Generation Interconnection

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 into the Peckville 230 kV Bus

Potential network impacts for the injection of 550 MW into the Peckville 230 kV bus were evaluated for summer peak conditions in 2004.

A summary of the results follows:

The B45 project was modeled at the Peckville 230 kV substation with a double circuit line between Lackawanna and Peckville. Connection to the Lackawanna 230 kV substation will not significantly change the results listed below.

Note: Since PPL has planned the elimination of the 230 kV and 69 kV switchyards at Peckville substation, a 230 kV line terminal at the existing Peckville 230 kV switchyard is not an appropriate permanent solution. A double circuit 230 kV line from Lackawanna 230 kV substation to the generation site would be required. This would include the following:

1. Construction of double circuit structures from the existing Peckville substation to the generation site in addition to the double circuit structures from Lackawanna to the existing Peckville substation.
2. A new Peckville substation to be developed at or near the generation site. The initial development would be a four, circuit breaker ring bus configuration capable of being expanded to a full, breaker and a half design when a future 230 kV line terminal is needed.
3. A single circuit line from the new Peckville 230 kV switchyard to connect to the existing Peckville-Blooming Grove 230 kV line.

The costs and lead-time requirements for the above complex rearrangement will be provided during the Impact Study.

Normal System

- The new generation contributes 150 MW to a normal overload on the Susquehanna 500/230 kV transformer T21.

- The new generation contributes 105 MW to a normal overload on the Sunbury 500/230 kV transformer T24.

Single Contingency (MAAC Criteria IIA)

- The new generation contributes 215 MW to an overload on the Susquehanna 500/230 kV transformer T21 for loss of the Sunbury 500/230 kV transformer T24.

- The new generation contributes 165 MW to an overload on the Sunbury 500/230 kV transformer T24 for loss of the Susquehanna 500/230 kV transformer T21.

Multiple Facility Contingency (MAAC Criteria IIC)

- The new generation contributes 35 MW to the overload on the Morris Park - Gilbert 230 kV line for the double circuit tower line outage that includes the Portland - Kittatiny 230 kV and Portland - Greystone Q 230 kV lines.

- The new generation contributes 40 MW to the overload on the Kittatiny - Newton 230 kV line for the double circuit tower line outage that includes the Portland - Greystone Q 230 kV and Kittatiny - Pohatcong 230 kV lines.

Generator Deliverability

- The new generation contributes 35 MW to a normal overload on the Martins Creek - Morris Park 230 kV line.

- The new generation contributes 30 MW to a normal overload on the Portland - Greystone Q 230 kV line.

- The new generation contributes 45 MW to a normal overload on the Portland - Kittatiny 230 kV line.

- The new generation contributes 35 MW to the overload on the Martins Creek - Morris Park 230 kV line for loss of the Portland - Martins Creek 230 kV line.

Short Circuit Analysis

No identified problems.

System Reinforcements

Second Susquehanna 500/230 kV Transformer

The new generation contributes to previously identified overloads on the Susquehanna 500/230 kV T21 and Sunbury 500/230 kV T24 transformers A new Susquehanna 500/230 kV, 750 MVA transformer is required. The total cost is estimated to be $19.3 million with a lead-time of 3 years (see Figure 2). A third 500/230 kV, 750 MVA transformer may be required to completely eliminate the overload problems in the Northern PPL region for which additional analysis during the Impact study will be needed. The new generator will be allocated a percentage of the costs for the upgrades based on their MW contribution in relation to other new generators. Cost allocation percentages are not provided as part of the Feasibility Study analysis but will be provided in the Impact Study report.

Substation costs for the first 500/230 kV transformer addition are detailed as follows:

- $13,560,000 for work at the Susquehanna 500 kV substation.
- $2,112,000 for work at the Susquehanna 230 kV substation.

Note: These costs do not include any equipment replacements or upgrades due to increased fault duties, and additional costs pertaining to coordination with the Susquehanna Nuclear station may be required.

Since the Susquehanna 500 kV and 230 kV substations are physically separated by the Susquehanna river, a single-circuit 230 kV line approximately two miles in length will be required to connect T22. This line is expected to cost approximately $3.6 million dollars and take 3 years to complete. As PPL owns the property on both sides of the river, no new right of way is required for this line. However, environmental permits are required. Tasks included in the first transformer estimate are:

- Transfer and reconnect the existing 500 kV to 230 kV transmission line yard tie to a new T22 transformer at the Susquehanna Plant 500/230 kV substation.
- Transfer and reconnect the Sunbury 500 kV line to a new bay position at the Susquehanna 230 kV switchyard.
- File a certification application with the PUC and secure a permit for the new 230 kV line crossing of the Susquehanna River.

