



***Facility Study for Generation  
Interconnection Request  
GEN – 2006 – 010***

***SPP Coordinated Planning  
(#GEN-2006-010)***

**May, 2007**

## Summary

American Electric Power Southwest Transmission Planning (AEP) performed the following study at the request of the Southwest Power Pool (SPP) for SPP Generation Interconnection request Gen-2006-010. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff Attachment V, which covers new generation interconnections on SPP's transmission system.

Pursuant to the tariff, AEP was asked to perform a detailed Facility Study of the generation interconnection request to satisfy the Facility Study Agreement executed by the requesting customer and SPP.

### Affected System Facilities

SPP also coordinated with Affected Systems that were deemed to may have been affected by generation interconnection request #GEN-2006-010. Potential Affected Systems were determined to be Arkansas Electric Cooperative Corporation (AECC) and Entergy Arkansas Inc. (EAI).

The Entergy Independent Coordinator of Transmission (ICT), which is a separate division of SPP was contacted to perform a short circuit analysis for the interconnection of GEN-2006-010. The ICT determined that no facilities were affected by the addition of GEN-2006-010.

Arkansas Electric Cooperative Corporation (AECC) was contacted to perform a short circuit and facility analysis for its facilities and the facilities of its member cooperatives. AECC determined that the conversion of the 115kV transmission line from Patterson to GEN-2006-010 would affect the Southwest Arkansas Electric Cooperative (SWAECC) Millwood 115kV substation (referred to as Ashdown REC in the following AEP study). Certain high side transmission voltage facilities rated at 115kV will need to be replaced with 138kV equipment. AECC also determined that two 138kV circuit switchers at SWAECC delivery points and one 138kV circuit switcher at an AECC delivery point would have its short circuit interrupt ratings exceeded by the addition of GEN-2006-010. The total costs for SWAECC and AECC facilities are listed below.

**Table 1. Affected System Facilities**

<b>Facility</b>	<b>Cost</b>
Convert SWAECC Millwood Substation high side from 115kV to 138kV	\$1,000,000
Replace Circuit Switcher at SWAECC Ashdown West Substation (due to short circuit considerations)	\$ 200,000
Replace Circuit Switcher at SWAECC McNab Substation (due to short circuit considerations)	\$ 200,000
Replace Circuit Switcher at AECC Foreman South Substation (due to short circuit considerations)	\$ 250,000
<b>Total</b>	<b>\$1,650,000</b>

***Generation Interconnection  
Facilities Study***

***For***

***GEN-2006-010***

***American Electric Power  
Southwest Transmission Planning***

**April 2007**

## Table of Contents

Table of Contents	4
Introduction	5
Interconnection Facilities	6
Interconnection Costs	8
One-line Diagram of Area Transmission Facilities	9
Area Transmission Map	10

## **Introduction**

The Southwest Power Pool (SPP) has requested a Facility Study for interconnecting a 610/620 MW (summer/winter net rating) coal-fired steam turbine power plant in Hempstead County, Arkansas. The proposed in-service date is June 1, 2011. The Customer's plant will consist of one coal-fired steam turbine generator.

The purpose of this study is to identify the facilities and their costs that are needed to interconnect the new generator with AEP's transmission system. This facilities study is done in conjunction with SPP Impact Study for Generation Interconnection Request GEN-2006-010.

The interconnection point for the new generation will be AEP's Turk 138/115 kV Substation, which will be constructed in Hempstead County for this purpose. AEP will construct the transmission facilities detailed in Table 1 to connect Turk Substation to the transmission grid.

## **Interconnection Facilities (See Figures 1 and 2)**

The design and construction of the new facilities will meet all AEP specifications for stations and transmission lines.

### **Turk 138 kV Substation**

A new Turk 138 kV substation will be built to facilitate the interconnection. The station will include twelve 138 kV breakers, one of which will be operated at 115 kV, and associated equipment. Two 138-115 kV autotransformers will be moved into this station from Patterson Substation. The costs provided herein do not include a short 138 kV line that will be required to connect the generation to the 138 kV bus and two more short 138 kV lines are needed to connect the reserve auxiliary transformer and the coal-handling transformer to the 138 kV bus. See Figure 1 for details.

The design and construction of the new station will meet all AEP specifications for stations. Bus work and disconnect switches will be designed to accommodate the loading requirements, and circuit breakers will be rated to ensure adequate load and fault interrupting capability. Metering equipment will be installed to monitor the plant output and will meet the required accuracy specifications. AEP will own, operate and maintain the station.

### **Sugar Hill 138 kV Substation**

A new 138 kV terminal will be added at Sugar Hill Substation for the new Turk to Sugar Hill 138 kV line. This will consist of two 138 kV breakers and associated equipment. See Figure 1 for details.

