



***Feasibility Study  
For  
Generation Interconnection  
Request  
GEN-2006-020S***

***SPP Tariff Studies  
(#GEN-2006-020S)***

**September, 2006**

## **Executive Summary**

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 19.8MW of wind generation within the service territory of Southwestern Public Service Company (d/b/a Xcel Energy Inc.) in Hansford County, Texas. The proposed interconnection point is in the existing Sherman-Texas County 115kV line at a new switching station. This 115kV line is owned by SPS. The proposed in-service date is September 1, 2007.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 19.8MW of generation with transmission system reinforcements within the local transmission system. At this time, it is not clear whether the Customer will need to install reactive compensation in order to account for reactive losses in the transformer and the wind turbine collector circuits. Dynamic Stability studies performed as part of the impact study will provide additional guidance as to whether reactive compensation will be necessary and if it can be static or a portion must be dynamic (such as a SVC).

The requirements for interconnection consist of adding a new 115kV switching station with 3 breakers. This 115kV addition shall be constructed and maintained by SPS. The Customer did not propose a specific 115kV line extending to serve its 115-34.5kV facilities. It is assumed that obtaining all necessary right-of-way for the substation additions in the Sherman-Texas County 115kV line will not be a significant expense.

The total cost for adding a new 115kV switching station, the required interconnection facility, is estimated at \$2,590,490. Other Network Constraints in the American Electric Power (AEP), SPS, Sunflower Electric Cooperative (SUNC), and West Plains Electric (WEPL) systems that may be verified with a transmission service request and associated studies are listed in Table 3. These Network Constraints are in the local area of the new generation when this generation is sunk throughout the SPP footprint for Energy Resource (ER) interconnection service. 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 115kV line from the Customer substation into a new SPS switching station. This cost does not include the Customer's 115-34.5kV substation.

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.

There are several other proposed generation additions in the general area of the Customer's facility. It was assumed in this preliminary analysis that these other projects within the SPS service territory will be in service. Those previously queued projects that have advanced to nearly complete phases were included in this Feasibility Study. In the event that another request for a generation interconnection with a higher priority withdraws, then this request may have to be re-evaluated to determine the local Network Constraints.

## Introduction

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 19.8MW of wind generation within the service territory of SPS in Hansford County Texas. The proposed interconnection point in on the existing Sherman – Texas County 115kV line is owned by SPS, and the proposed generation interconnection is within SPS. The proposed point of interconnection is at a new 115kV switching station in this line. The proposed in-service date is September 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 115kV switching station. This 115kV addition shall be constructed and maintained by SPS. The Customer did not propose a route of its 115kV line to serve its 115-34.5kV facilities. It is assumed that obtaining all necessary right-of-way for the new SPS 115kV switching station will not be a significant expense.

The total cost for SPS to add a new 115kV switching station, the interconnection facility, in the Sherman – Texas County 115kV line is estimated at \$2,590,490. Other Network Constraints in the AEP, SPS, SUNC, and WEPL systems that were identified are listed 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 115kV line from the Customer substation into the new SPS switching station. The Customer is responsible for this 115kV line up to the point of interconnection. This cost does not include the Customer's 115-34.5kV substation and the cost estimate should be determined by the Customer.

The costs of interconnecting the facility to the SPS transmission system are listed in Table 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.

