



***Feasibility Study  
For  
Generation Interconnection  
Request  
GEN-2006-049***

***SPP Tariff Studies  
(#GEN-2006-049)***

**June, 2007**

## Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 400 MW of wind generation within the control area of Southwestern Public Service (SPS) located in Seward County, Kansas. The proposed method and point of interconnection is to add a fourth 345 kV line terminal to a previously proposed SPS 345 kV switching station to be built on the existing Potter County – Finney Station 345 kV transmission line, owned by SPS. The proposed in-service date is December 31, 2010. This request is behind a prior queued request to interconnect into the same point. The prior queued request, GEN-2003-013, is for 198 MW.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 400 MW of generation with transmission system reinforcements within the local transmission system. In order to maintain acceptable reactive power compensation, the customer will need to install a combined total of at least 70 Mvar of 34.5 kV capacitor bank(s) in the Customer's collector substation. Dynamic Stability studies performed as part of the System Impact Study will provide additional guidance as to whether the required reactive compensation can be static or a portion must be dynamic (such as a SVC). Powerflow analysis has indicated that additional dynamic compensation will be required.

The requirement to interconnect the 400 MW of generation on the existing Potter County – Finney Station 345 kV transmission line consists of adding a new 345 kV terminal into a proposed SPS 345 kV switching station to be built for generation interconnection request #GEN-2003-013. SPS will build and maintain this switching station. The Customer did not propose a specific route for the 345 kV line extending to serve its 345/34.5 kV facilities. It is assumed that obtaining all necessary right-of-way for the new transmission line to serve its facilities will not be a significant expense.

The total minimum cost for building the required facilities for this 400 MW of generation is \$1,186,468. These costs are shown in Table 2. Other Network Constraints in the American Electric Power West (AEPW), Midwest Electric (MIDW), SPS, Sunflower Electric Cooperative (SUNC), West Plains (WEPL), Westar (WERE), and Western Farmers Electric Cooperative (WFEC) transmission systems that may be verified with a transmission service request and associated studies are listed in Table 5. These Network Constraints are in the local area of the new generation when this generation is sunk throughout the SPP footprint for the Energy Resource (ER) Interconnection request. With a defined source and sink in a Transmission Service Request (TSR), this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements. This cost does not include building the 345 kV line from the Customer 345/34.5 kV collector substation into the new SPS 345 kV switching station proposed for generation interconnect #GEN-2003-013. This cost also does not include the Customer's 345/34.5 kV collector substation or the three 34.5 kV, 70 Mvar (combined total) of capacitor bank(s).

In Table 6, 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 not all of these other projects within the SPS control area 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 400 MW of wind generation within the control area of Southwestern Public Service (SPS) located in Seward County, Kansas. The proposed method and point of interconnection is to add a fourth 345 kV line terminal to a previously proposed SPS 345 kV switching station to be built on the existing Potter County – Finney Station 345 kV transmission line, owned by SPS. The proposed in-service date is December 31, 2010.

## 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 Study 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 of the 400 MW consist of adding a new 345 kV line terminal into a previously proposed 345 kV three-breaker ring-bus and 345 kV switching station on the existing Potter County – Finney Station 345 kV transmission line owned by SPS. This 345 kV switching station was first proposed to be built for generation interconnection request #GEN-2003-013. This substation shall be constructed and maintained by SPS. If #GEN-2003-013 withdraws from the queue, the Customer will be responsible for the cost of constructing the original three-breaker 345 kV ring-bus. The Customer did not propose a specific route of its 345 kV line to serve its 345/34.5 kV collection system facilities. It is assumed that obtaining all necessary right-of-way for construction of the Customer 345 kV transmission line and the 345/34.5 kV collector substation will not be a significant expense.

The total cost for adding a 345 kV terminal to the proposed 345 kV ring-bus is approximately \$1,186,468. This cost is listed in Table 2. If #GEN-2003-013 withdraws from the queue, the Customer will be responsible for building a new 345 kV three-breaker ring-bus switching station and associated facilities, which is estimated in a range between \$6,700,000 and \$7,500,000. Due to switching surge requirements the cost to build the proposed GEN-2003-013 345kV switching station depends on the amount of line reactance needed on the Potter-Finney 345kV line. This line reactance is dependent upon how many taps are placed on the line. Therefore the cost to build the station proposed for GEN-2003-013 is also dependent upon whether other previous queued requests, namely GEN-2002-008, withdraw from the queue. These costs are listed in Tables 3 and 4.

Other Network Constraints in the American Electric Power West (AEPW), Midwest Electric (MIDW), SPS, Sunflower Electric Cooperative (SUNC), West Plains (WEPL), Westar (WERE), and Western Farmers Electric Cooperative (WFEC) transmission systems that were identified are listed in Table 5. These estimates will be refined during the development of the System Impact Study based on the final designs. This cost does not include building the 345 kV transmission line from the Customer 345/34.5 kV collector substation into the new SPS 345 kV switching station. This cost also does not include the Customer's 345/34.5 kV substation or the 70 Mvar (combined total) of 34.5 kV capacitor bank(s), all of which should be determined by the Customer. The Customer is responsible for these 345 – 34.5 kV facilities up to the point of interconnection.

The costs of interconnecting the facility to the SPS transmission system are listed in Tables 1 and 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.

A preliminary one-line drawing of the interconnection and direct assigned facilities are shown in Figure 1.