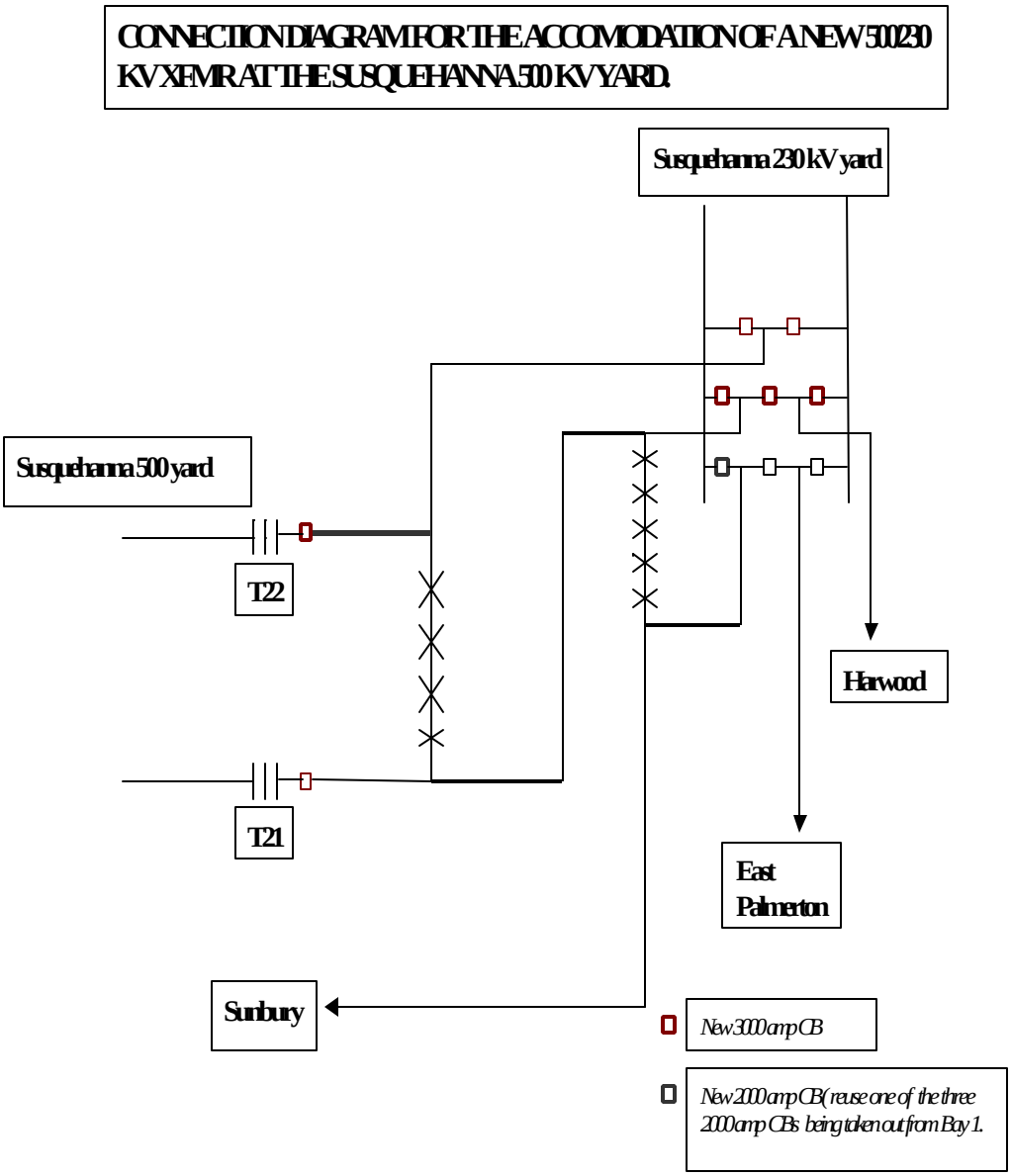

Figure 2

Northern New Jersey Upgrade

The new generation contributes to previously identified overloads in northern New Jersey. The new generator will be allocated a percentage of the costs for the upgrades based on their MW contribution in relation to other new generators. Cost allocation percentages are not provided as part of the Feasibility Study analysis but will be provided in the Impact Study report.

The new generation contributes to normal and contingency overloads on the Martins Creek - Morris Park, Portland - Kittatiny and Portland - Greystone Q 230 kV lines. The new generation also contributes to contingency overloads on the Morris Park - Gilbert and Kittatiny - Newton 230 kV lines. These problems were previously identified for an earlier queued generator. A new Portland - Whippany 230 kV line (see Figure 3) is required to alleviate the overloads. It is estimated that the line will cost $62.3 million and take 5 years to complete.

The new Portland - Whippany 230 kV line will alleviate all of overloads mentioned above with the exception of the Martins Creek - Morris Park 230 kV line for loss of the Portland - Martins Creek 230 kV. Upgrading the Martins Creek - Morris Park 230 kV line to an 888 MW (150 degrees C) 4-hour rating (Emergency) by replacing one wave trap at Martins Creek will alleviate this overload. This upgrade is expected to cost $160,000 and take 9 months.

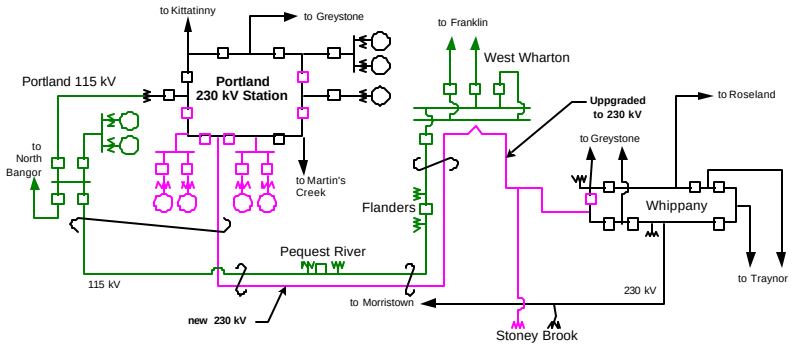

Figure 3