

# **DOUBS PROJECT (QUEUE #25)** **FEASIBILITY STUDY ANALYSIS**

## **DESCRIPTION OF PROJECT**

The developer wishes to interconnect a generating plant in southern Frederick County, Maryland, near the town of Point-of-Rocks. The generating plant will consist of two - 175 MW combustion turbine (CT) generators and one - 300 MW steam turbine generator (ST) located approximately one mile southeast of Allegheny Power's Doubs Substation. The units will generate at 18.0 kV using natural gas for fuel and will be used for peaking. The developer desires to interconnect to the AP transmission system using one of the following configurations:

- Interconnection at the 230 kV bus at Doubs Substation
- Interconnection at the 500 kV bus at Doubs Substation
- Interconnection along the Doubs-Loudoun 500 kV line

The developer plans to have the generators in service and producing power by May 31, 2003.

## **ANALYSIS RESULTS**

### **Interconnection at the 230 kV bus at Doubs Substation**

#### **Normal (Base) System Conditions**

- ◆ Overloads on the Doubs-Aqueduct and the Doubs-Station H 230 kV lines for base conditions. The new generator contributes 21 MVA and 15 MVA respectively to the overloads.

#### **Single Contingency Conditions**

- ◆ Overloads on the Doubs-Aqueduct and the Aqueduct-Station H 230 kV lines for an outage of the Doubs-Station H 230 kV line. The new generator contributes 171 MVA and 137 MVA respectively to the overloads.
- ◆ Overload on the Doubs-Station H 230 kV line for an outage of the Doubs-Aqueduct 230 kV line. The new generator contributes 168 MVA to the overload.

## **ANALYSIS RESULTS (Cont'd)**

### **Interconnection at the 230 kV bus at Doubs Substation (Cont'd)**

#### **Multiple Contingency Conditions**

No overloads or other system deficiencies were identified as being caused by credible multiple contingencies.

#### **Short Circuit Conditions**

18 - 230 kV and 9 - 138 kV circuit breakers at Doubs and neighboring substations were identified as exceeding their maximum interrupting capacity.

### **Interconnection at the 500 kV bus at Doubs Substation**

#### **Normal (Base) System Conditions**

- ◆ Overload on the Doubs No. 1, 500-230 kV transformer for base conditions. The new generator contributes 8 MVA to the overload.

#### **Single Contingency Conditions**

- ◆ Overloads on the Doubs No. 1, No. 2, No. 3 and No. 4, 500-230 kV transformers for an outage of the Doubs-Brighton 500 kV line. The new generator contributes 35 MVA, 2 MVA, 22 MVA and 16 MVA respectively to the overloads.
- ◆ Overload on the Doubs-Aqueduct 230 kV line for an outage of the Doubs-Station H 230 kV line. The new generator contributes 6 MVA to the overload.
- ◆ Overload on the Doubs-Station H 230 kV line for an outage of the Doubs-Aqueduct 230 kV line. The new generator contributes 3 MVA to the overload.

#### **Multiple Contingency Conditions**

No overloads or other system deficiencies were identified as being caused by credible multiple contingencies.

#### **Short Circuit Conditions**

17 - 230 kV circuit breakers at Doubs Substations were identified as exceeding their maximum interrupting capacity.

## **ANALYSIS RESULTS (Cont'd)**

### **Interconnection along the Doubs-Loudoun 500 kV line**

#### **Normal (Base) System Conditions**

- ◆ Overloads on the Doubs No. 1 and No. 3, 500-230 kV transformers for base conditions. The new generator contributes 16 MVA and 5 MVA respectively to the overloads.

#### **Single Contingency Conditions**

- ◆ Overloads on the Doubs No. 1, No. 2, No. 3 and No. 4, 500-230 kV transformers for an outage of the Doubs-Brighton 500 kV line. The new generator contributes 46 MVA, 13 MVA, 33 MVA and 27 MVA respectively to the overloads.
- ◆ Overload on the Doubs-Aqueduct 230 kV line for an outage of the Doubs-Station H 230 kV line. The new generator contributes 9 MVA to the overload.
- ◆ Overload on the Doubs-Station H 230 kV line for an outage of the Doubs-Aqueduct 230 kV line. The new generator contributes 5 MVA to the overload.

#### **Multiple Contingency Conditions**

No overloads or other system deficiencies were identified as being caused by credible multiple contingencies.

#### **Short Circuit Conditions**

17 - 230 kV circuit breakers at Doubs Substations were identified as exceeding their maximum interrupting capacity.