**TABLE 1: Direct Assignment Facilities**

<b>FACILITY</b>	<b>ESTIMATED COST (2007 DOLLARS)</b>
CUSTOMER – (1) 345/34.5 kV collector substation facilities.	*
CUSTOMER – (1) 345 kV transmission facilities between the Customer 345/34.5 kV collector substation and the point of interconnect.	*
CUSTOMER – (3) 345/34.5 kV transformers and all related 345/34.5 kV switching equipment located at the Customer 345/34.5 kV collector substation.	*
CUSTOMER – Right-of-Way for all Customer facilities.	*
CUSTOMER – 34.5 kV, 70 Mvar (combined total) of capacitor bank(s) in Customer collector substation.	*
<b>TOTAL</b>	*

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

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

<b>FACILITY</b>	<b>ESTIMATED COST (2007 DOLLARS)</b>
SPS – Add (1) 345 kV terminal to the three-breaker ring-bus constructed for #GEN-2003-013.	<b>\$1,186,468</b>
<b>TOTAL</b>	*

NOTES: \* Estimates of cost to be determined.

**TABLE 3: Required Interconnection Network Upgrade Facilities  
(If #GEN-2003-013 Withdraws from Queue)**

<b>FACILITY</b>	<b>ESTIMATED COST (2007 DOLLARS)</b>
SPS – Build 345 kV switching station required for GEN-2003-013. Price includes the installation of a 345kV line reactor on the GEN-2002-008 345kV line terminal. Price includes a line reactor at the switching station for GEN-2002-008.	<b>\$7,500,000</b>
<b>TOTAL</b>	*

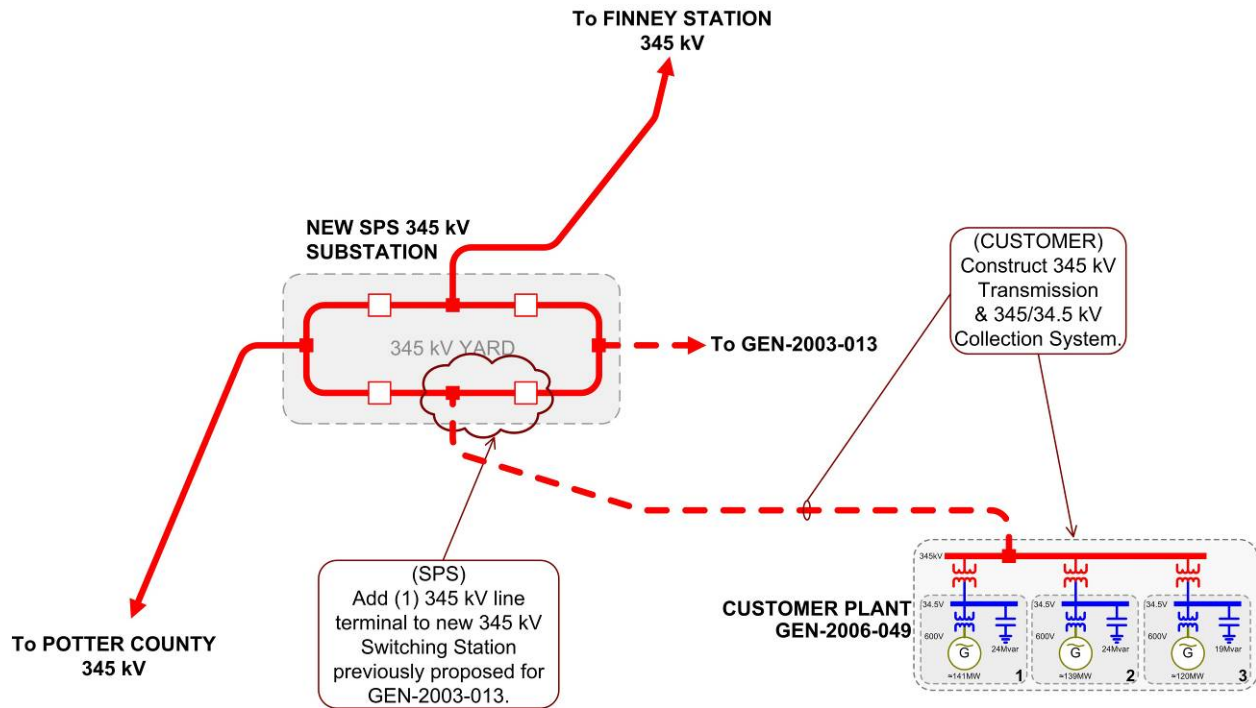
NOTES: \* Estimates of cost to be determined.

**TABLE 4: Required Interconnection Network Upgrade Facilities  
(If #GEN-2003-013 and GEN-2002-008 Withdraws from Queue)**

<b>FACILITY</b>	<b>ESTIMATED COST (2007 DOLLARS)</b>
SPS – Build 345 kV switching station required for GEN-2003-013. Price includes a line reactor on the Potter 345kV line terminal.	<b>\$6,700,000</b>

<b>TOTAL</b>	<b>*</b>
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*NOTES: \* Estimates of cost to be determined.*



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

## **Powerflow Analysis**

A powerflow analysis was conducted for the facility using modified versions of the 2009 and 2012 summer and winter peak, and 2017 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. This method allows the request to be studied as an Energy Resource (ER) Interconnection request. The proposed in-service date of the generation is December 31, 2010. The available seasonal models used were through the 2017 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 400 MW and location, additional criteria violations will occur on the existing AEPW, MIDW, SPS, SUNC, WEPL, WERE, and WFEC transmission systems under steady state and contingency conditions in the peak seasons.

