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 - 1271MW Injection at TMI

Potential network impacts for the injection of 1271 MW into the TMI 500 kV substation were evaluated for summer peak conditions in 2004. Several generation scenarios were studied in an attempt to bracket expected system conditions in 2004. A summary of results follows:

A) Normal Conditions

· Contributes to the existing loading problem on the Brunner - West Hempfield 230 kV circuit. The new generation increases the flow on the limiting facility by 35 MVA.

· Contributes to an overload on the Collins - Newberry 115 kV circuit. The new generator contributes 9 MVA to the circuit loading.

B) Single Contingency

· Contributes to contingency overload on the Conastone 500/230 kV transformer for the outage of the parallel Conastone transformer. The new generator increases the flow on the limiting facility by 40 MVA.

· Contributes to contingency overload on Graceton - Raphael 230 kV for the outage of Brighton - Conastone 500 kV. The new generator increases the flow on the limiting facility by 75 MVA.

· Contributes to potential contingency overload on Conastone - Northwest 230 kV and one of the Northwest 230/115 kV transformers for the outage of the parallel 230 kV circuit. The new generator increases the flow on the limiting facility by 15 MVA.

· Contributes to the overload on the Jackson 230/115 kV transformer, bank 4, and the Yorkana 230/115 kV transformer, bank 1A, for the outage of the Jackson-Yorkana 230 kV line. The new generator increases flow on the Jackson transformer by 32 MVA and on the Yorkana transformer by 60 MVA.

C) Tower Line Contingency

· Contributes to contingency overload on Graceton - Conastone 230 kV and Gracteton - Raphael 230 kV for the Conastone to Northwest 230 kV tower line outage. The new generator increases the flow on the limiting facility by 65 MVA.

D) Short Circuit Analysis

· The 1271 MW generator at the TMI 500 kV substation will contribute to the overdutied condition of three 230 kV circuit breakers at Conastone. The estimated cost for replacement of these breakers is $1.4 million and approximately 18 months would be required to complete the replacements. These are the same breakers identified in the queue A37 project report.

Reconductor the 6.6 mile Collins-Newberry 115 kV line using 795Kcmil 26/7 ACSR wire. Estimated cost is $850,000 and approximately two years to construct.

In addition, the 115 kV underlying system in the proximity of TMI will require upgrades in the next several years due to load growth. The new generator at TMI has a minimal, but negative, impact on these facilities. The cost exposure for the new generator is expected to be less than $0.2 million.

The flows on the Brunner - West Hempfield 230 kV circuit are negatively impacted by several new generation projects. Due to the existing number of generation interconnection requests that impact these circuits, it is not reasonable at this time to completely develop what, if any, reinforcements will be required. One possible solution that will be evaluated is the addition of a new 230 kV transmission line from Brunner to South Akron, which alleviates some existing network problems and will provide capability to relieve the overloads listed above. The line will cost approximately $52 million and take approximately six years to build. However, the Brunner area will be studied extensively during the next level of analysis. The impact of this resource will be evaluated, along with all others in the area, and any system reinforcements and associated costs will be specified at that time, if required.

Addition of another 230/115 kV transformer at Jackson will alleviate the overloads on both the Jackson and Yorkana transformers for the contingency problem described above.
The installation of the transformer is estimated at $2.5 million and will take approximately two years to complete.

The overloads attributed to the new generator at TMI in the Conastone, Graceton, and Raphael area are contingent on other new generators that are proposed on either side of the overloaded facilities. As such, it is not reasonable at this time to completely develop what, if any, reinforcements will be required.

One solution would be:

The installation of a third Conastone 500/230 kV transformer and upgrade of the overloaded circuits. Installation of the new Conastone transformer is estimated to cost

$20 million and take approximately three years to install. Installation of the third transformer requires significant modifications to the substation, which include a new two breaker 230 kV bay, approximately 2500' of 230 kV aluminum tubing, a 1500' 500 kV tap and a 500 kV breaker.

The upgrade for the 23.7 mile Conastone - Northwest 230 kV circuit, which is a reconductor using 1590ACSR conductor is estimated at $2 million and will take approximately one year. Replace the existing Northwest transformers with two 500MVA 230/115 kV transformers for an approximate cost of $7 million. It is estimated it will take 30 to 36 months to complete.

The reconductoring upgrade for the 8.5 mile Conastone - Graceton line is estimated to cost $800,000 and take approximately two years to construct.

The upgrade of the 19.85 mile Graceton - Raphael Road 230 kV circuit, which will be a rebuild using steel poles and installing 1272 ACSR conductor, is estimated to cost approximately $27 million and take five years to construct, including permits and engineering design. The possible reconductoring of the line was not analyzed. A complete engineering evaluation will take two to three months to complete