T174 Yukon – Browns Runs 500kV
Generation Interconnection

General

The Interconnection Customer has proposed a 930 MW that gas-fired combined cycle generating facility be located at the intersection of Interstate I-70 and the Smithton exit #49 in South Huntington Township, Westmoreland County, Pennsylvania. The project will interconnect with the Allegheny Power (AP) transmission system at a newly constructed Rhodes Lane 500 kV switching station into which the Browns Run (Hatfield) - Yukon 500 kV circuit will be looped. The project was evaluated for compliance with reliability criteria for summer peak conditions in 2013. The proposed back-feed date for the project is June 1, 2010 with a commercial in service date of June 1, 2011.

Point of Interconnection: A new AP Rhodes Lane 500 kV switching station to be constructed on the Browns Run (Hatfield) – Yukon 500 kV circuit.

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

The scope of work and estimated costs for the direct connection facilities is as follows:

1) Construct a new Rhodes Lane 500 kV substation consisting of the following: three (3) 500 kV circuit breakers configured as a ring bus; three (3) dead end structures; seven (7) 500 kV air switches; and 500 kV interconnection metering. The substation will include a control building to house all protective relaying, metering and all communications equipment, including SCADA RTU facilities.

The estimated cost to construct the 500kV substation is **$13,500,000 in 2010 dollars.**

The estimate assumes that the customer site will be adjacent to the AP site, and site preparation and site grading will be done by the developer.

2) Loop the Browns Run (Hatfield) – Yukon 500 kV circuit into the Rhodes Lane switching station. It is assumed that the developer will provide Right of Way (ROW) at no cost to Allegheny Power.

The estimated cost to perform this work is **$1,500,000 in 2010 dollars.**

The estimated time to complete this work is **30 months** after the receipt of an executed Interconnection Service Agreement and Construction Service Agreement.

Interconnection Customer Scope of Direct Connection Work

The customer will interconnect to the Allegheny Power Rhodes Lane substation via a short customer-owned 500 kV circuit from the customer facility. The above cost estimates do not include

construction of that line. Route selection, line design, right-of-way acquisition and construction of such lines will be entirely the responsibility of the interconnection customer.

While we can't mandate that our personnel install protective relaying and communications equipment at the generator site, Allegheny Power has responsibility for designing the protection scheme and providing specifications for all relays to be employed on the interconnection breaker terminal at the generation site to assure that the protective relaying equipment will be compatible with that installed on the interconnection breaker terminal at the new switching station. The relaying package will likely include both primary and backup protection. Allegheny Power is also responsible for testing and calibrating all relays and performing all tests to assure that relaying at the generator site is properly installed and functional.

The estimated total cost of this engineering and field test effort is **$5,000 in 2010 dollars**.

Note: Purchase and installation of protective relaying and associated equipment at the generation site is not included in this scope of work. This phase of work is the responsibility of the customer.

The estimated cost for Allegheny Power Controls Engineering to complete a coordination review of the area, develop new relay settings, and implement the required changes is approximately **$5,000 in 2010 dollars**.

It is assumed that a fiber optic interface will be used for the protection channel between the AP and developer's stations. The Interconnection Customer will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with the Allegheny Power Applicable Standards.

Network Impacts

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No base case overloads were identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only for the full energy output. Stuck breaker and bus fault contingencies will be performed for the System Impact Study)

No overloads due to multiple contingency events were identified.

Short Circuit

No breakers were identified as being over their maximum interrupting rating.

Listed below are the positive and zero sequence source equivalent impedance at a point on the existing Hatfield – Yukon 500 kV circuit approximately 2.8 miles from Yukon SS with the line, GSU, and generators OPEN.

Positive: (0.00020+j0.00489)
Zero: (0.00065+j0.00625)

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Stability and Reactive Power Requirements

Will be performed during the Queue T174 System Impact Study.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts", initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the System Impact Study)

T174 contributed significant fault current to nine 500 kV breakers at the Hatfield switching station which had been previously identified as over-dutied. An allocated share of the cost of this upgrade may be assigned to the T174 project.

They are:

HATFIELD 500.kV HFL-1
HATFIELD 500.kV HFL-3
HATFIELD 500.kV HFL-4
HATFIELD 500.kV HFL-6
HATFIELD 500.kV HFL-7
HATFIELD 500.kV HFL-9
HATFIELD 500.kV HFL-5
HATFIELD 500.kV HFL-8
HATFIELD 500.kV HFL-2

The estimated cost to replace the nine 500 kV breakers at the Hatfield switching station is **$9,000,000 in 2010 dollars**.

While the information in this report is considered accurate and reasonable for the scope of work defined, it should be noted however, that the cost figures are conceptual in nature at this stage, as an engineering team has not yet been assigned to the project. Obviously, any change to the scope of work will require that the estimates be revisited. The estimates in this report do not include tax gross-up.

Delivery of Energy Portion of Interconnection Request

(PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with Network Upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection Request).

As a result of the aggregate energy resources in the area, the following violations were identified:

None.

Other Concerns

This Generation Interconnection Feasibility Study Report included load flow testing with single contingency and common structure contingencies modeled. The System Impact Study will include line fault with stuck breaker contingencies and bus fault contingencies. Reliability violations may be identified during this phase of the project which were not previously noted. A stability study may identify required system upgrades or operating restrictions not noted in this report.

It should be noted that the model used in this study included the TrAIL 500 kV project, with a June 2011 in-service date, and the PATH 765/500 kV project, with a June 2012 in-service date. In the event that either of these facilities is delayed, the interconnection of the T174 project may not be permitted to interconnect on the proposed schedule.