In Table 6, 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.

Numerous voltage violations for load serving buses within the SPP footprint were also observed for the some of the contingencies listed in Table 6. These voltage violations have not been listed in this report.

In order to maintain a zero reactive power flow exchange at the point of interconnection, additional reactive compensation is required at the point of interconnection. The Customer will be required to install a combined total of at least 70 Mvar of capacitor bank(s) on the 34.5 kV busses in the Customer

345/34.5 kV collector substation. As shown in Figure 1, the approximate sizing of the minimum required capacitor bank(s) for each 34.5 kV bus is as follows: 24 Mvars on bus 1, 24 Mvars on bus 2, and 19 Mvars on bus 3. Dynamic Stability studies performed as part of the System Impact Study will provide additional guidance as to whether the reactive compensation can be static or a portion must be dynamic (such as a SVC or STATCOM). It is possible that an SVC or STATCOM device will be required at the Customer facility because of FERC Order 661A Low Voltage Ride-Through Provisions (LVRT) which went into effect January 1, 2006. FERC Order 661A orders that wind farms stay on line for 3-phase faults at the point of interconnection even if that requires the installation of a SVC or STATCOM device. Powerflow analysis has indicated that a large amount of dynamic compensation is necessary for contingencies near the point of interconnect.

There are several other proposed generation additions in the general area of the Customer's facility. Some of the 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.

### **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 Corporation (SUNC), Missouri Public Service (MIPU), Westar (WESTAR), Kansas City Power & Light (KCPL), West Plains (WEPL), Midwest Energy (MIDW), Oklahoma Gas and Electric (OKGE), American Electric Power West (AEPW), Grand River Dam Authority (GRDA), Southwestern Public Service (SPS), Western Farmers Electric Cooperative (WFEC), Western Resources (WERE), and other control areas were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

**TABLE 5: Network Constraints**

<b>AREA</b>	<b>OVERLOADED ELEMENT</b>
AEPW	CLINTON JUNCTION - ELK CITY 138KV CKT 1
AEPW	ELK CITY 138KV (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1
AEPW	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
AEPW	JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
AEPW	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1
AEPW	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1
AEPW/SPS	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
AEPW/SPS	MCCLEAN RURAL SUB - SHAMROCK 115KV CKT 1
AEPW/WFEC	LAKE PAULINE - RUSSELL 138KV CKT 1
MIDW	ALEXANDER - NEKOMA 115KV CKT 1
MIDW	ALEXANDER - NESS CITY 115KV CKT 1
MIDW	BEACH STATION - HOXIE 115KV CKT 1
MIDW	COLBY - HOXIE 115KV CKT 1
MIDW	HEIZER 115/69KV TRANSFORMER CKT 2
MIDW	HUNTSVILLE SWITCH - ST JOHN 115KV CKT 1
MIDW/SUNC	NESS CITY - NESS CITY 115KV CKT 1
MIDW/WEPL	MULLERGREN - S HAYS6 230.00 230KV CKT 1
MIDW/WEPL	ST JOHN - ST_JOHN 115KV CKT 1
SPS	(SPSNORTH_STH): BUSHLAND - DEAF SMITH 230KV CKT 1 POTTER COUNTY INTERCHANGE - PLANT X 230KV CKT 1 NICHOLS STATION - AMARILLO S 230KV CKT 1 OSAGE - CANYON EAST 115KV CKT 1 PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1
SPS	BOWERS INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1
SPS	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1
SPS	CONWAY SUB - YARNELL SUB 115KV CKT 1
SPS	EAST PLANT INTERCHANGE (EASTPL6) 230/115KV TRANSFORMER CKT 1
SPS	EAST PLANT INTERCHANGE 230KV (EASTPL6) 230/115KV TRANSFORMER CKT 1
SPS	ETTER RURAL SUB - MOORE COUNTY INTERCHANGE E. 115KV CKT 1
SPS	FAIN SUB - EXELL TAP 115KV CKT 1
SPS	GRAPEVINE - NICHOLS STATION 230KV CKT 1
SPS	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1
SPS	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1
SPS	HERRING TAP - RITA BLACA REC-SNEED 115KV CKT 1
SPS	KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1
SPS	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
SPS	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1
SPS	LUBBOCK POWER & LIGHT-HOLLY PLANT 230/69KV TRANSFORMER CKT 1
SPS	LUBBOCK POWER & LIGHT-SOUTHEAST 230/69KV TRANSFORMER CKT 1
SPS	LUBBOCK POWER & LIGHT-WADSWORTH 230/69KV TRANSFORMER CKT 1
SPS	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1
SPS	MOORE COUNTY INTERCHANGE E. - RITA BLANCA REC-HOGUE 115KV CKT 1
SPS	NICHOLS STATION - FAIN SUB 115KV CKT 1
SPS	NICHOLS STATION - YARNELL SUB 115KV CKT 1
SPS	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1
SPS	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1
SPS	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	RIVERVIEW INTERCHANGE - HERRING TAP 115KV CKT 1
SPS	SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	TEXAS COUNTY INTERCHANGE PHASE SHIFT TRANSFORMER 115KV CKT 1
SPS	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
SPS	TUCO 345KV (TUCO XX4) 345/230/13.8KV TRANSFORMER CKT 1
SPS	TUCO INTERCHANGE - TOLK STATION EAST 230KV CKT 1
SPS	YOAKUM COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS/WEPL	TEXAS COUNTY INTERCHANGE PS XFR - EAST LIBERAL 115KV CKT 1
SUNC	BEELEER - DIGHTON TAP 115KV CKT 1



