SPP Southwest Power Pool

# *Feasibility Study For Generation Interconnection Request GEN-2005-024*

***SPP Tariff Studies***
***(#GEN-2005-024)***

**May 18, 2006**

## Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 172MW of combustion generation within the service territory of American Electric Power West (AEPW) in Tulsa County Oklahoma. The proposed point of interconnection is in the existing Riverside 138kV Substation. This 138kV substation is owned by AEPW. The proposed in-service date is June 1, 2007.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 172MW of generation without transmission system reinforcements within the local AEPW transmission system. The requirements for interconnection consist of adding a 138-13.8kV generator step-up unit (GSU) at the Customer's new facilities. This 138-13.8kV transformer addition shall be installed and maintained by the Customer. AEPW will install new bus, breaker, switches and metering as required in the existing substation for a new 138kV terminal to accommodate the Customer's facilities.

The total cost for adding the GSU as part of the new 138-13.8kV facilities will be estimated by the Customer. The total cost for adding the new bus, breaker, switches and metering as required in the existing Riverside 138kV Substation, the interconnection facility, to accommodate new 138kV facilities is estimated to be $906,000 by AEPW. To accommodate the new terminal, four 138kV lines must be relocated. Given the estimated cost to relocate the 138kV lines of $1,232,000, the total estimated Network Upgrade cost is $2,138,000. No other Network Constraints in the SPP system are required as noted in Table 3 and this may be verified with a transmission service request and associated studies. These Network Constraints are in the local area of the new generation when this generation is sunk within the SPP footprint for the Energy Resource Interconnection request. With a defined source and sink in a Transmission Service Request, this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements. This cost does not include building 13.8kV facilities within the Customer's facilities.

In Table 4, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. These values may be used by the Customer for future analyses including the determination of lower generation capacity levels that may be installed. When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower. When a facility is overloaded for more than 10 contingencies, then only the results with the 10 highest values of loading may be included in this table. There are other proposed generation additions in the general area of the Customer's facility.

## Introduction

<OMITTED TEXT> (Customer) has requested a feasibility study for the purpose of interconnecting 172MW of combustion generation within the service territory of American Electric Power West in Tulsa County Oklahoma. The existing Riverside 138kV Substation is owned by AEPW, and the proposed generation interconnection is with AEPW in this facility. The proposed in-service date is June 1, 2007.

## Interconnection Facilities

The primary objective of this study is to identify the system problems associated with connecting the plant to the area transmission system. The Feasibility and other subsequent Interconnection Studies are designed to identify attachment facilities, Network Upgrades and other direct assignment facilities needed to accept power into the grid at the interconnection receipt point.

The requirements for interconnection consist of adding a new 138-13.8kV GSU by the Customer as part of its new facilities and interconnecting in the AEPW Riverside Substation via a new 138kV terminal. This station addition shall be installed and maintained by the Customer. A specific route of the Customer's 138kV facilities to serve its 138-13.8kV station has been defined. It is assumed that obtaining all necessary right-of-way for the new 138kV facilities will not be a significant expense.

The total estimated cost for AEPW to add new 138kV facilities in the Riverside 138kV Substation, the interconnection facility, is $2,138,000 including the relocation of four 138kV lines. No other Network Constraints in the SPP system were identified as noted in Table 3. These estimates will be refined during the development of the impact study based on the final designs. This cost does not include building the customer's 138kV facilities into the existing Riverside Substation. The Customer is responsible for all 138kV facilities up to the point of interconnection. This cost does not include the Customer's 138-13.8kV facilities and the cost estimate should be determined by the Customer.

The costs of interconnecting the facility to the AEPW transmission system are listed in Table 1 & 2. **These costs do not include any cost that might be associated with short circuit study results or dynamic stability study results**. These costs will be determined when and if a System Impact Study is conducted.