**Note: The generator contributions to overloads stated above represent only the amount of loading in excess of the applicable facility rating for the base or contingency case examined. They do not represent the generators' full contribution to the subject facility's loading.**

## **SYSTEM REINFORCEMENTS**

### **Interconnection at the 230 kV bus at Doubs Substation**

#### **Required Direct Interconnection facilities and System Reinforcements**

- ◆ Extend 230 kV “B” Bus, install new 230 kV cross bus and 3 - 230 kV breakers at Doubs Substation with associated metering and other facilities – Cost: \$2,670,000.
- ◆ Construct 8.0 miles of 230 kV line using 1272 kcmil ACSR conductor from Doubs Substation to PEPCO’s Station H Substation and change the connection of the service to Aqueduct Substation to new line – Cost: \$13,890,000.
- ◆ Install a 230 kV breaker terminal at PEPCO’s Station H Substation with 230 kV metering and associated facilities – Cost: \$460,000.

#### **Required Short Circuit Reinforcements**

- ◆ Replace 18 - 230 kV and 9 - 138 kV overstressed circuit breakers at Doubs and neighboring substations – Cost: \$4,770,000

#### **Summary**

Total estimated cost to interconnect the proposed generation facilities at the 230 kV bus at Doubs Substation = \$21,790,000.

### **Interconnection at the 500 kV bus at Doubs Substation**

#### **Required Direct Interconnection facilities and System Reinforcements**

- ◆ Install 500 kV breaker for interconnection at Doubs Substation and associated metering and other facilities, replace 1 - 500 kV breaker and install one additional 500 kV breaker – Cost: \$2,780,000.
- ◆ Relocate 500 kV line terminations for the Brighton and Loudoun 500 kV lines at Doubs Substation– Cost: \$1,380,000.
- ◆ Install fifth 210/280/350 MVA, 500-230 kV transformer with 500 kV motorized disconnects and a 230 kV breaker and relocate one existing 230 kV breaker at Doubs Substation – Cost: \$6,470,000.
- ◆ Extend 230 kV “B” Bus, install new 230 kV cross bus and 2 - 230 kV breakers at Doubs Substation and other facilities – Cost: \$2,230,000.

## **SYSTEM REINFORCEMENTS (Cont'd)**

### **Interconnection at the 500 kV bus at Doubs Substation (Cont'd)**

#### **Required Direct Interconnection facilities and System Reinforcements (Cont'd)**

- ◆ Construct 8.0 miles of 230 kV line using 1272 kcmil ACSR conductor from Doubs Substation to PEPCO's Station H Substation and change the connection of the service to Aqueduct Substation to new line – Cost: \$13,890,000.
- ◆ Install a 230 kV breaker terminal at PEPCO's Station H Substation with 230 kV metering and associated facilities – Cost: \$460,000.

#### **Required Short Circuit Reinforcements**

- ◆ Replace 17 - 230 kV overstressed circuit breakers at Doubs Substation – Cost: \$3,400,000.

#### **Summary**

Total estimated cost to interconnect the proposed generation facilities at the 500 kV bus at Doubs Substation = \$30,610,000.

### **Interconnection along the Doubs-Loudoun 500 kV line**

#### **Required Direct Interconnection facilities and System Reinforcements**

- ◆ Construct 500 kV switching station with 3 - 500 kV breakers and ring bus to accommodate terminations for 2 - 500 kV lines and one generation interconnection with associated metering and other facilities – Cost: \$7,370,000.
- ◆ Construct 500 kV loop line using 2-2032 kcmil ACSR conductor to loop the existing Doubs-Loudoun line into new 500 kV switching station – Cost: \$760,000.
- ◆ Install 1 - 500 kV breaker and replace 1 - 500 kV breaker at Doubs Substation – Cost: \$1,830,000.
- ◆ Relocate 500 kV line terminations for the Brighton and Loudoun 500 kV lines at Doubs Substation – Cost: \$1,380,000.
- ◆ Install fifth 210/280/350 MVA, 500-230 kV transformer with 500 kV motorized disconnects and a 230 kV breaker and relocate one existing 230 kV breaker at Doubs Substation – Cost: \$6,470,000.

## **SYSTEM REINFORCEMENTS (Cont'd)**

### **Interconnection along the Doubs-Loudoun 500 kV line (Cont'd)**

#### **Required Direct Interconnection facilities and System Reinforcements (Cont'd)**

- ◆ Extend 230 kV “B” Bus, install new 230 kV cross bus and 2 - 230 kV breakers at Doubs Substation and other facilities – Cost: \$2,230,000.
- ◆ Construct 8.0 miles of 230 kV line using 1272 kcmil ACSR conductor from Doubs Substation to PEPCO’s Station H Substation and change the connection of the service to Aqueduct Substation to new line – Cost: \$13,890,000.
- ◆ Install a 230 kV breaker terminal at Station H Substation with 230 kV metering and associated facilities – Cost: \$460,000.

#### **Required Short Circuit Reinforcements**

- ◆ Replace 17 - 230 kV overstressed circuit breakers at Doubs Substation – Cost: \$3,400,000.

#### **Summary**

Total estimated cost to interconnect the proposed generation facilities along the Doubs-Loudoun 500 kV line = \$37,790,000.