### **Southeast Texarkana 138 kV Substation**

A new 138 kV terminal will be added at Southeast Texarkana Substation for the new Turk to Southeast Texarkana 138 kV line. This will consist of two 138 kV breakers and associated equipment. See Figure 1 for details.

### **Patterson 138 kV Substation**

A new 138 kV terminal will be added at Patterson for the 138 kV line from Patterson to Okay that will be converted from 115 kV to 138 kV. This 138 kV bus will be converted to a breaker and half scheme. Six 138 kV breakers will be added and one will be replaced. Two 138-115 kV autotransformers will be removed and relocated to Turk Substation. See Figure 1 for details.

### **Okay Substation**

Three single-phase 115-69 kV autotransformers will be replaced with one 90 MVA, three-phase, 138-69 kV autotransformer, and the high side of substation will be converted to 138 kV. See Figure 1 for details.

### Turk - Sugar Hill 138 kV line

A new twenty-four mile, 138 kV line will be constructed from Turk to Sugar Hill with 1590 ACSR conductor. See Figure 1 for details.

### Turk - Southeast Texarkana 138 kV line

A new thirty-four mile, 138 kV line will be constructed from Turk to Southeast Texarkana with 1590 ACSR conductor. See Figure 1 for details.

### Turk - Hope 115 kV line

A new two mile, 138 kV, 1590 ACSR line section (operated at 115 kV) will be constructed from Turk Substation to the existing Okay-Hope 115 kV transmission line to form a Turk-Hope 115 kV line.

### Turk - Okay 138 kV line

A new two mile, 138 kV, 1590 ACSR line section from Turk Substation to the existing Okay-Hope 115 kV line will be constructed. Twelve miles of 115 kV line from Okay Substation to this new line section will be rebuilt to 138 kV, 1590 ACSR, to form a Turk-Okay 138 kV line.

### Okay - Patterson 138 kV line

Nineteen miles of 115 kV line from Okay to Patterson will be rebuilt to 138 kV and reconductored with 1590 ACSR.

### Ashdown REC

Ashdown REC is a point of delivery for Arkansas Electric Cooperative Corporation (AECC) that is served from the Okay - Patterson line. Switches 6276 and 6277 will be replaced with 3000 A, 138 kV switches and the conductor between them will be replaced with 1590 ACSR.

### Short Circuit Fault Duty Evaluation

It is standard practice for AEP to recommend replacing a circuit breaker when the current through the breaker for a fault exceeds 100% of its interrupting rating with recloser de-rating applied, as determined by the ANSI/IEEE C37.5-1979, C37.010-1979 & C37.04-1979 breaker rating methods.

In the AEP system, two 138 kV breakers (3300 and 3310 at Bann Substation) were found to exceed their interrupting capability after the addition of the 610/620 MW (summer/winter net rating) of generation and related facilities. The cost to replace these two breakers is included in the costs associated with the Gen-2006-010 interconnection.