**TABLE 5: Network Constraints (continued)**

AREA	OVERLOADED ELEMENT
SUNC	BEELER - NESS CITY 115KV CKT 1
SUNC	CTU SUBLETTE - HASKELL 115KV CKT 1
SUNC	CTU SUBLETTE - PIONEER TAP 115KV CKT 1
SUNC	DIGHTON TAP - MANNING TAP 115KV CKT 1
SUNC	DOBSON - PILE 115KV CKT 1
SUNC	FLETCHER - HOLCOMB 115KV CKT 1
SUNC	FLETCHER - WILLIAMSON 115KV CKT 1
SUNC	HASKELL - SEWARD-3 115KV CKT 1
SUNC	HOLCOMB - GARDEN CITY 115KV CKT 1
SUNC	HOLCOMB - JONES SUBSTATION 115KV CKT 1
SUNC	HOLCOMB - PLYMELL 115KV CKT 1
SUNC	HOLCOMB (HOLCOMB) 345/115/13.8KV TRANSFORMER CKT 1
SUNC	JAMESON - JONES SUBSTATION 115KV CKT 1
SUNC	KANARADO - SHARON SPRINGS 115KV CKT 1
SUNC	MANNING TAP - SCOTT CITY 115KV CKT 1
SUNC	NORTH CIMARRON - SEWARD-3 115KV CKT 1
SUNC	NSI TAP - KANARADO 115KV CKT 1
SUNC	PALMER - TRIBUNE SWITCH 115KV CKT 1
SUNC	PILE - SCOTT CITY 115KV CKT 1
SUNC	PIONEER TAP - PLYMELL 115KV CKT 1
SUNC	SETAB - SCOTT CITY SUBSTATION 115KV CKT 1
SUNC	SHARON SPRINGS - PALMER 115KV CKT 1
SUNC	SYRACUSE - WILLIAMSON 115KV CKT 1
SUNC/WEPL	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1
SUNC/WEPL	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
WEPL	CIMARRON RIVER PLANT - CIMARRON RIVER TAP 115KV CKT 1
WEPL	GREAT BEND TAP - SEWARD 115KV CKT 1
WEPL	GREENSBURG - JUDSON LARGE 115KV CKT 1
WEPL	GREENSBURG - SUN CITY 115KV CKT 1
WEPL	HARPER - MEDICINE LODGE 138KV CKT 1
WEPL	MEDICINE LODGE - SUN CITY 115KV CKT 1
WEPL	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1
WEPL	MILAN TAP - HARPER 138KV CKT 1
WEPL	MULLERGREN - SPEARVILLE 230KV CKT 1
WEPL	SEWARD - ST JOHN 115KV CKT 1
WEPL/WERE	CIRCLE - MULLERGREN 230KV CKT 1
WEPL/WERE	CLEARWATER - MILAN TAP 138KV CKT 1
WERE	RENO COUNTY - CIRCLE 115KV CKT 2
AEPW	American Electric Power West
MIDW	Midwest Electric
SPS	Southwestern Public Service
SUNC	Sunflower Electric Power Corporation
WEPL	West Plains
WERE	Westar
WFEC	Western Farmers Electric Cooperative

**TABLE 6: Contingency Analysis**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09SP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	249	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	221	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	212	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	205	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	HARPER - MEDICINE LODGE 138KV CKT 1	72	186	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	180	0	MINGO - SETAB 345KV CKT 1
09SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	174	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	171	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	HOLCOMB - PLYMELL 115KV CKT 1	143	161	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	PIONEER TAP - PLYMELL 115KV CKT 1	143	157	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	GREENSBURG - JUDSON LARGE 115KV CKT 1	130	153	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	152	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	CIMARRON RIVER PLANT - CIMARRON RIVER TAP 115KV CKT 1	90	152	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	RENO COUNTY - CIRCLE 115KV CKT 2	92	152	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	151	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	ALEXANDER - NESS CITY 115KV CKT 1	101	150	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	ALEXANDER - NEKOMA 115KV CKT 1	101	144	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	SEWARD - ST JOHN 115KV CKT 1	80	142	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	BEELER - DIGHTON TAP 115KV CKT 1	98	142	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	141	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	GREENSBURG - SUN CITY 115KV CKT 1	130	140	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	BEELER - NESS CITY 115KV CKT 1	98	137	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	99	136	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	COLBY - HOXIE 115KV CKT 1	101	136	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	99	135	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1	97	123	0	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	LUBBOCK POWER & LIGHT-HOLLY PLANT 230/69KV TRANSFORMER CKT 1	100	120	0	LUBBOCK POWER & LIGHT-SOUTHEAST - LUBBOCK SOUTH INTERCHANGE 230KV CKT 1
09SP	LUBBOCK POWER & LIGHT-SOUTHEAST 230/69KV TRANSFORMER CKT 1	100	119	0	JONES STATION - LUBBOCK POWER & LIGHT-HOLLY PLANT 230KV CKT 1
09SP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	99	118	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	(SPSNORTH_STH): BUSHLAND - DEAF SMITH 230KV CKT 1 POTTER COUNTY INTERCHANGE - PLANT X 230KV CKT 1 NICHOLS STATION - AMARILLO S 230KV CKT 1 OSAGE - CANYON EAST 115KV CKT 1 PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	800	111	0	BASE CASE
09SP	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	259	109	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	157	15	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	MEDICINE LODGE - SUN CITY 115KV CKT 1	130	135	22	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	90	134	44	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	144	45	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	MULLERGREN - SPEARVILLE 230KV CKT 1	330	126	54	BASE CASE