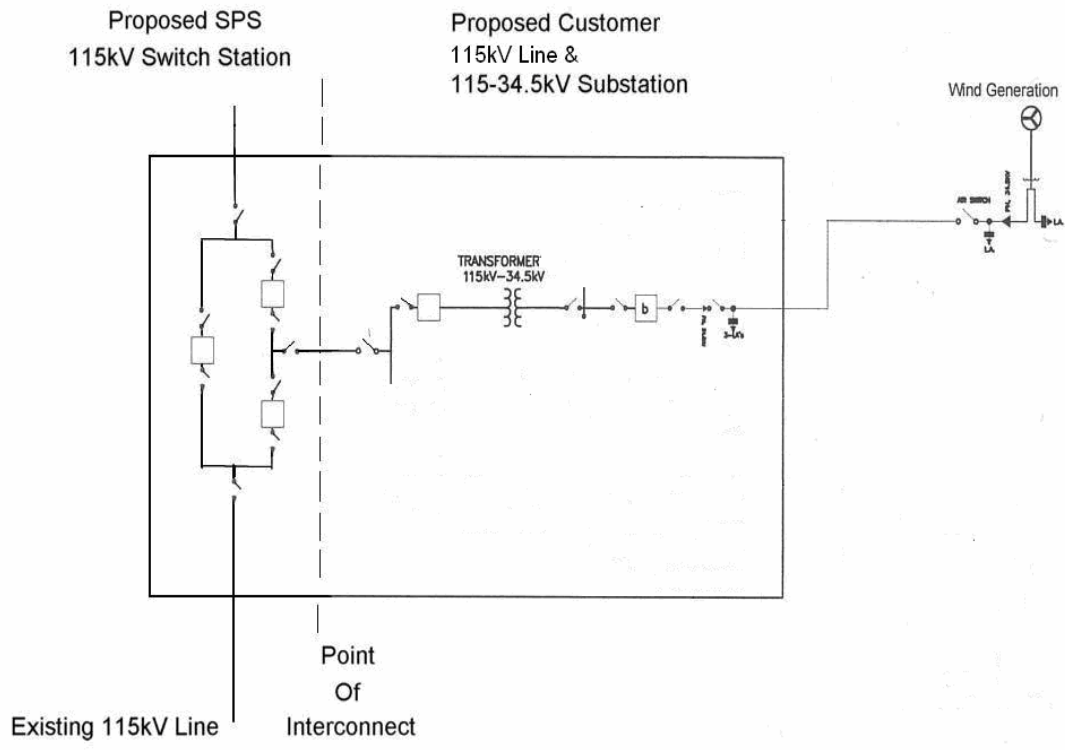
**Table 1: Direct Assignment Facilities**

Facility	ESTIMATED COST (2006 DOLLARS)
Customer – 115-34.5 kV Substation facilities,	*
Customer – 115kV line between Customer substation and new SPS 115kV switching station.	*
Customer - Right-of-Way for Customer Substation & Line.	*
<b>Total</b>	<b>*</b>

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

**Table 2: Required Interconnection Network Upgrade Facilities**

Facility	ESTIMATED COST (2006 DOLLARS)
SPS - Add 3-breaker ring 115kV switching station in Sherman – Texas County 115kV line	\$2,266,369
SPS - Right-of-Way for SPS Switching Station (site cost, surveying, permitting, etc.).	\$105,000
SPS - 115kV Transmission Line Re-Termination	\$219,121
<b>Total</b>	<b>\$2,590,490</b>



**FIGURE 1. ONE-LINE OF THE INTERCONNECTION**

## **Powerflow Analysis**

A powerflow analysis was conducted for the request using modified versions of the 2007, 2008, and 2011 Summer and Winter Peak, and the 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 September, 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 19.8MW and location, additional criteria violations will occur on the existing SPS, AEP, SUNC, and WEPL facilities under contingency conditions in the peak seasons. These Network Constraints may be verified with a transmission service request and associated studies are listed in Table 3. These Network Constraints are in the local area of the new generation when this generation is sunk throughout the SPP footprint for Energy Resource (ER) interconnection service. 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.

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 a facility is overloaded for more than one contingency, only the highest loading on the facility for each season is included in the table. Each facility may also overload for other contingencies as well. 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.

There are several other proposed generation additions in the general area of the Customer's facility. Local projects that were previously queued were assumed to be in service in this Feasibility Study. Those local projects that were previously queued and have advanced to nearly complete phases were included in this Feasibility Study.