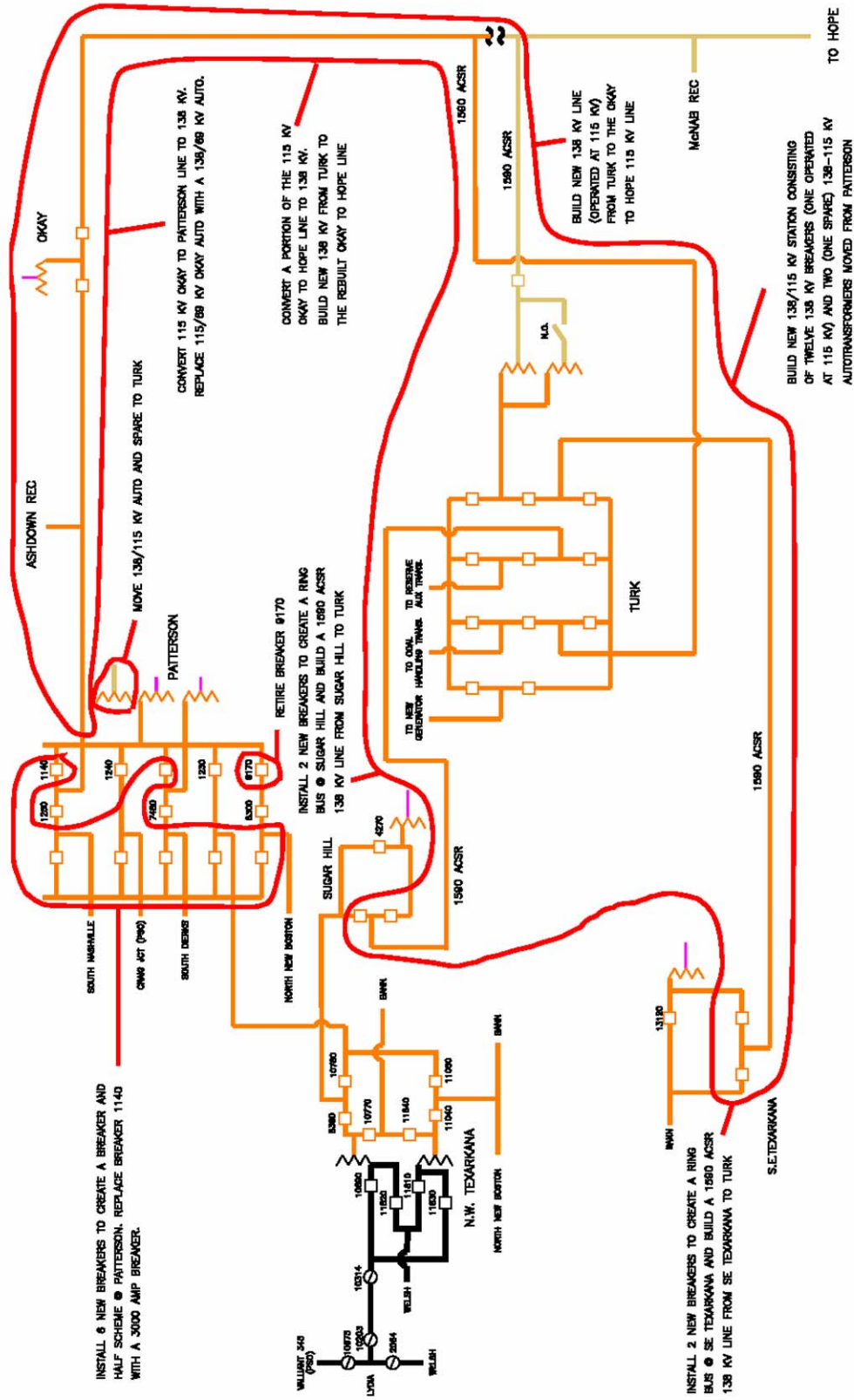
## Interconnection Costs

Listed below are the costs associated with interconnecting the 610/620 MW (summer/winter net rating) generation facility to the AEP transmission system.

SYSTEM IMPROVEMENT	ESTIMATED COST
Turk 138/115 kV Substation: Build new substation with twelve 138 kV breakers, one of which will be operated at 115 kV. Relocate two 138-115 kV autotransformers from Patterson to Turk.	\$9,110,000
Sugar Hill 138 kV Substation: Add one 138 kV terminal including two 138 kV breakers.	\$1,570,000
Southeast Texarkana 138 kV Substation: Add one 138 kV terminal including two 138 kV breakers.	\$1,210,000
Patterson 138 kV Substation: Install six 138 kV breakers to convert the station to a breaker and half scheme. Replace one 138 kV breaker. Remove two 138-115 kV autotransformers and relocate to Turk Substation.	\$6,670,000
Okay Substation: Replace three single-phase 115-69 kV autotransformers with one 90 MVA, three-phase 138-69 kV autotransformer and convert high side of station to 138 kV.	\$3,400,000
Turk - Sugar Hill 138 kV line: Build a new twenty-four mile, 138 kV, 1590 ACSR line.	\$18,130,000
Turk - Southeast Texarkana 138 kV line: Build a new thirty-four mile, 138 kV, 1590 ACSR line.	\$25,640,000
Turk - Hope 115 kV line: Build a new two mile, 138 kV, 1590 ACSR line section (operated at 115 kV) from Turk Substation to the existing Okay-Hope 115 kV line to form a Turk - Hope 115 kV line.	\$1,520,000
Turk - Okay 138 kV line: Build a new two mile, 138 kV, 1590 ACSR line section from Turk Substation to the existing Okay-Hope 115 kV line and rebuild twelve miles of 115 kV line to Okay Substation to 138 kV, 1590 ACSR, to form a Turk - Okay 138 kV line.	\$9,190,000
Okay - Patterson 138 kV line: Rebuild nineteen miles of 115 kV line to 138 kV and reconductor with 1590 ACSR.	\$10,810,000
Ashdown REC (AECC delivery point): Replace switches 6276 and 6277 with 3000 A, 138 kV switches and replace the conductor between them with 1590 ACSR.	\$290,000
Bann Substation: Replace 138 kV breakers 3300 & 3310 (short circuit).	\$300,000
<b>TRANSMISSION INTERCONNECTION FACILITY TOTAL COSTS</b>	<b>\$87,840,000</b>

**TABLE 1**





TURK AREA TRANSMISSION – 610/620 MW (SUMMER/WINTER) COAL PLANT

FIGURE 1  
ONE-LINE DIAGRAM OF AREA TRANSMISSION FACILITIES