**TABLE 6: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09SP	MILAN TAP - HARPER 138KV CKT 1	96	139	57	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	129	62	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	90	132	65	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	CIRCLE - MULLERGREN 230KV CKT 1	319	135	65	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	CTU SUBLETTE - PIONEER TAP 115KV CKT 1	143	124	69	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	ST JOHN - ST_JOHN 115KV CKT 1	88	128	75	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	99	113	79	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
09SP	GREAT BEND TAP - SEWARD 115KV CKT 1	90	119	90	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	BEACH STATION - HOXIE 115KV CKT 1	101	123	93	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	CTU SUBLETTE - HASKELL 115KV CKT 1	143	118	141	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	GRAPEVINE - NICHOLS STATION 230KV CKT 1	497	118	154	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	HASKELL - SEWARD-3 115KV CKT 1	143	117	158	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	MCCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	90	121	163	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	CONWAY SUB - YARNELL SUB 115KV CKT 1	180	109	186	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	180	109	188	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	NESS CITY - NESS CITY 115KV CKT 1	143	112	208	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	DOBSON - PILE 115KV CKT 1	198	120	220	HOLCOMB - SETAB 345KV CKT 1
09SP	LUBBOCK POWER & LIGHT-WADSWORTH 230/69KV TRANSFORMER CKT 1	100	106	229	LUBBOCK POWER & LIGHT-SOUTHEAST 230/69KV TRANSFORMER CKT 1
09SP	PILE - SCOTT CITY 115KV CKT 1	198	118	236	HOLCOMB - SETAB 345KV CKT 1
09SP	NORTH CIMARRON - SEWARD-3 115KV CKT 1	143	111	241	HOLCOMB - SPEARVILLE 345KV CKT 1
09SP	TEXAS COUNTY INTERCHANGE PS XFR - EAST LIBERAL 115KV CKT 1	119	128	245	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	CLEARWATER - MILAN TAP 138KV CKT 1	110	115	257	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09SP	MANNING TAP - SCOTT CITY 115KV CKT 1	143	108	275	MULLERGREN - SPEARVILLE 230KV CKT 1
09SP	ELK CITY 138KV (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	72	106	279	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	56	107	291	BASE CASE
09SP	FLETCHER - HOLCOMB 115KV CKT 1	198	102	298	HOLCOMB - PLYMELL 115KV CKT 1
09SP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	110	303	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	83	105	306	BASE CASE
09SP	BOWERS INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1	97	104	313	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	TUCO 345KV (TUCO XX4) 345/230/13.8KV TRANSFORMER CKT 1	560	106	340	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	150	101	342	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
09SP	TEXAS COUNTY INTERCHANGE PHASE SHIFT TRANSFORMER 115KV CKT 1	146	104	372	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09SP	FLETCHER - WILLIAMSON 115KV CKT 1	98	102	375	HOLCOMB - SETAB 345KV CKT 1
09SP	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1	180	101	386	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
09SP	SYRACUSE - WILLIAMSON 115KV CKT 1	98	100	395	HOLCOMB - SETAB 345KV CKT 1
09SP	HUNTSVILLE SWITCH - ST JOHN 115KV CKT 1	88	100	400	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	226	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
09WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	205	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	177	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	175	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	168	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1

**TABLE 6: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09WP	HARPER - MEDICINE LODGE 138KV CKT 1	72	159	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	153	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	152	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	HOLCOMB - PLYMELL 115KV CKT 1	143	149	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	ALEXANDER - NESS CITY 115KV CKT 1	101	149	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	PIONEER TAP - PLYMELL 115KV CKT 1	143	146	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	145	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	ALEXANDER - NEKOMA 115KV CKT 1	101	142	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	140	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	137	0	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	SEWARD - ST JOHN 115KV CKT 1	80	127	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	BEELER - DIGHTON TAP 115KV CKT 1	98	131	5	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	BEELER - NESS CITY 115KV CKT 1	98	127	46	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	COLBY - HOXIE 115KV CKT 1	101	122	76	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	CTU SUBLETTE - PIONEER TAP 115KV CKT 1	143	118	82	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	MULLERGREN - SPEARVILLE 230KV CKT 1	471	129	103	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	127	110	CIRCLE - MULLERGREN 230KV CKT 1
09WP	CTU SUBLETTE - HASKELL 115KV CKT 1	143	115	143	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	HASKELL - SEWARD-3 115KV CKT 1	143	114	160	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	BEACH STATION - HOXIE 115KV CKT 1	101	115	173	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	TEXAS COUNTY INTERCHANGE PS XFR - EAST LIBERAL 115KV CKT 1	119	125	226	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	RENO COUNTY - CIRCLE 115KV CKT 2	92	115	238	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	NORTH CIMARRON - SEWARD-3 115KV CKT 1	143	109	240	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	112	242	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1	117	105	261	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
09WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	130	113	272	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	NESS CITY - NESS CITY 115KV CKT 1	143	108	272	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	TUCO 345KV (TUCO XX4) 345/230/13.8KV TRANSFORMER CKT 1	560	111	285	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	56	109	290	BASE CASE
09WP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	107	105	313	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	MILAN TAP - HARPER 138KV CKT 1	96	109	317	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	107	104	340	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	CIMARRON RIVER PLANT - CIMARRON RIVER TAP 115KV CKT 1	118	103	362	HOLCOMB - SPEARVILLE 345KV CKT 1
09WP	TEXAS COUNTY INTERCHANGE PHASE SHIFT TRANSFORMER 115KV CKT 1	146	102	372	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
09WP	ST JOHN - ST JOHN 115KV CKT 1	88	102	380	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
09WP	HEIZER 115/69KV TRANSFORMER CKT 2	32	101	390	BASE CASE
12SP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	199	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	199	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	198	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	179	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	170	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	HARPER - MEDICINE LODGE 138KV CKT 1	72	154	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	147	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1