## Table 1: Direct Assignment Facilities

| Facility | ESTIMATED COST (2006 DOLLARS) |
|---|---|
| Customer – 138-13.8 kV Station facilities. | * |
| Customer – 138kV facilities between Customer facilities and existing AEPW 138kV Substation. | * |
| Customer - Right-of-Way for Customer facilities. | * |
| | |
| | |
| **Total** | ***** |

Note: *Estimates of cost to be determined by Customer.

## Table 2: Required Interconnection Network Upgrade Facilities

| Facility | ESTIMATED COST (2006 DOLLARS) |
|---|---|
| AEPW – Add 138kV bus, breaker, switches and metering in the existing Riverside Substation for a new terminal. | $906,000 |
| | |
| AEPW – Relocate 81-513, Riverside – 96$^{th}$ & Yale 138kV line | 225,000 |
| AEPW – Relocate 81-550, Riverside – Tulsa Power Station 138kV line | 557,000 |
| AEPW – Relocate 81-809, Riverside – South Hudson 138kV line | 225,000 |
| AEPW – Relocate 81-522, Riverside – Tulsa Power Station 138kV line | 225,000 |
| AEPW – Subtotal, Relocate four 138kV lines at the Riverside Substation to accommodate the new terminal. | 1,232,000 |
| | |
| **Total** | **$2,138,000** |

## Table 3: Network Constraints

| Facility |
| --- |
| None |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |

## Table 4: Contingency Analysis Results

| Facility | Model & Contingency | Facility Loading (% Rate B) Or Voltage (PU) | ATC (MW) | Date Required (M/D/Y) |
|---|---|---|---|---|
| None | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Note: When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. If the loading of a facility is higher, the level of ATC will be lower.

## Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2007 April, 2007, 2008 & 2011 Summer and Winter Peak, and 2016 Summer Peak models. The output of the Customer's facility was offset in each model by a reduction in output of existing online SPP generation. The proposed in-service date of the generation is June 1, 2007. The available seasonal models used were through the 2016 Summer Peak of which is the end of the current SPP planning horizon.

The analysis of the Customer's project indicates that, given the requested generation level of 172MW and location, additional criteria violations will not occur on the existing SPP facilities under steady state conditions in the peak seasons. There are no other proposed generation additions in the general area of the Customer's facility.

## Powerflow Analysis Methodology

The Southwest Power Pool (SPP) criteria states that: "The transmission system of the SPP region shall be planned and constructed so that the contingencies as set forth in the Criteria will meet the applicable *NERC Planning Standards* for System Adequacy and Security – Transmission System Table l hereafter referred to as NERC Table l) and its applicable standards and measurements".

Using the created models and the ACCC function of PSS\E, single contingencies in portions or all of the modeled control areas of American Electric Power West, Grand River Dam Authority, OG&E Electric Services and Southwestern Power Administration, were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

## Conclusion

The minimum cost of interconnecting the Customer project is estimated at $2,138,000 for AEPW's interconnection Network Upgrade facilities listed in Table 2 excluding upgrades of other SPP transmission facilities listed in Table 3 of which are Network Constraints. At this time, the cost estimates for other Direct Assignment facilities including those in Table 1 have not all been defined by the Customer. As stated earlier, local projects that were previously queued are assumed to be in service in this Feasibility Study.

In Table 4, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. These values may be used by the Customer to determine lower generation capacity levels that may be installed. When transmission service associated with this interconnection is evaluated, the loading of the facilities listed in this table may be greater due to higher priority reservations. When a facility is overloaded for more than 10 contingencies, then only the results with the 10 highest values of loading may be included in this table.

These interconnection costs do not include any cost that may be associated with short circuit or transient stability analysis. These studies will be performed if the Customer signs a System Impact Study Agreement.

The required interconnection costs listed in Table 2 and other upgrades associated with Network Constraints listed in Table 3 do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer requests transmission service through Southwest Power Pool's OASIS.