With the information used for this study, it is unclear at this time whether any reactive compensation will be required for this generation interconnection request. At the time of the Impact Study, all wind turbines will be modeled with the detailed turbine collector feeder system. At this time, it will be clear how much capacitance may be needed to compensate for losses of the transformer and feeder system. At this time, the wind farm will be studied for FERC Order #661A compliance at which time it can be determined if the reactive compensation may need to be dynamic (SVC or STATCOM).

## **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 I hereafter referred to as NERC Table I) 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 Sunflower Electric Power Cooperative, West Plains Energy, Southwestern Public Service, and certain areas of American Electric Power in western Oklahoma were applied and the resulting scenarios analyzed. This satisfies the ‘more probable’ contingency testing criteria mandated by NERC and the SPP criteria.



**Table 3: Network Constraints**

Facility
AEP - 'ALUMAX TAP - BANN 138KV CKT 1'
AEP - 'ALUMAX TAP - NORTHWEST TEXARKANA 138KV CKT 1'
SPS - 'CANYON EAST - CANYON WEST 115KV CKT 1'
SPS - 'CANYON EAST - OSAGE SWITCHING STATION 115KV CKT 1'
SPS - 'CANYON WEST - DAWN 115KV CKT 1'
SPS - 'CARSNT3 - PANTEX NORTH 115KV CKT 1'
SPS - 'CHAVES COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 2'
SPS - 'CHERRY - NICHOLS STATION 115KV CKT 1'
SPS - 'DAWN - PNDAHFD3 115 115KV CKT 1'
SPS - 'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'
AEP - 'ELDORADO - LAKE PAULINE 69KV CKT 1'
AEP-SPS - 'ELK CITY - GRAPEVINE INTERCHANGE 230KV CKT 1'
AEP - 'ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'
WEPL - 'GREENSBURG - JUDSON LARGE 115KV CKT 1'
SPS - 'HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1'
SPS - 'HAPPY INTERCHANGE - PALODU 115KV CKT 1'
SPS - 'HEREFORD INTERCHANGE - PNDAHFD3 115 115KV CKT 1'
SPS - 'HIGHT3 - PANTEX SOUTH 115KV CKT 1'
SUNC - 'HOLCOMB - PLYMELL 115KV CKT 1'
SPS - 'JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1'
SPS - 'KRESS INTERCHANGE - TULIAT3 115KV CKT 1'
SPS - 'MANHATTAN - MANHTP3 115KV CKT 1'
WEPL - 'MEDICINE LODGE - SUN CITY 115KV CKT 1'
SPS - 'NICHOLS STATION - WHITAKER 115KV CKT 1'
SPS - 'OSAGE SWITCHING STATION - PIERCE TAP 115KV CKT 1'
SPS - 'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'

**Table 3: Network Constraints**

Facility
SPS - 'PANTEX NORTH - PANTEX SOUTH 115KV CKT 1'
SPS - 'RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'
SPS - 'SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'

**Table 4: Contingency Analysis**

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
<b>2007 SUMMER PEAK</b>					
'CANYON EAST - CANYON WEST 115KV CKT 1'	07sp	99	113.2	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CANYON EAST - OSAGE SWITCHING STATION 115KV CKT 1'	07sp	99	126.1	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CARCNT3 - PANTEX NORTH 115KV CKT 1'	07sp	161	109.2	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'	07sp	161	103.5	0	'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'
'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'	07sp	161	104.3	0	'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'
'ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	07sp	287	107.8	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'GREENSBURG - JUDSON LARGE 115KV CKT 1'	07sp	79.7	142.1	0	'MULLERGRENN - SPEARVILLE 230KV CKT 1'
'HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1'	07sp	99	102.1	0	'SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	07sp	99	134.6	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HAPPY INTERCHANGE - TULIAT3 115KV CKT 1'	07sp	99	110.3	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HIGHT3 - PANTEX SOUTH 115KV CKT 1'	07sp	161	103.5	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'HOLCOMB - PLYMELL 115KV CKT 1'	07sp	143	100.2	0	'HOLCOMB - SPEARVILLE 345KV CKT 1'
'KRESS INTERCHANGE - TULIAT3 115KV CKT 1'	07sp	99	104.8	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'MANHTP3 - OSAGE SWITCHING STATION 115KV CKT 1'	07sp	161	104.2	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	07sp	79.7	121.6	0	'MULLERGRENN - SPEARVILLE 230KV CKT 1'