**TABLE 6: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12SP	HOLCOMB - PLYMELL 115KV CKT 1	143	147	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	146	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	CIMARRON RIVER PLANT - CIMARRON RIVER TAP 115KV CKT 1	90	145	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	144	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	PIONEER TAP - PLYMELL 115KV CKT 1	143	143	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	ALEXANDER - NESS CITY 115KV CKT 1	101	141	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	138	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	135	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	ALEXANDER - NEKOMA 115KV CKT 1	101	135	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	BEELER - DIGHTON TAP 115KV CKT 1	98	135	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	GREENSBURG - JUDSON LARGE 115KV CKT 1	130	134	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	SEWARD - ST JOHN 115KV CKT 1	80	132	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
12SP	BEELER - NESS CITY 115KV CKT 1	98	130	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	COLBY - HOXIE 115KV CKT 1	101	128	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	CONWAY SUB - YARNELL SUB 115KV CKT 1	180	116	23	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	180	115	24	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	90	116	59	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	MULLERGREN - SPEARVILLE 230KV CKT 1	330	124	59	BASE CASE
12SP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	121	64	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	90	116	91	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	123	92	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	GREENSBURG - SUN CITY 115KV CKT 1	130	124	92	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	MEDICINE LODGE - SUN CITY 115KV CKT 1	130	119	154	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	BEACH STATION - HOXIE 115KV CKT 1	101	114	174	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	GRAPEVINE - NICHOLS STATION 230KV CKT 1	497	115	180	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	DOBSON - PILE 115KV CKT 1	198	124	182	HOLCOMB - SETAB 345KV CKT 1
12SP	CTU SUBLETTE - PIONEER TAP 115KV CKT 1	143	111	194	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	PILE - SCOTT CITY 115KV CKT 1	198	123	198	HOLCOMB - SETAB 345KV CKT 1
12SP	ST JOHN - ST_JOHN 115KV CKT 1	88	109	206	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	CIRCLE - MULLERGREN 230KV CKT 1	319	107	232	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	GREAT BEND TAP - SEWARD 115KV CKT 1	90	106	243	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1	180	106	244	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	MILAN TAP - HARPER 138KV CKT 1	96	107	265	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12SP	FLETCHER - WILLIAMSON 115KV CKT 1	98	111	274	HOLCOMB - SETAB 345KV CKT 1
12SP	MCCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	90	106	285	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	CTU SUBLETTE - HASKELL 115KV CKT 1	143	106	291	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	SYRACUSE - WILLIAMSON 115KV CKT 1	98	110	292	HOLCOMB - SETAB 345KV CKT 1
12SP	NESS CITY - NESS CITY 115KV CKT 1	143	106	298	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	TUCO INTERCHANGE - TOLK STATION EAST 230KV CKT 1	497	110	307	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
12SP	HASKELL - SEWARD-3 115KV CKT 1	143	105	313	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	133	103	349	BASE CASE
12SP	MANNING TAP - SCOTT CITY 115KV CKT 1	143	103	353	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	83	101	382	BASE CASE
12SP	HOLCOMB - JONES SUBSTATION 115KV CKT 1	143	101	384	HOLCOMB - SETAB 345KV CKT 1
12SP	EAST PLANT INTERCHANGE 230KV (EASTPL6) 230/115KV	252	101	389	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1