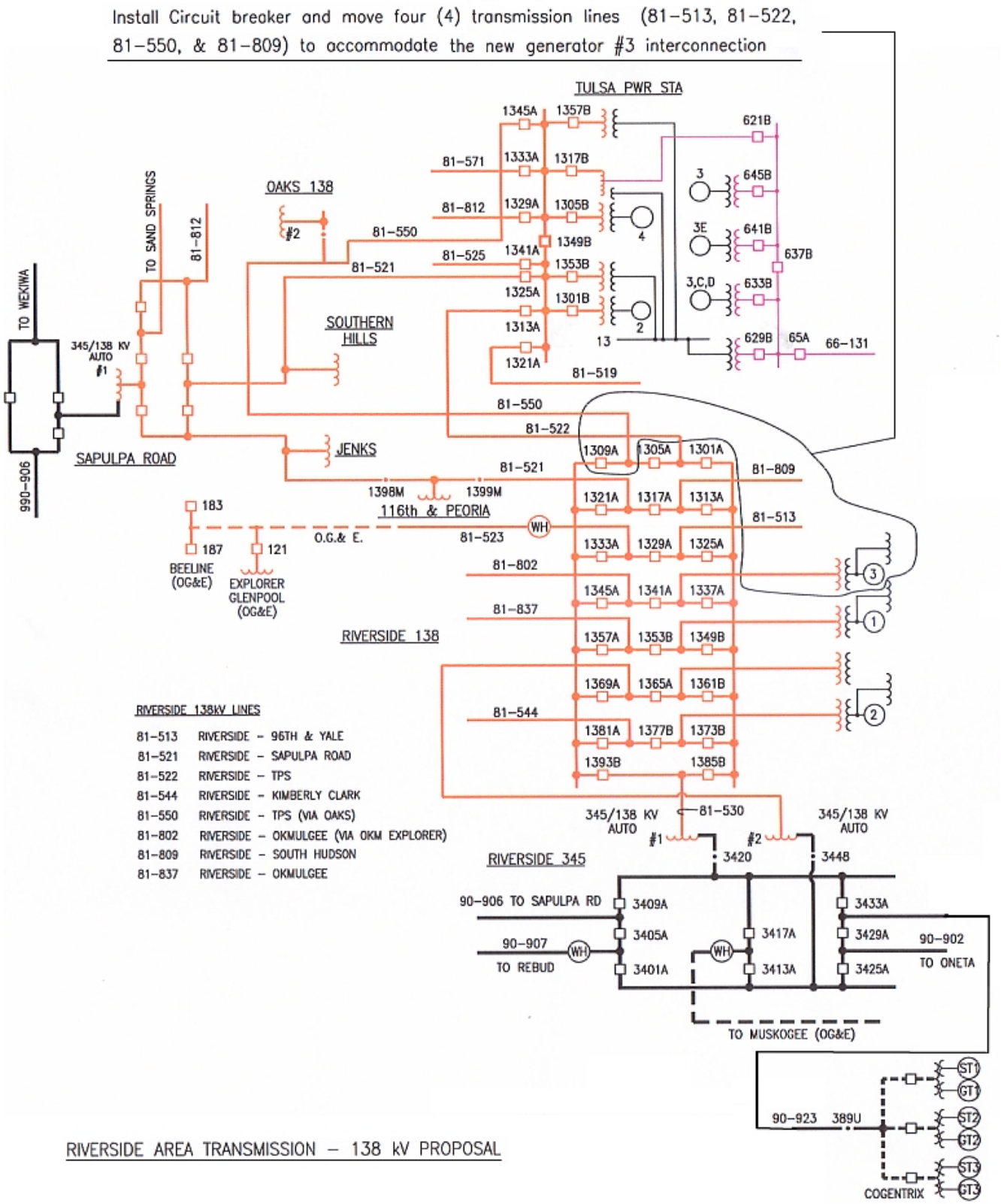


**Figure 1: Proposed Interconnection**
**(Final substation design