

Buzzard Point Generating Station and Benning Road Generating Station Retirement Study

General

PJM received a deactivation notice from Potomac Power Resources, LLC (PPR) for the Buzzard Point and Benning Road generating stations. The request was to deactivate four units (E3-5/W6) with a total capacity of 64 MW at Buzzard Point generating station by May 31, 2007, and to retire the remaining 12 units at Buzzard Point generating station (total capacity of 192 MW) and units 15 and 16 at Benning Road generating station (total 550 MW) by May 31, 2012.

Buzzard Point East Bank 3, 4, 5 and West Bank 6 (E3-5/W6)

PJM has determined the requested termination of operation of four Buzzard Point units effective May 31, 2007 would have no adverse impact on system reliability for 2007. However, PJM analysis has identified two reliability problems for the summer of 2008 related to the SWMAAC Load Deliverability analysis. Based on the estimated in-service dates of the transmission system upgrades required to maintain reliability, the four Buzzard Point generating units (E3-5/W6) are expected to be needed for reliability through the summer of 2008.

The 2007 summer peak load system was studied to determine compliance with applicable PJM Reliability Criteria. For years 2008 and 2012, the Load Deliverability analysis results from the Reliability Pricing Model (RPM) study were used in determining compliance with PJM Reliability Criteria. The results are summarized below.

For 2007, retiring four Buzzard Point units effective May 31, 2007 would have no adverse impact on system reliability.

For 2008, no voltage drop or voltage limit violations are identified, but the following thermal constraints limit SWMAAC imports below CETO values:

- Brighton 500/230 kV transformer (103.9%) / loss of Brighton - W. Chapel 500 kV line
- Doubs – Aqua Duct 230 kV line (121.6%) / loss of Doubs – Station H 230 kV line (the other combination too)

These thermal constraints in 2008 are expected to be eliminated by the following transmission upgrades:

- At Brighton Substation - Install a second 1000 MVA 500/230 kV transformer and also two 500 kV breakers. The project is baseline upgrade number b0288. Estimated cost is \$33.1M and the in-service date is 6/1/2009.
- Reconductor both Doubs-Dickerson and Doubs-Aqueduct 230 kV circuits. The project is baseline upgrade number b0238. Estimated cost is \$9.6M and the in-service date is 6/1/2009.

Balance of Buzzard Point Station and Benning Road Station

Based on 2012 RTEP base case analysis assuming that Amos to Kemptown 765 kV circuit in-service, retiring the remaining twelve units at Buzzard Point generating station (total capacity of 192 MW) and units 15 and 16 at Benning Road generating station (total 550 MW) by May 31, 2012 will have an adverse impact on PEPCO sub transmission and distribution system reliability. Transmission and distribution upgrades have been identified that can eliminate the identified overloads. PJM's Transmission Planning Department has done thermal analysis with Benning and Buzzard units in service and also retired in 2012 with Amos to Kemptown 765 kV circuit in-service. In 2012, preliminary analysis indicates a few contingency overloads occur on the BGE/PEPCO transmission system and these can be fixed by 2012.

In addition, Pepco has done analysis assuming that Amos to Kemptown 765 kV circuit will not be in-service, and developed projects to eliminate all the identified local overloads by implementing the following transmission and distribution upgrades summarized below.

The 2012 system with retirement of Benning and Buzzard Point generation does not meet the BGE/Pepco load deliverability criteria. The first limiting thermal constraint is the Burches Hill – Palmers Corner 230kV circuits followed by Burches Hill 500/230kV transformer. The following thermal constraints were identified for the load deliverability test:

- Overload of approximately 15% on the Burches Hill 500/230kV transformer for the outage of the parallel transformer.
- Overload of approximately 10% on the Burches – Palmers Corner 230kV circuits for the outage of the parallel circuits.
- Overload of approximately 1% on Dickerson Station H – Quince Orchard 230kV circuit for the outage of the Brighton – Doubs 500kV circuit.
- Overload of approximately 9% on Quince Orchard – Bells Mill 230kV (028) circuits for the outage of the Quince Orchard – Bells Mill 230kV (029) circuits.
- Overload of Pleasant View 500/230kV transformer for the outage of the Doubs – Brighton 500kV circuit. (This Dominion facility was identified as overloaded in the 2012 Baseline case and Dominion is evaluating the needed enhancement)
- Voltage violations on Pepco's northern 230kV system, including Quince Orchard, Mt. Zion, Bells Mill Road and Burtonsville for the outage of Possum Pt. – Burches Hill 500kV circuit.