**TABLE 6: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
	TRANSFORMER CKT 1				
12WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	201	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	195	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	159	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	146	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	146	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	145	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12WP	HOLCOMB - PLYMELL 115KV CKT 1	143	143	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	ALEXANDER - NESS CITY 115KV CKT 1	101	142	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	PIONEER TAP - PLYMELL 115KV CKT 1	143	140	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	137	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	ALEXANDER - NEKOMA 115KV CKT 1	101	136	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	134	0	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	133	0	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	BEELER - DIGHTON TAP 115KV CKT 1	98	126	41	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	146	42	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	MULLERGRENN - S HAYS6 230.00 230KV CKT 1	147	133	42	CIRCLE - MULLERGRENN 230KV CKT 1
12WP	HARPER - MEDICINE LODGE 138KV CKT 1	72	131	57	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12WP	MULLERGRENN - SPEARVILLE 230KV CKT 1	471	138	62	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
12WP	BEELER - NESS CITY 115KV CKT 1	98	123	86	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	117	91	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	COLBY - HOXIE 115KV CKT 1	101	119	99	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	CTU SUBLETTE - PIONEER TAP 115KV CKT 1	143	114	140	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	SEWARD - ST JOHN 115KV CKT 1	80	115	143	CIRCLE - MULLERGRENN 230KV CKT 1
12WP	KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1	117	108	195	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12WP	CTU SUBLETTE - HASKELL 115KV CKT 1	143	110	208	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	BEACH STATION - HOXIE 115KV CKT 1	101	111	223	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	HASKELL - SEWARD-3 115KV CKT 1	143	109	226	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	TUCO 345KV (TUCO XX4) 345/230/13.8KV TRANSFORMER CKT 1	560	113	252	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	NORTH CIMARRON - SEWARD-3 115KV CKT 1	143	104	315	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	106	319	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	TEXAS COUNTY INTERCHANGE PS XFR - EAST LIBERAL 115KV CKT 1	119	108	339	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	NESS CITY - NESS CITY 115KV CKT 1	143	104	339	HOLCOMB - SPEARVILLE 345KV CKT 1
12WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	130	104	349	MULLERGRENN - SPEARVILLE 230KV CKT 1
12WP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	107	102	362	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
12WP	HEIZER 115/69KV TRANSFORMER CKT 2	32	105	365	BASE CASE
12WP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	107	100	394	GEN-2003-13 345.00 - FINNEY STATION 345KV CKT 1
17SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	189	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	188	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	178	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	MULLERGRENN - SPEARVILLE 230KV CKT 1	355	177	0	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	ETTER RURAL SUB - MOORE COUNTY INTERCHANGE E. 115KV CKT 1	99	169	0	MOORE COUNTY INTERCHANGE E. - RITA BLANCA REC-HOGUE 115KV



**TABLE 6: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
					CKT 1
17SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	155	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	148	0	HOLCOMB - SETAB 345KV CKT 1
17SP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	145	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	HOLCOMB - PLYMELL 115KV CKT 1	143	144	0	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	143	0	MINGO - SETAB 345KV CKT 1
17SP	PIONEER TAP - PLYMELL 115KV CKT 1	143	139	0	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	HERRING TAP - RITA BLACA REC-SNEED 115KV CKT 1	180	127	0	MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	RIVERVIEW INTERCHANGE - HERRING TAP 115KV CKT 1	180	127	0	MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	BEELER - DIGHTON TAP 115KV CKT 1	98	135	8	MINGO - SETAB 345KV CKT 1
17SP	CONWAY SUB - YARNELL SUB 115KV CKT 1	180	116	9	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	180	116	11	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	139	23	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	DOBSON - PILE 115KV CKT 1	198	145	29	HOLCOMB - SETAB 345KV CKT 1
17SP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	90	125	32	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	PILE - SCOTT CITY 115KV CKT 1	198	143	45	HOLCOMB - SETAB 345KV CKT 1
17SP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	122	55	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	BEELER - NESS CITY 115KV CKT 1	98	130	59	MINGO - SETAB 345KV CKT 1
17SP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	90	123	61	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	126	62	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	127	72	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	130	72	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	ELK CITY 138KV (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	72	113	80	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	CIMARRON RIVER PLANT - CIMARRON RIVER TAP 115KV CKT 1	90	123	94	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	FLETCHER - WILLIAMSON 115KV CKT 1	98	130	106	HOLCOMB - SETAB 345KV CKT 1
17SP	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1	497	120	109	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	ALEXANDER - NESS CITY 115KV CKT 1	101	121	119	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	SYRACUSE - WILLIAMSON 115KV CKT 1	98	128	123	HOLCOMB - SETAB 345KV CKT 1
17SP	HARPER - MEDICINE LODGE 138KV CKT 1	72	126	125	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	GREENSBURG - JUDSON LARGE 115KV CKT 1	130	117	135	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	GRAPEVINE - NICHOLS STATION 230KV CKT 1	497	114	166	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	HOLCOMB - JONES SUBSTATION 115KV CKT 1	143	115	192	HOLCOMB - SETAB 345KV CKT 1
17SP	NICHOLS STATION - FAIN SUB 115KV CKT 1	161	111	196	MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	SEWARD - ST JOHN 115KV CKT 1	80	111	202	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	COLBY - HOXIE 115KV CKT 1	101	118	203	MINGO - REDWILO3 345.00 345KV CKT 1
17SP	MOORE COUNTY INTERCHANGE E. - RITA BLANCA REC-HOGUE 115KV CKT 1	180	127	204	MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	HOLCOMB - GARDEN CITY 115KV CKT 1	198	113	207	HOLCOMB - SETAB 345KV CKT 1
17SP	FLETCHER - HOLCOMB 115KV CKT 1	198	103	212	HOLCOMB - PLYMELL 115KV CKT 1
17SP	ALEXANDER - NEKOMA 115KV CKT 1	101	114	215	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	PALMER - TRIBUNE SWITCH 115KV CKT 1	98	113	223	MINGO - SETAB 345KV CKT 1
17SP	MCCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	90	111	230	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1	180	106	253	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1