**Table 4: Contingency Analysis**

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	07sp	99	136.6	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'PANTEX NORTH - PANTEX SOUTH 115KV CKT 1'	07sp	161	106.8	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'SPSNORTH_STH'	07sp	800	106.2	0	'BASE CASE'
<b>2007 WINTER PEAK</b>					
'ELDORADO - LAKE PAULINE 69KV CKT 1'	07wp	20	134.8	0	'LAKE PAULINE - RUSSELL 138KV CKT 1'
'ELK CITY - GRAPEVINE INTERCHANGE 230KV CKT 1'	07wp	351	110.6	0	'SPP-AEPW-03'
'ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	07wp	287	119.3	0	'SPP-AEPW-03'
'GREENSBURG - JUDSON LARGE 115KV CKT 1'	07wp	79.7	100.1	0	'MULLERGREN - SPEARVILLE 230KV CKT 1'
<b>2008 SUMMER PEAK</b>					
'CANYON EAST - CANYON WEST 115KV CKT 1'	08sp	99	113.4	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CANYON EAST - OSAGE SWITCHING STATION 115KV CKT 1'	08sp	99	126.6	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CARNT3 - PANTEX NORTH 115KV CKT 1'	08sp	161	108.3	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'	08sp	161	104.1	0	'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'
'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'	08sp	161	105.0	0	'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'
'ELDORADO - LAKE PAULINE 69KV CKT 1'	08sp	20	117.1	0	'LAKE PAULINE - RUSSELL 138KV CKT 1'
'ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	08sp	287	107.7	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'

**Table 4: Contingency Analysis**

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'GREENSBURG - JUDSON LARGE 115KV CKT 1'	08sp	79.7	138.0	0	'MULLERGREN - SPEARVILLE 230KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	08sp	99	135.7	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HAPPY INTERCHANGE - TULIAT3 115KV CKT 1'	08sp	99	111.2	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HIGHTL3 - PANTEX SOUTH 115KV CKT 1'	08sp	161	102.4	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'KRESS INTERCHANGE - TULIAT3 115KV CKT 1'	08sp	99	105.6	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'MANHTP3 - OSAGE SWITCHING STATION 115KV CKT 1'	08sp	161	105.5	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	08sp	79.7	117.4	0	'MULLERGREN - SPEARVILLE 230KV CKT 1'
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	08sp	99	137.8	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'PANTEX NORTH - PANTEX SOUTH 115KV CKT 1'	08sp	161	105.8	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	08sp	258	103.7	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'SPSNORTH_STH'	08sp	800	107.0	0	'BASE CASE'
'SPSSPPTIES'	08sp	620	110.6	0	'BASE CASE'
'SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	08sp	150	101.6	0	'SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1'
<b>2008 WINTER PEAK</b>					
'ELDORADO - LAKE PAULINE 69KV CKT 1'	08wp	20	130.0	0	'LAKE PAULINE - RUSSELL 138KV CKT 1'
'ELK CITY - GRAPEVINE INTERCHANGE 230KV CKT 1'	08wp	351	111.3	0	'SPP-AEPW-03'
'ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	08wp	287	120.4	0	'SPP-AEPW-03'

