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 - 679 MW Injection at Hunterstown

Potential network impacts for the injection of 679 MW into the Hunterstown 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 a normal overload on the Manor - West Hempfield 230 kV circuit. The new generation increases the flow on the limiting facility by 10 MVA.

· Contributes to a normal overload on the Carlisle-Gardners 115 kV circuit. The new generator increases the flow on this circuit by several MVA.

Single Contingency

· Contributes to contingency overload on Conastone 500/230 kV transformer for the outage of the parallel Conastone transformer. The new generator increases the flow on this transformer by 60 MVA.

C) Tower Line Contingency

· Contributes to potential contingency overload on 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 35 MVA.

D) Short Circuit Analysis

· The fault duty was evaluated at all bulk power substations and no locations had fault current increases greater than 5% due to a 679 MW generator at the Hunterstown 500 kV substation. However, three 230 kV circuit breakers at Conastone were identified as being overdutied with contribution from the new generator at Hunterstown. The estimated cost for replacement of these breakers is $1.4 million and approximately 18 months would be required to complete the replacements.

The flows on the Manor-West Hempfield 230 kV circuit are negatively impacted by several new generation projects. Other circuits are also negatively impacted by the

several projects proposed for this area. Either of two upgrades identified will alleviate the Manor-West Hempfield 230 kV circuit overload. 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. Another solution is to build a new Brunner-Manor 230 kV circuit, which would also alleviate the above overload. This upgrade will cost approximately 65 million and take approximately six years to construct. . 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. 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.

Upgrade of the Gardners-Carlisle 115 kV line is estimated to cost $250,000 and take two years to construct.

Numerous contingency flows on the underlying 115 kV system in the proximity of Hunterstown were above the line normal ratings. While no line was found to exceed its emergency rating or violate MAAC Criteria, it may be necessary to reduce the Hunterstown generation to restore all lines to within their normal ratings should any of these contingencies occur.

The overloads attributed to the new generator at Hunterstown 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 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.