Generation Interconnections

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 into the Brunner Island-West Hempfield 230kV transmission line (D19)

Network Impacts (Option A)

Potential network impacts for the injection of 430 MW into the Brunner Island-West Hempfield 230 kV transmission line at a new substation (Armstrong) 43 % of the line distance from Brunner Island and 120 MW into the 69kV West Hempfield substation were evaluated for summer peak conditions in 2005. All load flow studies were performed under the assumption that the Yorkana-Otter Creek 230 kV line and Otter Creek 230 kV switchyard are in-service.

Normal System

- No identified problems.

Multiple Facility Contingency - Tower Line Outages (MAAC Criteria IIC)

- No identified problems.

Generator Deliverability

1. The D19 project causes a 105% overload on the West Hempfield - Marietta 230 kV circuit.
2. The D19 project causes a 110% overload on the Marietta - West Hempfield 230kV circuit for the loss of the Yorkhana - Otter Creek 230kV circuit.
3. The D19 project causes a 110% overload on the West Hempfield - Manor 230kV circuit for the loss of the Brunner - South Manheim 230kV circuit and the South Manheim 230/69kV transformer #3.
4. The D19 project contributes 90 MW to an overload of the Yorkhana - Brunner 230kV circuit for the loss of the Marietta - West Hempfield 230kV circuit and West Hempfield 230/69kV transformer #1.

System Reinforcements

A new 230 kV circuit between Brunner Island and Manor would eliminate the previously identified overloads. The cost estimate for this new circuit is $39 million with a minimum construction time of 5 years. The D19 project would be connected to this new circuit

approximately 6 miles from Brunner Island.

Addition of the new generation as described and construction of the new Brunner Island-Manor 230kV will cause the following additional network problems.

Normal System

- No identified problems

Multiple Facility Contingency - Tower Line Outages (MAAC Criteria IIC)

- No identified problems.

Generator Deliverability

1) The D19 project causes a 105% overload on the Otter Creek - Conastone 230 kV circuit for the outage of Manor - Graceton 230kV circuit.

2) The D19 project causes a 110% overload on the Manor - Graceton 230 kV circuit for the outage of Otter Creek - Conastone 230 kV circuit.

3) The D19 project causes a 105% overload on Manor - West Hempfield 69 kV circuit for the outage of the Manor - West Hempfield 230 kV circuit.

4) The D19 project contributes 90 MW to an overload of the Yorkana - Brunner 230kV circuit for the loss of the Brunner - West Hempfield 230kV circuit and West Hempfield 230/69kV transformer #1.

Short Circuit Analysis

5) The D19 project contributes to six (6) overdutied breakers previously identified at Brunner Island 230kV

6) The D19 project causes eight (8) overdutied breakers at Brunner Island 230kV.

7) The D19 project causes three (3) overdutied breakers at West Hempfield 69 kV.

System Reinforcements

Increasing the operating temperature of the Otter Creek-Conastone 230kv line from 125c to 160c can alleviate the overloads on the line noted The estimated cost to perform this work is $2.5 million, with a lead time of 12-18 months.

The Manor-Graceton line overload can be alleviated by rebuilding the line with 1590 ACSR or similar conductor. The cost to rebuild this line is estimated to be $24 million, with a lead time of 4 to 6 years.

Rebuilding the Manor-West Hempfield 69kv line with 795 ACSR wire operating at 140c can alleviate the overload, noted on the circuit, above. The estimated cost for this rebuild is $6.9 million, with a lead time of 3.5 to 4 years, assuming no involved archaeological or environmental permitting, and no interventions in the siting process.

The Yorkana-Brunner Island 230kV circuit will be upgraded at a cost of $0.66 million. Lead time on this project is 2 years. The D19 project will be allocated a portion of the cost.

The estimated cost to replace the three over duties circuit breakers at West Hempfield 69kV is $300,000. The estimated time for replacement is 1 year.

The estimated cost to replace the eight 230kV circuit breakers at Brunner Island and the two 230kV circuit breakers at Manor is $3,000,000. The estimated time for replacement is 2 years.

The estimated cost to replace the six overdutied circuit breakers previously identified at Brunner Island is $1.8 million. The D19 project will be allocated a portion of these costs. The estimated time for replacement is 2 years. The estimated time for replacement is 2 years.

Estimated network reinforcement connection costs for Option A is $75.7 million totally attributable to the D19 project and an allocated portion of $2.66 million.

Network Impacts (Option B)

For connection Option B (550 mw on the TMI-Peach Bottom 500kv line) the system was analyzed under 2005 summer peak conditions with a load flow case provided by PJM on December 28, 2000. It was assumed that the new Otter Creek 230kv substation and new Yorkana-Otter Creek 230kv line were in service for purposes of this study.

Normal System

- No problems identified.

Multiple Facility Contingency -Tower Line Outages (MAAC Criteria IIC)

- No problems identified.

Generator Deliverability

- No problems identified

Short Circuit

- Contributes to the overdutied condition of eleven (11) 500kV circuit breakers at Peach Bottom substation.

NETWORK UPGRADES

Replacement of the eleven circuit breakers at Peach bottom 500kV is estimated to cost $8 million and take 2 years to complete. The D19 project will be allocated a percentage of these costs.

The actual cost allocation amounts for network upgrades required by more than one generation project will be defined in the Impact Study report.