kV circuit and the Metuchen 230/138 kV transformer. The circuit between Sewaren and

Metuchen was required for Project A17.

- The Sewaren - Woodbridge "M" 138 kV circuit is normally overloaded at 105% of the existing rating.

SHORT CIRCUIT ANALYSIS

The B52 project will have cost allocation for at least twenty 230 kV breakers at the Linden, Sewaren, and Deans 230 kV substations.

NETWORK IMPACT REQUIREMENT SUMMARY

The following reinforcements will be required for the B52 project and will eliminate all identified problems:

1) The Sewaren - Woodbridge - New Dover - Fanwood- Roseland 138 kV will need to be converted to 230 kV. The cost is estimated at $15.4 million with a 3 year lead-time.
2) The Deans - Edison 230 kV circuit will need to be reconductored. The cost is estimated at $3.5 million with a 2 year lead-time.
3) The Warinanco - Aldene 230 kV circuit will need to be reconductored. The cost is estimated at $1 million with a 2 year lead-time.
4) A wavetrap will need to be replaced on the Sewaren - Woodbridge "M" 138 kV circuit. The cost is estimated at $0.1 million with a 1 year lead-time.

5) At least twenty 230 kV breakers will need to be replaced. The cost for a breaker replacement is $350,000 per breaker ($7 million total) and are estimated to take 2 years to complete. Cost allocation based on this projects kA contribution in relation to other generation projects will be determined during the Impact Study.

In addition to these new reinforcements, the B52 project will have cost allocation for the following previously identified system reinforcements.

6) A series PAR will need to be installed at each of the following four locations. The cost to install each series PAR is estimated at $10 million for a total cost of $40 million. The time required to install the PARs is estimated at 3 years. Project A14 was the first generator to require these reinforcements. The B52 project has approximately a 2 degree impact on the Waldwick PARs and a 5 degree impact on the Linden PAR.
- Waldwick - Hawthorne 230 kV PAR
- Waldwick - Hillsdale 230 kV PAR
- Waldwick - Fairlawn 230 kV PAR
- Linden - Goethels 230 kV PAR

7) The B52 project contributes 165 MW to the requirement for a new 230 kV circuit that extends from Sewaren to Metuchen to Brunswick 230 kV. Project A17 was the first generator to require this reinforcement. The cost estimate for a new Sewaren - Metuchen - Brunswick 230 kV circuit is $22

million with a 3 year lead -time.
8) The B52 project contributes 15 MW to the requirement to reconductor the Deans - Brunswick 230 kV circuit. Project A17 was the first generator to require this reinforcement. The cost estimate to reconductor Deans - Brunswick 230 kV is $4 million with a 2 year lead-time.
9) The B52 project contributes 110 MW to the requirement to reconductor the Linden - Warinanco 230 kV circuit. Project A17 was the first generator to require this reinforcement. The cost estimate to reconductor Linden - Warinanco 230 kV is $1 million with a 2 year lead-time.
10) The B52 project contributes 35 MW to the requirement to install a 2.5% series reactor at Aldene. Project A17 was the first generator to require this reinforcement. The cost estimate for the reactor is $2.5 million with a 2 year lead -time.

The total network costs associated with this project are estimated at **$96.5 million** and are expected to take **5 years** to complete. The B52 project cost allocation for these reinforcements will be determined during the Impact Study.

ADDITIONAL IMPACTS FOR #D30 (REQUEST TO INCREASE #B52 BY 187 MW)

In addition to the previous mentioned overloads and required reinforcements, the following problems were identified with an additional 187 MW at Sewaren 230 kV (queue position D30). These were included to provide a more complete result for the entire project (B52 and D30).

The Sewaren - Woodbridge 230 kV circuit that was converted from 138 kV is overloaded both normally and for various contingencies. The ability to string a different conductor on these towers will need to be evaluated. The cost associated with this upgrade will be determined when the D30 feasibility study is completed.

The Linden - Minue St. "G" 230 kV circuit is overloaded both normally and for various contingencies. The circuit will need to be reconductored. The cost associated with this upgrade will be determined when the D30 feasibility study is completed.

The Deans - Edison 230 kV circuit is overloaded both normally and for various contingencies. These overloads occur even with reconductoring required by a previous generation project. Further reconductoring may not be possible. The ability to string a larger capacity conductor will be evaluated when #D30 feasibility study is completed.