Feasibility Study for Interconnection of 500 MW in AEP Control Area

Southwest Transmission Planning
(#OAIP 00 004)

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Executive Summary

Customer has requested a feasibility study for interconnection of a merchant in AEP West Control Area near an existing 345 kV substation. The plant will have a maximum output of 500 MW and the projected in service date is 2005.

The principal objective of this study is to identify the costs associated with connecting the plant to PSO's system and what system problems and potential system modifications might be necessary to facilitate the installation of the plant. For the purposes of this study, two (2) scenarios were studied. The first consisted of sending 250 MW to Oklahoma Gas & Electric (OG&E) and 250 MW to PSO. The second scenario consisted of sending the whole 500 MW to PSO.

The steady-state analysis considers the impact of an 500 MW transfer on transmission line loading and transmission bus voltages for outages of single, double, and triple circuit transmission lines, autotransformers, and generators on the western portion of AEP's system. The 00 Series Southwest Power Pool 2004 summer peak base case was used for this study.

The cost of interconnecting the generator to AEP's system is $3.3 million. This cost does not include any cost that might be associated with short circuit study results or stability study results. These costs will be determined when and if a System Impact Study is requested.

The analysis in this document shows that to accommodate a 500 MW transfer, upgrades will be required on the western portion of AEP's 69 kV and 138 kV transmission systems. These upgrades are listed in Tables 1 and 2. This study provides only preliminary results regarding the transfer of power from the generation facility to the requested locations and does not guarantee that if the recommended improvements are made that the full 500 MW can be transferred.

Study Methodology

The AEP and Southwest Power Pool (SPP) criteria state that the following conditions be met in order to maintain a reliable and stable system.

1) More probably contingency testing .... must conclude that

   a) All facility loadings are within their emergency ratings and all voltages are within their emergency limits (0.90-1.05 per unit) and
   b) Facility loadings can be returned to their normal limits within four hours

2) Less probable contingency testing .... shall conclude that

   a) Neither uncontrolled islanding, nor uncontrolled loss of large amounts of load will result.

More probable contingency testing is defined as losing any single piece of equipment or multi-circuit transmission lines. Less probable contingency testing involves the loss of any two critical pieces of equipment such as 345kV autotransformers and generating units or the loss of critical transmission lines in the same right-of-way.

The 00 Series Southwest Power Pool 2004 summer peak base case was used to model the transmission network and system loads. A base Southwest Power Pool Case for 2005 summer peak was not available at the time of this study.

Using the created models and the ACCC function of PSS\E, single and select double contingency outages on the CSW system were analyzed.

System Improvements

In order to accommodate the total of 500 MW the following improvements must be made on the western portion of AEP's system.

Table 1: 250 MW to OG&E and 250 MW to PSO

SYSTEM IMPROVEMENT	ESTIMATED COST (2000 DOLLARS)
Construct new 345kV 3-breaker ring bus substation.	$3,300,000
Subtotal for interconnection	**$3,300,000**
Rebuild Bann – Alumax Tap (0.67 miles) with 1590 ACSR	$165,000
Replace Alumax Tap Switch	$20,000
Rebuild Broken Bow to Bethel (9.19 miles) with 795 ACSR and replace CTs at Broken Bow	$1,850,000
Rebuild Hobart – Roosevelt Amoco Tap (10 miles) with 795 ACSR	$2,000,000
Rebuild Hugo – Antlers (15.76 miles) w/795 ACSR	$4,200,000
Rebuild Fixico Tap – Maud (11.83 miles) with 795 ACSR	$3,000,000
Subtotal for Transmission Service Improvements	**$11,235,000**
TOTAL	**$14,535,000**

Interconnection Cost $3,300,000
System Improvements Cost $14,535,000

Table 2: 500 MW to PSO

SYSTEM IMPROVEMENT	ESTIMATED COST (2000 DOLLARS)
Construct new 345kV 3-breaker ring bus substation.	$3,300,000
Subtotal for interconnection	**$3,300,000**
Rebuild Bann – Alumax Tap (0.67 miles) with 1590 ACSR	$165,000
Replace Alumax Tap Switch	$20,000
Rebuild Broken Bow to Bethel (9.19 miles) with 795 ACSR and replace CTs at Broken Bow	$1,850,000
Replace NES wavetrap	$20,000
Rebuild Hugo – Antlers (15.76 miles) w/795 ACSR	$4,200,000
Rebuild Fixico Tap – Maud (11.83 miles) with 795 ACSR	$3,000,000
Subtotal for Transmission Service Improvements	**$9,255,000**
TOTAL	**$12,555,000**

Interconnection Cost $3,300,000
System Improvements Cost $12,555,000

NOTE: Under this scenario, an outage of either of the 161/138 kV autotransformers (owned by GRDA) at Catoosa causes the other autotransformer to overload. The solution and estimated cost for this overload and any other overloads on systems other than AEP's are not included in this study.