**TABLE 6: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
17SP	JAMESON - JONES SUBSTATION 115KV CKT 1	143	110	257	HOLCOMB - SETAB 345KV CKT 1
17SP	SHARON SPRINGS - PALMER 115KV CKT 1	98	110	261	MINGO - SETAB 345KV CKT 1
17SP	FAIN SUB - EXELL TAP 115KV CKT 1	161	107	262	MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	MULLERGREY - SPEARVILLE 230KV CKT 1	330	109	269	BASE CASE
17SP	GREENSBURG - SUN CITY 115KV CKT 1	130	107	287	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	CTU SUBLETTE - PIONEER TAP 115KV CKT 1	143	106	287	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	HOLCOMB (HOLCOMB) 345/115/13.8KV TRANSFORMER CKT 1	336	102	288	HOLCOMB GEN #1 (GEN531447 1)
17SP	YOAKUM COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	150	101	323	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	SETAB - SCOTT CITY SUBSTATION 115KV CKT 1	198	108	325	HOLCOMB - SETAB 345KV CKT 1
17SP	TUCO 345KV (TUCO XX4) 345/230/13.8KV TRANSFORMER CKT 1	560	107	330	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	KANARADO - SHARON SPRINGS 115KV CKT 1	98	104	344	MINGO - SETAB 345KV CKT 1
17SP	EAST PLANT INTERCHANGE (EASTPL6) 230/115KV TRANSFORMER CKT 1	252	105	347	ETTER RURAL SUB - MOORE COUNTY INTERCHANGE E. 115KV CKT 1
17SP	BEACH STATION - HOXIE 115KV CKT 1	101	104	363	MINGO - REDWILO3 345.00 345KV CKT 1
17SP	MEDICINE LODGE - SUN CITY 115KV CKT 1	130	102	367	GEN-2002-08 345.00 - POTTER COUNTY INTERCHANGE 345KV CKT 1
17SP	TEXAS COUNTY INTERCHANGE PS XFR - EAST LIBERAL 115KV CKT 1	119	104	370	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	MANNING TAP - SCOTT CITY 115KV CKT 1	143	102	372	MINGO - SETAB 345KV CKT 1
17SP	NSI TAP - KANARADO 115KV CKT 1	98	101	380	MINGO - SETAB 345KV CKT 1
17SP	CTU SUBLETTE - HASKELL 115KV CKT 1	143	101	386	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	100	396	HOLCOMB - SETAB 345KV 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's interconnection request is estimated at \$1,186,468 for Direct Assignment facilities and Network Upgrades listed in Tables 1 and 2. These costs exclude upgrades of other transmission facilities that are listed in Table 5 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. In addition to the Customer's proposed interconnection facilities, the Customer will be responsible for installing a combined total of 70 Mvar of 34.5 kV capacitors in the Customer collector substation for reactive support. Dynamic stability analysis will determine if a portion of this should be dynamic (SVC). As previously stated, some but not all of the local projects that were previously queued are assumed to be in service in this Feasibility Study.

In Table 6, 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 5 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.

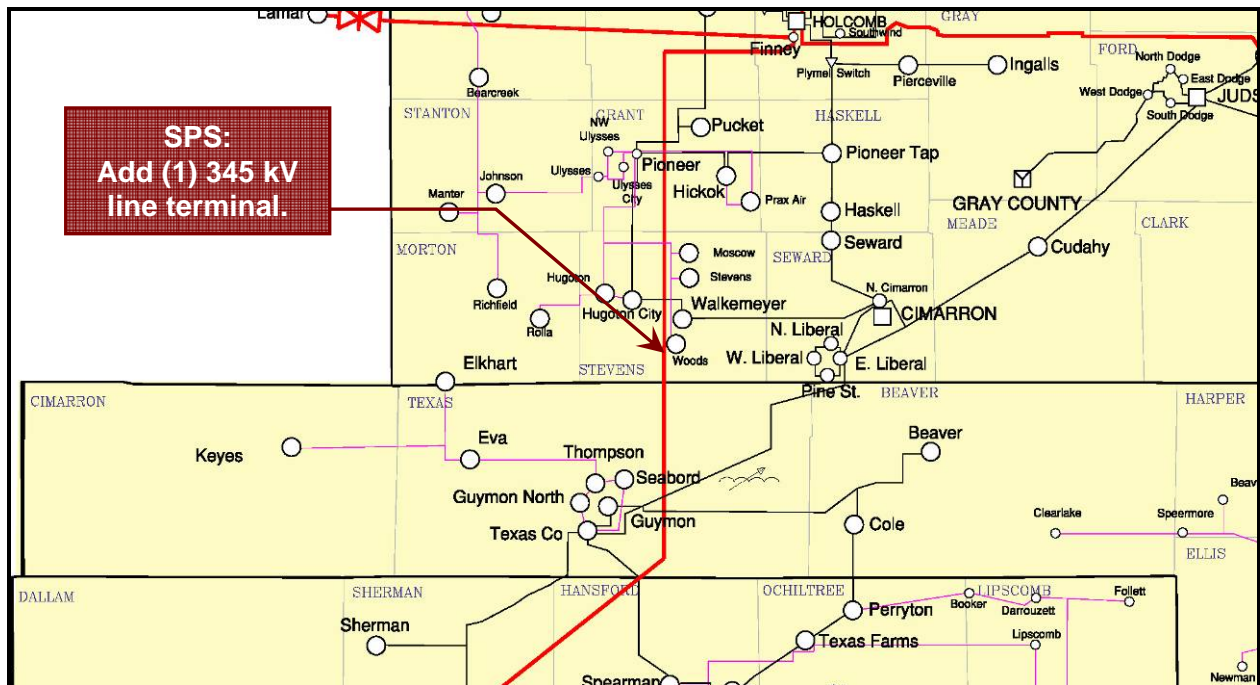


FIGURE 2. Point of Interconnection Area