**Table 4: Contingency Analysis**

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'GREENSBURG - JUDSON LARGE 115KV CKT 1'	08wp	79.7	100.4	0	'MULLERGREN - SPEARVILLE 230KV CKT 1'
'SPSSPPTIES'	08wp	620	111.1	0	'BASE CASE'
<b>2011 SUMMER PEAK</b>					
'CANYON EAST - CANYON WEST 115KV CKT 1'	11sp	99	122.5	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CANYON EAST - OSAGE SWITCHING STATION 115KV CKT 1'	11sp	99	136.2	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CARNT3 - PANTEX NORTH 115KV CKT 1'	11sp	161	105.6	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'	11sp	161	107.4	0	'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'
'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'	11sp	161	108.4	0	'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'
'GREENSBURG - JUDSON LARGE 115KV CKT 1'	11sp	79.7	108.3	0	'MULLERGREN - SPEARVILLE 230KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	11sp	99	133.9	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HAPPY INTERCHANGE - TULIAT3 115KV CKT 1'	11sp	99	108.7	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'KRESS INTERCHANGE - TULIAT3 115KV CKT 1'	11sp	99	102.8	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'MANHTP3 - OSAGE SWITCHING STATION 115KV CKT 1'	11sp	161	108.8	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	11sp	99	136.0	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'PANTEX NORTH - PANTEX SOUTH 115KV CKT 1'	11sp	161	102.9	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	11sp	258.75	107.4	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'

**Table 4: Contingency Analysis**

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'SPSNORTH_STH'	11sp	800	112.4	0	'BASE CASE'
'SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	11sp	150	103.3	0	'SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1'
<b>2011 WINTER PEAK</b>					
'ELK CITY - GRAPEVINE INTERCHANGE 230KV CKT 1'	11wp	351	109.7	0	'SPP-AEPW-03'
'ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	11wp	287	118.4	0	'SPP-AEPW-03'
'JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1'	11wp	46	102.6	0	'KIRBY - MCLELLN3 115KV CKT 1'
'SPSSPPTIES'	11wp	620	111.2	0	'BASE CASE'
'ALUMAX TAP - BANN 138KV CKT 1'	16sp	261	107.3	0	'SPP-AEPW-29'
<b>2016 SUMMER PEAK</b>					
'ALUMAX TAP - NORTHWEST TEXARKANA 138KV CKT 1'	16sp	261	114.5	0	'SPP-AEPW-29'
'CANYON EAST - CANYON WEST 115KV CKT 1'	16sp	99	146.2	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CANYON EAST - OSAGE SWITCHING STATION 115KV CKT 1'	16sp	99	161.1	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CANYON WEST - DAWN 115KV CKT 1'	16sp	99	121.2	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CARSENT3 - PANTEX NORTH 115KV CKT 1'	16sp	161	101.9	0	'HUTCHINSON CO. INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'CHAVES COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 2'	16sp	172.5	103.2	0	'CHAVES COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'
'CHERRY - NICHOLS STATION 115KV CKT 1'	16sp	161	107.4	0	'NICHOLS STATION - WHITAKER 115KV CKT 1'
'DAWN - PNDAHFD3 115 115KV CKT 1'	16sp	99	116.4	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'	16sp	161	117.4	0	'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'

**Table 4: Contingency Analysis**

ELEMENT	SEASON	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'	16sp	161	118.4	0	'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	16sp	99	140.9	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HAPPY INTERCHANGE - TULIAT3 115KV CKT 1'	16sp	99	116.4	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HEREFORD INTERCHANGE - PNDALFD3 115 115KV CKT 1'	16sp	99	107.8	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'KRESS INTERCHANGE - TULIAT3 115KV CKT 1'	16sp	99	110.2	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'MANHATTAN - MANHTP3 115KV CKT 1'	16sp	161	101.0	0	'EAST PLANT INTERCHANGE - PIERCE TAP 115KV CKT 1'
'MANHTP3 - OSAGE SWITCHING STATION 115KV CKT 1'	16sp	161	119.6	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'NICHOLS STATION - WHITAKER 115KV CKT 1'	16sp	249	104.7	0	'EAST PLANT INTERCHANGE - HARRINGTON STATION 230KV CKT 1'
'OSAGE SWITCHING STATION - PIERCE TAP 115KV CKT 1'	16sp	161	104.7	0	'EAST PLANT INTERCHANGE - MANHATTAN 115KV CKT 1'
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	16sp	90	100.7	0	'BASE CASE'
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	16sp	99	143.1	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	16sp	258.75	117.9	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'SPSNORTH_STH'	16sp	800	128.6	0	'BASE CASE'
'SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	16sp	150	112.1	0	'SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1'

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.