In addition, further analysis identified the following criteria violations in the Benning/Buzzard Point area for 2012:

- Normal overloads of 13% on the 230kV in feeds from Oak Grove to Ritchie to Benning and 17% on 69kV in feeds from the Takoma area into the Benning area.
- The normal case 69kV bus voltage at Benning, 0.956 pu, was less than the target voltage of 1.0 pu.
- Outage of either 230/69kV transformer at Benning resulted in contingency overloads of 5% to 9% on the remaining 230/69kV transformer and 40% to 51% on 69kV in-feeds from the Takoma area into the Benning area.

- Outage of one 69kV in-feed from the Takoma area resulted in an 83% overload on the remaining 69kV indeed from the Takoma Area.
- Outage of one 230kV in-feed from Oak Grove resulted in a 50% overload on the remaining 230kV indeed from Oak Grove.
- Outage of one 115kV in-feed from Bowie to the Benning Area resulted in an 11% overload on the remaining 115kV in feed.
- Outage on one 230/115kV transformer at Bowie resulted in a 9% overload on the remaining Bowie transformer.
- Outage on one 230kV in feed from Oak Grove combined with a stuck breaker at Benning resulted in 0% to 2% overload on the remaining 230/69kV transformer at Benning, 23% to 25% on the remaining 230kV in feed from Oak Grove and 46% to 61% on the 69kV in-feeds from Takoma.
- The Benning 69kV bus voltage remained marginal for all of the above outages.

In addition to the above thermal and voltage constraints, the analysis also indicated that for single contingency outages of Black Oak – Bedington 500kV circuit or Hatfield – Black Oak 500kV circuit, there are widespread voltage violations across Pepco, Dominion northern systems and Allegheny Power system.

Required System Additions and Enhancements Associated with Proposed Retirement of Benning & Buzzard Generation by 5/31/2012.

After consideration of various alternatives, Pepco identified a comprehensive solution to not only to address the 2012 situation but to provide a longer term solution to mitigate the impacts of these generation retirements. These enhancements are needed to address the significant reliability violations expected by 2012 as a result of the Benning and Buzzard Point generation retirements. The following system addition/enhancements are required to resolve thermal overloads and voltage violations:

1. Add two new 230kV under ground circuits from Ritchie Substation 123 to Benning Sta. "A". (ISD 2012)
2. Add one 50 MVAR Shunt Reactor on the Benning 230kV bus. (ISD 2012)
3. Add one new 230/69kV, 250 MVA Transformer at Benning Sta. "A". (ISD 2012)
4. Add two 50 MVAR 69kV Capacitor Banks at Benning. (ISD 2012)
5. Add a third Burches Hill 500/230kV transformer. (ISD 2012)
6. Upgrade three Burches Hill – Palmers Corner 230kV circuits (090,091,092). These circuits identified in 2012 Baseline for second contingencies. (ISD 2012)
7. Upgrade one Dickerson Station H – Quince Orchard 230kV circuit (032). (ISD 2012)
8. Upgrade terminal equipment on two Quince Orchard – Bells Mill 230kV circuits. (ISD 2012)
9. Add approximately 200 MVAR SVC at Dickerson Station H 230kV substation. (ISD 2012)
10. Add a 500kV circuit from Possum Point to Calvert Cliffs with terminations at Burches Hill and Chalk Point. (ISD 2012)

More analysis is required with more alternative transmission plans to determine when and what combination of these upgrades are required.