to be determined)**

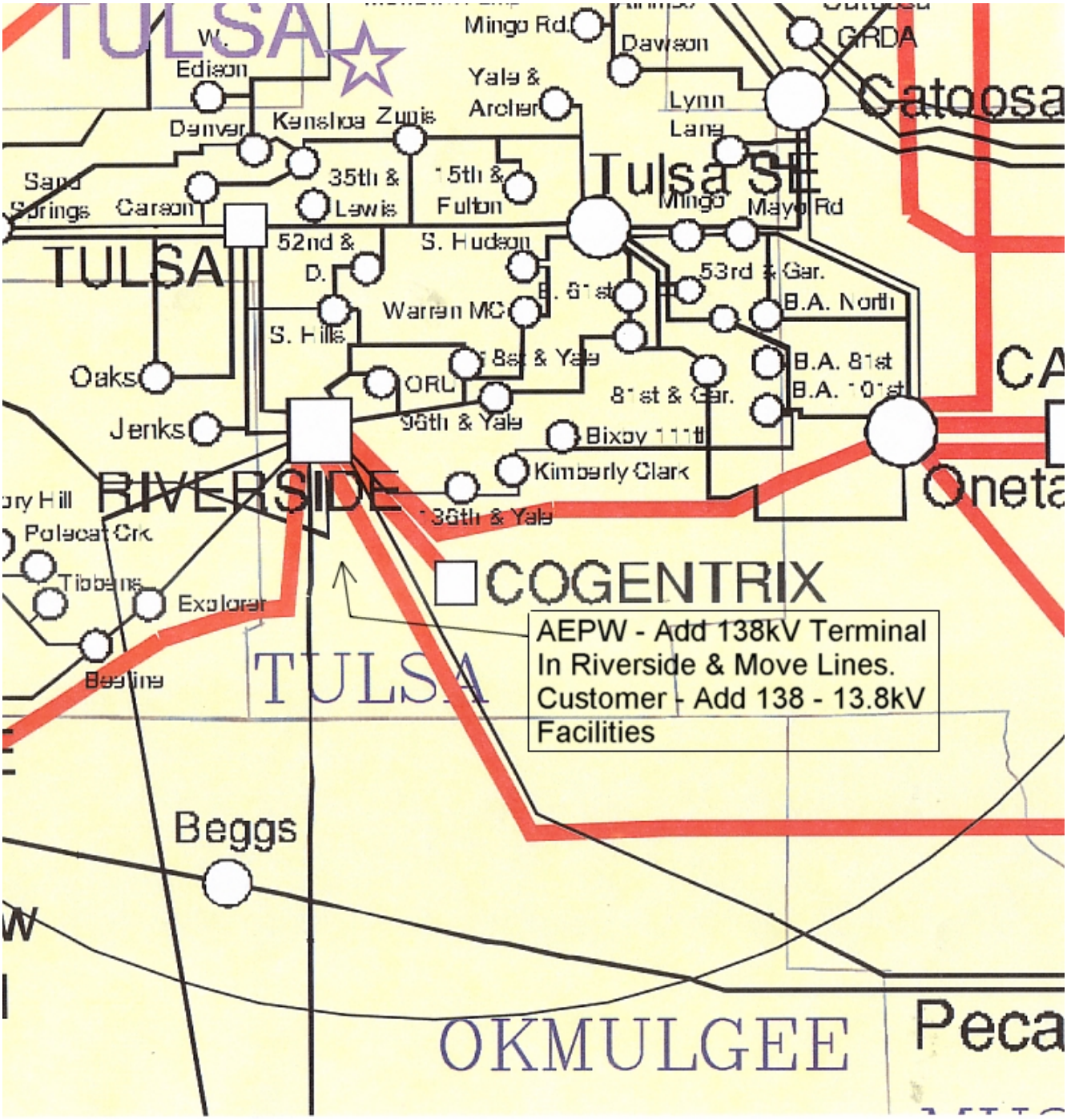


**Figure 2: Map Of The Surrounding Area**