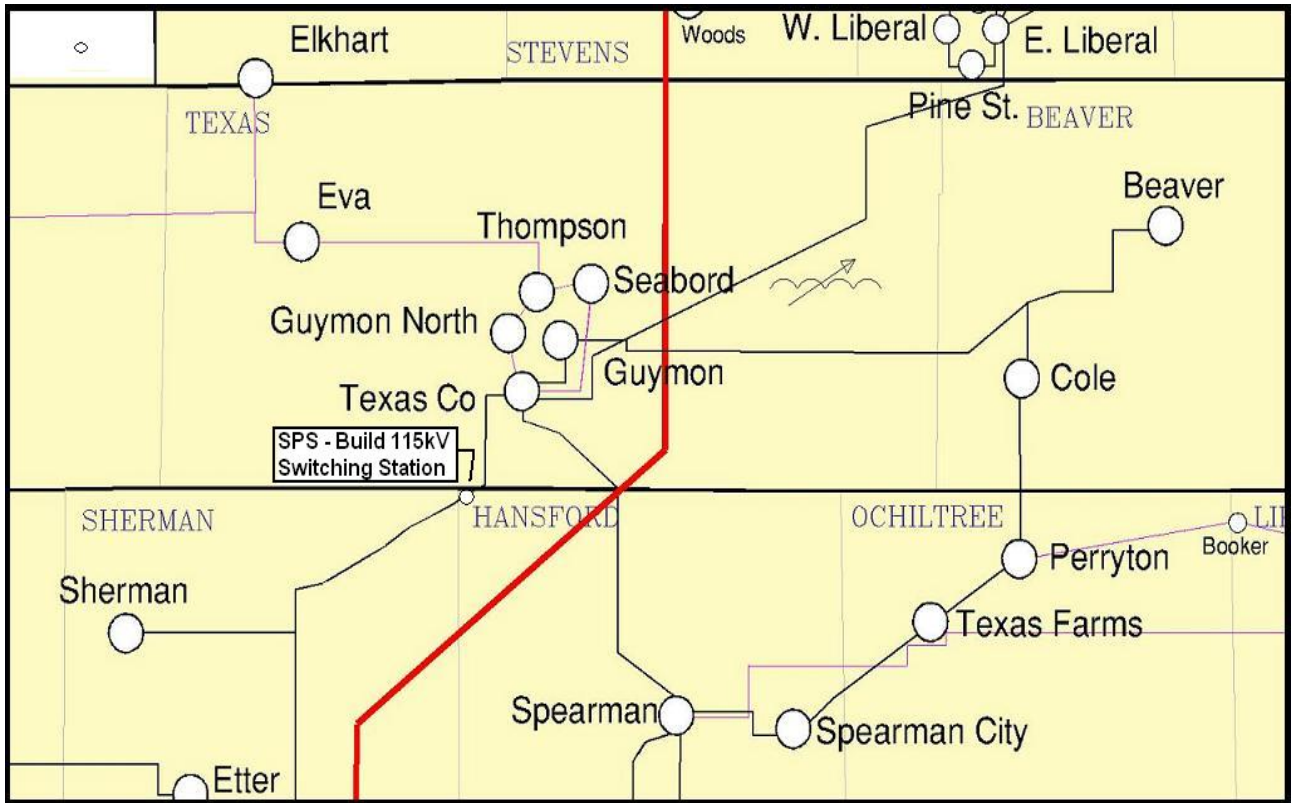
## **Conclusion**

The minimum cost of interconnecting the Customer project is estimated at \$2,590,490 for SPS's interconnection Network Upgrade facilities listed in Table 2 excluding upgrades of other transmission facilities by AEPW, SPS, SUNC, and WEPL 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 been defined by the Customer. The need for reactive compensation of the request will be addressed in the Impact Study. 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 one contingency, only the highest loading on the facility for each season is included in the 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 2. MAP OF THE LOCAL AREA**